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ABSTRACT

This proceedings contains papers from the 2002 Society for Information Technology & Teacher Education (SITE) conference. Papers are organized in the following sections: (1) Invited Papers and Invited Panels; (2) Concepts & Procedures; (3) Corporate & Distance Education; (4) Diversity/Equity; (5) Educational Computing Course; (6) Educational Leadership; (7) Electronic Portfolios; (8) Faculty Development; (9) Fine Arts; (10) Graduate and Inservice Education; (11) Instructional Design; (12) International; (13) Mathematics; (14) New Media; (15) Partnerships across Organizations; (16) Preservice Teacher Education; (17) PT3 (Preparing Tomorrow's Teachers To Use Technology) Papers; (18) Reading, Language Arts, and Literacy; (19) Research; (20) Science; (21) Simulations; (22) Social Studies; (23) Special Needs; (24) Technology Diffusion; (25) Telecommunications: Graduate and Inservice & Faculty Use; (26) Telecommunications: Preservice, Inservice, Graduate, and Faculty; (27) Telecommunications: Systems and Services; (28) Theory; (29) Video Cases; and (26) Young Child. In addition to long and short papers, many brief summaries of conference presentations are also included. (MES)

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SOCIETY FOR INFORMATION TECHNOLOGY & TEACHER EDUCATION

2002

13TH INTERNATIONAL CONFERENCE

Information Technology & Teacher Education Annual

Proceedings of SITE 2002
March 18-23 • Nashville, Tennessee, USA

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SITE: From Our Society's Foundation Towards Shared Leadership for an Intercultural Future.

Niki Davis
President of the Society for Information Technology and Teacher Education (SITE) 2001-2004
Co-Director of Iowa State University Center for Technology in Learning and Teaching, ISU, USA
Professor of Educational Technology in London University Institute of Education (part time), UK
nedavis@iastate.edu

Abstract: The current context for teacher education in many countries worldwide has brought new technology and teacher education to the forefront of policies, with major initiatives to renew education through technology. Our Society for Information Technology and Teacher Education (SITE) is moving to a new stage of maturity with over a decade of scholarship and the participation of over one thousand teacher educators. We have a significant role in promoting reflective, participative leadership for the deployment of new technology in education, particularly teacher education. SITE's first decade is described to provide a view of our shared heritage. The society is further developing its scholarly publications on paper and on the web. The new governance ratified during our 2001 annual conference is accompanied by changes in our conference and the emergence of innovative virtual environments to enhance our community. This builds upon the innovative social and technical engineering already underway and aims to develop shared leadership and to encourage cross-generation, interdisciplinary, and intercultural participation. In recognition of the loosely coupled nature of educational organizations my vision for SITE, as president, aims to be a model of good practice for an inclusive knowledge society.

The first decade of the Society of Information Technology in Teacher Education has seen the formation of a wonderful loosely coupled system, which we enjoy. Part of that enjoyment is our common socialization – we think and act like teacher educators with enthusiasm and expertise with new technology. We enjoy sharing that enthusiasm and developing the scholarship and practice in our field and service to our societies worldwide. Even though we often do not communicate much with each other, we can still coordinate our actions because we can anticipate what other SITE participants are thinking and doing and we enjoy hearing about it at our conference. We also share the administrative support of SITE, through the strong arms of the Association for the Advancement of Computing in Education (AACE).

Educational organizations are loosely coupled systems and as such require more leadership than tightly coupled bureaucratic systems (Weick, 1982 and 2001). Our society is even more loosely coupled than a university or school organization and, within it, leadership comes from many angles. Leaders include editors, committee chairs, and leading researchers, as well as administrators such as the President and Executive Director. They all participate in the leadership of our society. We aim to increase this participation. Therefore, it is important for me to share the developments underway by as many forms of communication as possible, including within the archive that these proceedings provide.

For these reasons I have decided to provide a preface to the SITE proceedings for 2002 that documents the roots of our society and then to share with you the developments underway, as well as the leadership's emerging vision for the future. Figure 1 provides a time line for our society as it moves into its teenage years.

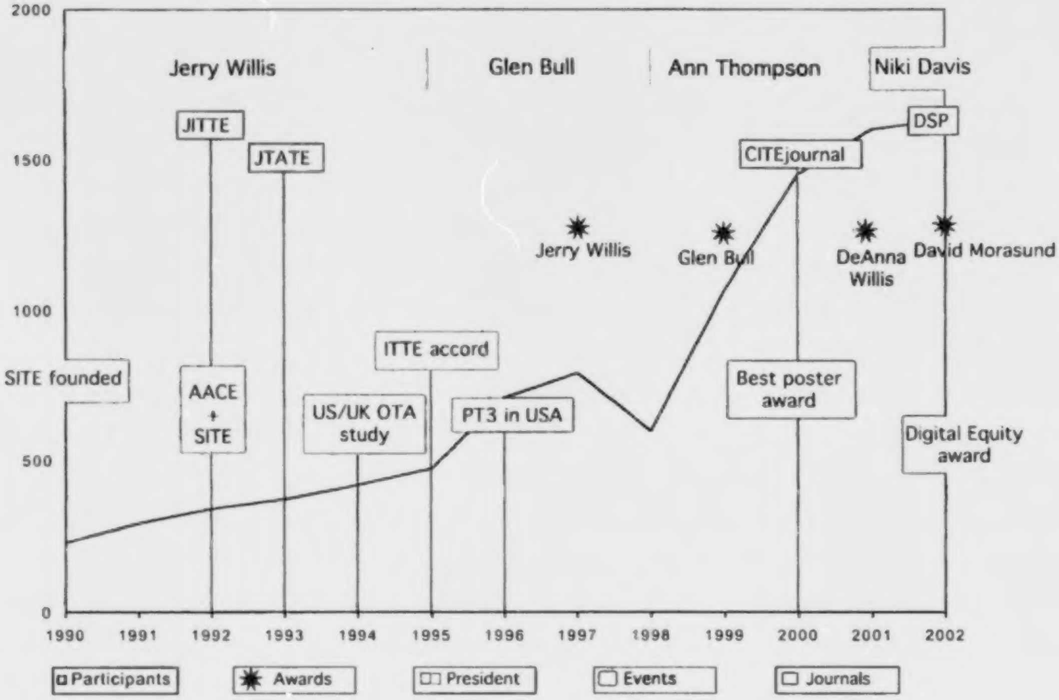

Figure 1: A timeline illustrating SITE's growth from 1990-present

SITE's First Decade

SITE 2002 is the thirteenth annual conference of the Society for Information Technology and Teacher Education. Jerry Willis, DeeAnna Willis, and Glen Bull, among others, founded SITE in 1990 to provide a scholarly home for teacher educators who had come from many directions to find their place in preparing teachers to become comfortable with the use of information technology in education and to play their part in renewal of educational systems worldwide. In the preface to the 1992 SITE Annual, Jerry Willis and DeeAnna Willis, as co-directors of the third SITE conference, made this prediction, which has now come true:

> During this decade, the last of this century, technology-using teacher educators will bring information technology out of isolation in the educational computing course and integrate it into the entire range of teacher education. Many of the innovative, cutting-edge projects described in this publication will be routine, expected activities by the turn of the century. (Willis & Willis, 1992, p. x)

It may be difficult to realize how different things were in the early 1990's. Just a decade ago, few papers suggested that there was any problem with technology in teacher education. I met the SITE founders in a conference in Belgium, where I was audacious enough to suggest a need for curriculum development in information technology (IT) in initial teacher training (Davis, 1990). We joyfully recognized each other as pioneers with a mission in a special field, the importance of which had yet to be recognized. At the time I was chairperson of the UK Association of Information Technology in Teacher Education (ITTE), a small collegial body founded by Roger Keeling and others less than a decade before to promote development of IT in teacher education in the UK, especially preservice teacher education. My own professional development and enjoyment were significantly enhanced by participation in ITTE. My participation progressed from elected committee member to chairperson to newsletter editor, and then to taking over as editor of ITTE's international scholarly journal, the Journal of Information

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Technology for Teacher Education (http://www.triangle.co.uk/jit). The little word "for" in its title is the most important because it states that through our scholarly field, we aim to serve the needs of teacher education with new technology rather than to simply educate teachers about information technology in education. This sympathy for a new scholarly community, many of whom had yet to recognize the importance of their work, was the reason for my joy in meeting up with SITE and its founders.

As a result of this meeting in Brussels, I was invited to give the first international keynote at the 1991 SITE conference, which was organized and managed by its energetic founders in Greenville, North Carolina. Jerry Willis, DeeAnna Willis, and Glen Bull have all continued to contribute their unique energy and support for the field. Although AACE "became the supportive organizational home" of SITE in 1992, the editing of the SITE Annual (and now the leadership and coordination of the SITE proceedings) has been undertaken by DeeAnna Willis and Jerry Willis. SITE and its Annual have provided a very supportive and fertile ground for the establishment of our new scholarly field for many teacher educators across the world. In the preface to the 1992 Annual, the co-directors noted the arduous labor undertaken. They described the editing process undertaken to ensure high quality of content. SITE was one of the first conferences to use the technology and energy of its editors so that the Annual was ready at the start of each conference, because they believed that it was important for technology-using teacher educators to use the technology well. Only recently was a move made to proceedings with digitally ready papers to reduce the editing effort. This was a hard decision for the committee to make, but was forced by the volume of contributions. The first Annual had 42 papers, the second 84, and the growth continued to be exponential. The 1992 Annual preface recognized the labor, the underlying motivation, and our debt to the editors (and now section leaders):

> All these people are volunteers who do the work because they think it is important to the field. Although the Society thanks them for their work, they are themselves, in reality, the heart of the society. When you have the opportunity please convey your appreciation to all the editors and let them know you recognize and appreciate their work. (p. xi)

In 1997 SITE created an award for lifetime achievement in our field and named it after Jerry Willis, as the first recipient. In 2000, we presented the Willis award to Glen Bull and in 2001 we also gave special recognition to DeeAnna Willis as a founder of SITE. All of them have continued to make outstanding contributions to our Society each year for more than a decade because they thought it was important for our field.

I would like to help readers recognize the supportive scholarly community that grew through this collaboration. For this purpose, I will describe events around my keynote speech at SITE's second annual conference that led to ongoing collaboration. In that speech, I described the first decade of the development of Information Technology in UK teacher education (Davis, 1992). The UK was probably the first country in the world to promote strategic development of technology in teacher education, including pre-service teacher training. With encouragement from SITE's founders, my speech later became the first paper in ITTE's new scholarly Journal of Information Technology for Teacher Education (JITTE). SITE's own journal, the Journal of Technology and Teacher Education (JTATE), was founded a few years later in 1993 and the two journals have continued to support each other's development.

The 1991 SITE conference was dazzling, providing between three and five parallel sessions, all of which I wanted to attend. In a pre-conference workshop I attended, David Morasund, a founder of the International Society of IT in Education (ISTE) inspired me in the application of problem-based learning. It is notable that SITE will present the Willis award to David during our 2002 conference in recognition of his lifetime work in the wider field of information technology in education, including that for K-12 schools. Before that second SITE conference in Greenville, North Carolina, I decided to gain a feel for the context of technology in education in the USA. With an impromptu introduction from Jerry Willis, I visited the University of Virginia Curry School of Education and established what became a long-term collaboration with Glen Bull. We both had been experimenting with the use of communications technologies to support education, including the professional development of teachers. My national network was called ResCue and Glen's statewide network was the Virginia Public Education Network. We therefore had much in common. Glen and his colleagues in Virginia were kind enough to let us establish their software in England and, using this common on-line environment, we were able to promote collaborative activities for student teachers across boundaries of culture and time. We still collaborate across the Atlantic today.

The UK Association, ITTE, became a sister with SITE. Older and smaller, it had a view that complemented the expertise that resided in the USA. Colleagues in ITTE continued to raise awareness of international issues and cultures and to share our evolving knowledge of the political context of technology in teacher education. Following that first keynote, I became a regular attendee of SITE, often representing our sister organization ITTE along with the late Brent Robinson, who was the founding editor of the UK journal, JITTE. We also welcomed SITE's founders as representatives of SITE to the annual ITTE conference and our Journal Editorial Board. Both organizations formalized this relationship with an Accord agreement, crafted by Brent Robinson and ratified by ITTE at the Annual General Meeting. Brent and I supported the establishment of SITE's own Journal of Technology and Teacher Education and became members of the Editorial Board. Over the years, the Association for ITTE struggled with the notion that it should support an international membership. There are less than one hundred institutions of initial teacher training in the UK, less that a tenth of the number that are in the USA. So ITTE has been more than happy to promote the international role and responsibility for SITE.

Because of my experiences with telecommunications in teacher education, I was also eager to promote the use of communications technologies, including the on-line Academical Village envisioned for SITE by Glen Bull and implemented through Barnard Robin's thesis scholarship (Robin, Bull, Bull, & Willis, 1995). This web site design was modeled on Thomas Jefferson's Academical Village design for the University of Virginia. At the University of Virginia, you can visit the rotunda, faculty houses, and student accommodations built around the green. SITE's first attempt at building an electronically supported academic community adapted this concept, and faculty leaders became curators for the themed sections that aimed to build resources and opportunities. However, the technology and collaboration available at that time did not prove to be robust enough for an enduring approach. ITTE has also found extensive web site development challenging for busy teacher educators. I will return to related web developments later in this preface.

SITE has also proved to be a fertile ground for strategic change of teacher education. SITE's American founders found that ITTE had an unusual approach. ITTE was formed as a scholarly community to improve practice and to lobby for strategic change in information technology in teacher education. By 1990 ITTE had undertaken a national survey, and Janet Trotter had produced the seminal Trotter report on the state of IT in initial teacher education. SITE also decided to step into the policy arena in the USA and invited Kathleen Fulton of the federal Office of Technology Assessment (OTA) to provide a keynote at its conference. Later a project was negotiated to survey technology in teacher education across the USA using a range of approaches, including case studies and quantitative information. I provided a small complementary study on the UK that showed that the position there was better but far from perfect (Davis, Willis, Fulton, & Austin, 1995). The OTA published its report (see http://www.pt3.org) (OTA, 1995). We were disappointed that the OTA was disbanded shortly afterwards. However, the PT3 program (Preparing Tomorrow's Teachers to use Technology) eventually developed and has exceeded our wildest dreams (Carroll, 2000). Kathleen Fulton, now a consultant in our field, is an invited speaker for the SITE 2002 conference. The current leader of the PT3 program, Lavona Grow is also invited to share her perspectives on this important imitative in the USA and its value for teacher education worldwide.

Maturity for SITE

SITE has provided over a decade of scholarship, and the annual conference has grown from a few hundred to over a thousand participants. Today SITE is well established, with significant ongoing participation from across the USA and from more than 40 countries worldwide. Most activities are currently supported and managed through AACE, under Gary Mark's able leadership as SITE's current Executive Director. In scholarly terms we are more than a village, yet the founders and past and current presidents wish to retain the informal scholarly community and support that was the early hallmark of SITE. Given today's challenging environment for education, especially teacher education, we need all the networking and support that we can give each other. We are fulfilling our aim to have a significant role in promoting reflective, participative leadership in the deployment of new technology in education, particularly in teacher education.

The expertise of the Society's membership is recognized. The good news is that we are wanted; the bad news is that there is too much to do! However, over the years the work of the committees reduced. This was probably due to conflicting needs. The informal open membership for all committees appears to have resulted in less participation. This included the Governance Committee that had been deliberating for many years. Challenged to retain open governance, the society also needed to constrain it within a framework. Glen Bull and I took on the challenge during 2000 and vowed that we would get it done! The result is the Governance Document that follows this preface, which was debated and ratified during the SITE 2001 conference. The Governance envisages the work of SITE to be firmly rooted in its committees, which undertake their collaboration in an on-line environment and at its conferences and meetings. Our governance lays out our society's mission, which is 'to encourage appropriate uses of information technologies in teacher education worldwide.' We aim to keep our membership 'open to all those with an interest in information technology in teacher education' and we welcome all participants in our conferences to share our mission.

SITE Developments Underway

The governance also lists our main ongoing activities. This section will describe current developments to facilitate them. There has been significant development of on-line environments with the collaboration of SITE participants and AACE, its organizational home. SITE has developed to a sophisticated presence on the web, from the early Internet sites already described. The structure of the organization is also undergoing a rapid maturation that will be described in this section. The activities are:

- Annual conference and its proceedings
- Scholarly journals (traditional: JTATE and on-line: CITE)
- Web site(s)
- Ongoing Working Committees
- Liaison with organizations promoting information technology in teacher education worldwide, including the negotiation of complementary activities to support scholarly development of information technology in teacher education within and across countries and cultures around the world.

SITE Conference and its Proceedings: Each year the SITE conference web site provides key information for prospective delegates and then provides the portal through which they submit their proposals and register for the conference. AACE, under the leadership of Gary Marks, our Executive Director has developed an effective SITE conference web site with integral proceedings collection and publication. DeeAnna Willis has led the reviewing of around 1500 submissions, resulting in acceptance of over 1000 presentations and the coordination of more than 25 sections within the proceedings. Gary Marks and Jerry Price's careful web designs ensure that those papers can be reviewed on-line, that the abstracts could be moved to the database that provides the conference program of abstracts, and that access for the papers to be loaded by delegates and created the source file for the proceedings on CD ROM. The SITE president contributes the preface, with keynote and invited speakers adding their pieces. Coordinated by DeeAnna, the individuals and teams who write the section introductions step into action during Christmas vacation, reading abstracts to provide an introduction to each section. In this way the SITE proceedings retain their objective of becoming an important resource for technology and teacher education across the world. You may also notice the web site being transformed as the executive committee leads the firming up and finalizing of the conference program. The previous conference committees' suggestions are implemented during this process where practical.

The editing of the SITE Proceedings will move through a new stage to update its structure and process during 2002. The aim is to capitalize on the expertise within our society and to better spread the activity across the year, including better links with working committees and leaders within the field. The first stage will be to review and revise the section categories. As a temporary measure we have introduced two new categories (electronic portfolios and video cases). However, it is clear from the uneven number of papers in the sections and contributors' comments that a substantial revision is required. This process will also be informed by the ASTUTE (A Survey of Technology Using Teacher Educators) survey of conference participants' needs and contributions, which was undertaken during SITE 2001 (Davis, Mumma, Sprague, Riddle & Carter, 2002). This will be discussed by the conference committee during the conference in Tennessee and on-line. That committee will advise the editorial team. In addition, both the general editors and section leaders will also be reselected. The editorial team will seek applications and nominations for section leaders, who will be required to provide a resume of their scholarship, including research, teaching and service. The role of the section leader will be expanded to actively promote their section and contributions to it. Their introductions to sections within the proceedings will aim to provide an update of the topics and some links to the contributions within their section.

The society does much of its work at its conference, but it is also hoped to improve the work throughout the year through the meeting all committees and working groups online in the SITE Forums that have been established during 2001. The formal structure of SITE's committees is laid out in the governance. However, it is the informal structure and the feeling of community and collaboration that are more important to our society. The ASTUTE survey also indicated that side participants wish to have more opportunities to contribute to SITE. During 2002 the major focus for SITE participants must be the establishment of these communities, facilitated by meetings (face-to-face and online). The digital scholarship portal, described below, also aims to promote the development of our scholarly community. Therefore Glen Bull and myself have convened a task force to promote this change. We are particularly pleased by the contributions of Judy Harris of the University of Texas at Austin and Roger Carlsen of Wright University, and we look forward to an increased community spirit in all SITE participants.

Awards: The awards that SITE has established during this conference have proved their value:

- Best paper awards have permitted the society to highlight interesting and important work from around the world. However, the number of paper awards has caused some 'constipation' for our society's journal, because award papers are invited to make a submission to the journal. For this very practical reason the number of best papers awards will shrink to five in 2002. The section leaders will continue to be the first line of those who nominate papers for consideration of an award.
- SITE will retain four awards for best poster/demo, which were established in 2000. It is important to note that SITE sees these awards of equivalent value to papers in our field, due to the rich scholarly discussion that take place around poster display. The demonstration of software, student work and web environments is much valued by our society.
- The Willis Award for lifetime achievement acknowledges those who have become lifetime fellows in our society through their sustained commitment to information technology in teacher education has already been described. The names of these distinguished fellows of our society are provided in the timeline in Figure 1.
- The new Digital Equity award to be inaugurated during the 2003 conference has a specific purpose. Nominations will be sought accompanied by a brief description of the ways in which an individual or group have worked to increase digital equity in teacher education. It will also include the ways in which the issue of digital equity is integrated into courses, service learning, or ways in which teacher education has been expanded to include under represented populations. Nominations for the award may come from activities within the conference or beyond. The short descriptions provided with nominations that will be posted at the conference and on the SITE web site will serve to expand our knowledge and engagement with digital equity in teacher education. The Committee on digital equity with support from the committee on special education and assistive technology will judge the nominations and make a recommendation to the President.

SITE Scholarship: It has been a busy year for SITE journals, a time of change and strong growth. JTATE is benefiting from AACE's web developments. These are permitting our scholarly journal on paper to complement our second site web-based journal, Current Issues in Technology and Teacher education (CITEjournal), and our new discussion forums providing the foundation for a Digital Scholarship Portal for technology and teacher education (Bull, Sprague, & Bell, 2001).

- **The SITE Journal of Technology And Teacher Education** (JTATE) founded in 1993 by Jerry Willis and DeeAnna Willis changed editor to Debra Sprague of George Mason University during 2001. Debra Sprague, in collaboration with Glenn and Gina Bull, has added a series of editorials to acknowledge the contribution of the two founding editor's and to plot the new direction of the journal. We are delighted to see a new generation of leaders emerging in SITE. Debra's scholarship will impact the whole of our field.
- **Current Issues in Technology and Teacher Education** (CITEjournal) is SITE's second journal. Glen

Bull and Jerry Willis became co-editors of this innovative and exemplary online journal in this field, with support from a PT3 catalyst grant 'National Technology Leadership Initiative' led by Glen Bull. The innovative approach of the Current Issues in Technology and Teacher Education (CITE) journal is to place, from the start, its content sections within the quality control, direct input, and participation of the teacher education associations for core content areas of mathematics, science, social sciences, and English, while retaining the technology and teacher education sections under the control of SITE (Willis & Bull, 2000). In addition, care is being taken to model exemplary practice for others, including research and development support from Digital Libraries projects in the University of Virginia, to ensure that the potentially transient contributions with integral multimedia will remain accessible for generations to come. During 2001, Glen Bull became the sole general editor.

- **The Journal of Information Technology for Teacher Education** (JITTE), JTATE's sister journal, has also changed editor during 2001 from myself to Avril Loveless of the University of Brighton in the UK. JITTE went online some years ago, at http://www.triangle.co.uk/jit. The editorial board has decided to change the title to reflect changing times, so from volume 11 JITTE will be renamed: *Technology, Pedagogy And Education: The Journal for IT in Teacher Education.* Avril gave an acclaimed international keynote for the 1998 conference helping us to rethink pedagogy (Loveless, 1998). In 2001 the following chairperson of the UK association, Tim Denning of University of Keele in the UK, will also consider the critical issue of the influence of ICT on pedagogy.

Inter-cultural collaboration: Possibly the most exciting development during 2001 has been in the creation of the digital scholarship portal for technology and teacher education led by Glen Bull. Through this portal our field may be seen in its entirety. In his first stage the view is a national one from the perspective of the USA. There is commitment to extending this perspective to intercultural and worldwide view by adding relevant websites and scholarly archives such as that of the UK (utilizing JITTE) and the AACE Asia Pacific chapter.

The challenges of collaborating across organizations and cultures are immense. Those of us proficient in English may not appreciate the challenge posed by the Internet and English as an academic lingua franca. On the other hand, we who are only proficient in English miss out on many other cultural riches through our lack of access to other languages. SITE, as a society with a large proportion of its membership in the USA and the UK, will have to take special care not to let the common language of English block legitimate participation. Indeed, SITE will also have to take special steps to encourage development of educational systems that are rich in tradition while also cosmopolitan and culturally diverse. Language will only be a part of this multicultural effort.

In 2001 we welcomed our first invited speaker from the Asia Pacific region. Shelley Chiwa Young chaired the AACE Asia Pacific chapter conference, ICCE'00, and her scholarship takes particular care to widen participation for teachers in that region including Chinese language and culture on the web. In 2002 Enriquez Hinestrosa, our 2002 international keynote speaker, brings us a view from South America. Chile is a country that has used technology and teacher education to revitalize the educational system. This included the educational renewal for indigenous people who did not have a written language. Success with information technology in education in a context that faces up to the enormous challenges with few resources has much to offer teacher educators in other cultures and educational systems, particularly for those who are concerned about the increasing digital divide within and between countries.

Inter-organizational collaboration: The challenges faced by SITE are also shared by other scholarly and professional societies. The Association for Teacher Education has convened a task force led by Paul Resta, of the University of Texas at Austin, to guide that association in its use of technology. As a member of that task force I will be using my experience with SITE and ITTE to guide that community and hope that we can also build collegial links between the two societies to the benefit of both. Such collaborative procedures have already been established under the leadership of our former SITE president, Glen Bull and his dean, James Cooper. The National Technology Leadership Initiative, funded by a PT3 catalyst grant, has been promoting the collaborative leadership of technology in teacher education through a National Technology Leadership Retreat to reflect upon technology and teacher education and to share educational philosophies. This has brought together, in an unprecedented way, leaders from all core content areas, plus those for technology. This included leaders from the professional organizations for teachers of science, social science, mathematics, English, and their teacher education associations. The

National Technology Leadership Retreats have consolidated and disseminate this important strategic collaboration. Future action aims to encourage the spread of this approach to other content areas and other countries. This reflective "retreat" of people is complemented with the CITEjournal described above. The conceptualization of this synergistic multifaceted publications and change agency is a major piece of artful engineering (information, social, and technological) for an emerging knowledge society.

The ongoing collaboration between SITE and the UK ITTE association has been described above. There has been discussion regarding a collaborative conference sponsored by SITE, ITTE and the UK University Council for the Education of Teachers. It is hoped to follow this through and to organize a collaborative conference in Europe on a topic of mutual interest. It may also be possible to develop further collaborative links in the Asia Pacific region through the AACE Asia Pacific chapter.

On a more personal level, I am delighted to note that we have been successful in gaining the first EC-US (European-USA) collaborative project that focuses specifically on the preparation of future technology using teacher educators, which will develop an intercultural certificate (Davis, Brown et al, 2002). Students from the six collaborating universities in Europe and the USA will undertake studies together online and study abroad as well as service learning that addresses issues raised by the lack of digital equity nationally and internationally. I also see myself personally representing SITE in the UNESCO task force that is creating an ICT curriculum for teacher education in UNESCO supported countries (Resta, Semenov et al, in preparation).

These collaborative developments represent relatively few of creative scholarship and service associated with SITE participants, especially in the USA where the PT3 program is currently providing significant resources and impetus. SITE's proceedings provide accounts of many actions, evaluations and action research.

Concluding Remarks

Our Society for Information Technology and Teacher Education stands at a threshold of an exciting opportunity and increased challenge. The importance of both teacher education and of new technologies is widely recognized. In order to fulfill our responsibilities to future teachers and their students, we must refocus our resources of expertise and knowledge to establish new models of good practice for society. Clearly, communications technologies can and are being deployed to support learning and collaboration in ways that would have been impossible.

However, mobilizing new ways of working together will require engagement by a significant proportion of SITE's participants in ways that serve their pressing needs and concerns. The Society will need to creatively ensure wide participation in its meetings and in on-line environments, while avoiding duplication and competition with other organizations that have overlapping remits. The CITEjournal shows us that, with artful leadership, such shared leadership is possible. We now need to go further and encourage a similar synergistic collaborative ethic within SITE's reformed committee structure, and expand our collaboration across into complementary organizations' committees where relevant. Similarly, new approaches to team teaching and scholarly research are becoming viable with stronger on-line tools and techniques. The opportunities for innovation have never been more exciting, just the sort of work technology-using teacher educators enjoy!

SITE's interlaced knowledge community will require both technical and social engineering to match our needs and challenges. The social engineering that I lead will be transparent, showing our dilemmas and reasoning for the choices that we make. I believe that ensuring that processes are transparent to all participants, as we develop our knowledge community, is an important aspect of a knowledge society. It is a means of ensuring ease of transition between roles and receiving support from one another, hopefully without increasing administration (Collins, 2001). This is also a means to educate the next generation of leaders. I hope that it will be accompanied by artful delegation and support, so that our community grows by spreading our knowledge and recognition as far and wide as possible. Our challenge is to synergize the expertise within our membership in a way that opens our SITE community up to legitimate peripheral participation and strong growth of our scholarship across many cultural contexts, as well as to respond to the many challenges faced by the educational systems of the world.

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Last, but not least, I acknowledge the collaboration and friendship that I hope shines through this preface.

Reflections and Dedication from an Editor

Spring 2002 – the phrase holds hope of new beginnings. After a long dark autumn and a winter of worry the birth of this New Year holds special promise for better days. As the Annual 2002 nears completion, I reflect on the year past and what it may mean to all of us as technology-using teacher educators.

Welcome

First, if you are new to this profession or at least to this particular coterie, "Welcome." As you read through these papers you will find colleagues here who will become your friends. Some will be "old friends who've just met" and others will be new friends who have found their academic 'home' amongst those of us who use technology in our teaching of teachers, who can't imagine going back to a classroom, on either side of the desk, without IT.

Second, if you are returning to SITE, "Welcome back." Thank you for your contributions. It is always particularly exciting to receive proposals from authors who met here last year and are now collaborating. Seeing the professional growth that takes place when new ideas are exchanged is extraordinary. While the World Wide Web gets all the press, the SITE world wide web of colleagues is equally great and has the potential to become even greater. It is made up of people – people who teach, people who care, people who learn, and people who share. What could be greater?

Reflections

When I was a child, adults meeting asked each other, "Where were you on December 7, 1941 when Pearl Harbor was attacked?" My children asked, "Where were you on November 22, 1963 when John Kennedy was assassinated?" Today we all ask, "Where were you on "September 11, 2001?" While these are US-centric questions, albeit with world wide implications, consider the impact technology has had on the delivery of such information. News of the first was delivered on the radio; news of the second was delivered by television as well, but not quite as it happened; news of the third was delivered as it occurred, burned into our retina, etched on our souls, by means of radio, TV, satellite, and the Internet.

Last fall, when a student entered my classroom with news of the first attack, my initial response was polite disbelief, but then the news was confirmed and spread through our building, which includes a middle school [11, 12, 13 year olds] as well as university classrooms. I released my class and we moved into the auditorium to view a large screen television. While others might have seen that as a 'teachable moment,' I was too stunned for so cogent a thought. We watched, horrified, as the second plane detonated a second building and as the ashes covered New York.

In the following days, glued to the television coverage, alternately crying and filled with anger, I assumed a 'mental fetal position.' I could not help thinking how much we

Americans have offended the rest of the world, how much they hate us, all the sorts of non-productive, self-pitying thoughts one could have at times like this.

But almost instantly, wonderful things began to occur. I started getting e-mail from friends and acquaintances around the world with messages of sympathy and encouragement and hope. I was sent a PowerPoint file that showed people, ordinary people, around the world bringing flowers to our embassies. I learned that the terrorists didn't attack the US they attacked the World. It truly was a World Trade Center and people from around the globe worked and lost their lives there. An act designed to shatter the US instead brought us closer, not just Americans, but peace loving peoples all over the World. Just writing that I have a sense of euphoria, of the touching of friends from around the globe, some I know, many I do not, but friends nonetheless.

This feeling, this knowledge, could not have occurred in the same way in 1941 nor in 1963. The almost instantaneous outreach was not possible. Information technology delivered the wounding news, but it also delivered the healing messages.

After September 11, the planners of this conference feared that attendance would be drastically reduced. Travel was more complicated, more expensive. Would the international community avoid the US? Would Americans stay home? As the proposals began to first trickle and then flood in over the Internet they gave answer to those questions. No, they **would** come. They would participate.

Dedication

Therefore I am honored to dedicate this annual to each of **you**, you who were not intimidated by terrorists, not put off by the difficulties of travel, nor dissuaded by the additional costs. Each of you faced these hurdles to come together in our common goal of educating tomorrow's teachers to lead our youth into the technologically rich new millennium. I salute each and every one of you.

Dee Anna Willis
General Editor
SITE 2002

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INVITED PAPERS

Information and Communications Technology in Education: A Personal Perspective

David Moursund
University of Oregon, USA

Abstract

Throughout my professional career I have worked, played, studied, taught, experienced, and learned about Information and Communications Technology (ICT) in Education. I have been an active participant in this field as it has slowly moved from infancy into early childhood. In this presentation, I will share some of the things that I have learned and that I think are particularly important. I will illustrate some of these things with personal stories and reflections. My goal is to help move the field of ICT in Education out of its current early childhood phase.

Introduction

My first experience in the field of Information and Communications Technology (ICT) was in the summer of 1963, shortly after I received my doctorate in mathematics. My area of specialization was numerical analysis, and this involved developing computational methods for solving various types of math problems. In the summer of 1963 (nearly 40 years ago), I helped to teach Talented and Gifted high school students who were learning about computers and computer mathematics. This remains one of my interest areas (Special and Gifted Education).

In the summer of 1965 I taught a course for secondary school teachers in a National Science foundation (NSF) summer institute, and by the summer of 1966 I was running my own NSF summer institute for teachers. All of the summer institutes and other NSF programs that I have run have focused on uses of ICT in precollege education.

My professional career has been one of learning and of sharing my learning. I have been fortunate in having job situations that supported this approach. I have held faculty appointments in Mathematics at the University of Wisconsin, in Engineering and Mathematics at Michigan State University, and in Mathematics, Computer Science, and Education at the University of Oregon. In addition, I started the professional society that eventually became the International Society for Technology in Education, and I headed that organization for 19 years (ISTE).

This document is divided into somewhat isolated pieces, but readers may find that some of the pieces tie together as they work to create meaning from the document. The organization of the document, as well as the messages I am attempting to convey, are fuzzy.

Throughout my professional career I have had an increasingly broad range of interests. These can be thought of in terms of discipline areas such as mathematics, computer science, and education. Significant chunks of my professional career have been spent in each of these three fields.

Or, my interests can be thought of in terms of more general ideas such as teaching, learning, problem solving, and research. The academic positions that I have held have all allowed me considerable time to pursue these general ideas.

In the next few sections of this document I will explore some topics that I would like to share with you. Some of the topics will be illustrated through personal stories. Over the years, I have gradually come to understand that story telling is an important aspect of teaching.

Research

You have all heard the expression, don't reinvent the wheel. This is a profound idea. There are many problems that people want to solve. Some have the characteristic that once one person solves the problem, others need only imitate what the first person did. This is sometimes called the Einstein effect. For example, perhaps it was an "Einstein," living many thousands of years ago, who invented the wheel. (See Figure 1.) Others saw how useful the wheel was, learned to make wheels, and taught still others to make and use wheels.

Figure 1. Invention of the wheel.

I view research as solving problems in a manner so that others can build upon the results—so that others do not have to reinvent the wheel. My initial research was in mathematics. As a mathematician I posed and solved some problems, wrote and published some papers, and achieved both promotion and tenure at the Associate Professor level. While at Michigan State University, early in my teaching career, I also did research on the various methods used to teach freshman mathematics at that University.

One of the key ideas in mathematical research is that a problem gets posed and solved. If the statement of the problem and the solution are carefully done, then that problem is solved once and for all. People have been able to depend on the correctness of the Pythagorean Theorem for more than 2,000 years.

Imagine my surprise later in my career when I eventually began to read the research literature in education and ran into the idea of a meta study. In essence, a number of studies are carried out on various versions of an education problem. A meta study analyzes the results, attempting to discern results that others can build upon. However, what one typically finds is that the problem being studied is so complex and involves so many variables that no clear-cut solution emerges. We pose such problems as "What is the best way to teach a child to read?" At the same time that we know that a combination of nature and nurture makes every learner different. Thus, education problems are not solved once and for all. Moreover, changes in technology lead to changes in possible solutions to educational problems.

Thus, my career as a researcher in mathematics and in education feels somewhat schizophrenic. My father was a research mathematician. One of his favorite statements was, "Either it is or it isn't." Fuzzy logic had not yet been invented back in those days. Fuzzy logic is now important in mathematics, engineering, and other fields. It helps to describe our research findings in education.

My career as a researcher is thoroughly intertwined with those of a large number of master's and doctorate students. In 1970, I created this country's second master's degree program in the field of computers in education. In 1971 a student asked me if the University of Oregon offered a doctorate in that field. After a brief discussion with Keith Acheson, a math education colleague in the College of Education, we decided the answer was "yes." I think it was more than ten years before the Dan of the College of Education realized that such a new program had been created and was graduating a large number of students. I have been the major professor or co-major professor of about 75 doctoral students in this field (along with five in mathematics). By and large I have been able to work with whatever area of interest the students have had. Thus, I have had the opportunity to work in a huge number of different aspects of the field of computers in education.

Computer Science

I was one of three people who worked together to create the University of Oregon's Computer and Information Science Department in 1969, and I served as chair of the department for its first six years. In those days I believed strongly in the importance of computer and information science and such topics as computer programming, artificial intelligence, computer graphics, and information retrieval. Although I didn't have any undergraduate or graduate coursework in these areas, I eventually learned enough to teach a variety of such courses.

During those years, a colleague of mine suggested that the single most important ideas that were coming out of computer science in the 20th Century were *effective procedure* and *procedural thinking*. A computer program can be thought of as being an effective procedure, even if it contains bugs and fails to solve the problem it was intended to solve. Procedural thinking is the type of thinking that one uses when developing computer programs and in making use of computer programs to solve problems.

The early master's degree and doctorate computer in education programs at the University of Oregon required a substantial amount of computer and information science coursework. There was a considerable emphasis on the ideas of effective procedure and procedural thinking. I considered that to be one of the strengths of the programs. A number of my doctoral students went on to hold positions in Computer and Information Science Department.

To a large extent, this emphasis on computer science has disappeared from both the University of Oregon programs and from computer in education programs throughout the country. We are producing ICT master's and doctorate students who tend to have very little knowledge in the field of computer and information science. This saddens me.

Science of Teaching and Learning (SoTL)

In recent years I have become quite interested in the Science of Teaching and Learning (SoTL). Branford et al. (1999) and Bruer (1993) provide excellent summaries of this field. Bruer's 1993 book contains an example that resonates with me and helps to illustrate what SoTL means.

One of my earliest memories is of my parents doing some gardening in our backyard, and my father asking me a question somewhat like "What is 9 plus 14?" I had no idea what the answer might be, or how to solve such a problem. A few minutes later, however, I happened to walk past our picket fence, and it occurred to me that I could answer the question by counting pickets. I "discovered" *counting on* as a way to solve such a problem. I was so excited that I ran to find my father to tell him my answer.

Bruer's book contains an example of research suggesting that perhaps one-third of first graders have not discovered or been taught counting on prior to entering the first grade. This is a significant barrier to learning the arithmetic in the typical first grade curriculum. The SoTL intervention was to develop a short unit about the number line and counting on that could be taught to first grade students. Less that an hour of instructional time was required to make a significant difference in the math education of many students who had not previously discovered or been taught these ideas.

This research result and educational intervention illustrates a very important idea. Think for a moment about whether each first grade teacher is able to determine which, if any, of his/her students would benefit by such an intervention and has the knowledge and skills to implement the intervention. We immediately see a major problem in our efforts to improve education. How can we "bring to scale" our educational research findings? How can we translate good research results into widespread practice?

For the most part, we are not successful in doing so. The difficulty is that teacher knowledge and skill cannot be mass produced and mass distributed. Over the years I have does lots of staff development, written books and articles on staff development, and taught both courses and workshops on staff development. It is clear to me that staff development is a critical component of improving our education system.

However, we need better ways to turn educational research into practice. ICT is a powerful aid to doing so. In addition, computers and computerized equipment are contributing significantly to progress in Brain Science. This helps explain my current interests in Brain Science, SoTL, and ICT in math education (Moursund, 2002).

Intelligence

Howard Gardner's 1983 book on Multiple Intelligences had a significant impact on my thinking about teaching and learning. Both my father and mother taught in the Mathematics Department at the University of Oregon, and my father served as head of the department for about 30 years. It is clear that my father raised me to be a mathematician. My report card from early in the first grade indicated: "Now that we have hit numeration, David really shines." It turned out that the combination of nature and nurture facilitated my getting a doctorate in mathematics and achieving some level of success as a research mathematician.

I have a reasonably high level of logical/mathematical intelligence from Howard Gardner's Multiple Intelligences point of view. However, my spatial intelligence is below average. Spatial intelligence is considered to be very important for success in mathematics. But, my other talents, supported by our formal and informal educational systems along with intrinsic and extrinsic motivation, allowed me to achieve success as a mathematician. I find this particularly interesting as our educational system continues to label children and pigeonhole them. The tests that I State of Oregon vocational tests that I took during my senior year of high school indicated that I should not seek a career in mathematics.

Of course, I heard about the idea of IQ long before I graduated from high school. But it was only when I ran into Howard Gardner's first book on Multiple Intelligences that I began to take a serious interest in this topic. The following definition appears in Moursund (1996, 2001) and is synthesized from the work of Howard Gardner, David Perkins, and Robert Sternberg.

Intelligence is a combination of the ability to:

1. learn. This includes all kinds of informal and formal learning via any combination of experience, education, and training.
2. pose problems. This includes recognizing problem situations and transforming them into more clearly defined problems.
3. solve problems. This includes solving problems, accomplishing tasks, and fashioning products. It involves creativity and higher-order thinking skills.

I find that this definition works well both in being a teacher and in being a computer-using educator. For example, ICT is a powerful aid to solving problems. Thus, part 3 of the definition allows me to argue that computers make us more intelligent. In addition, ICT contributes SoTL.

Problem Solving

In this document, I use the term problem solving in a very broad sense. Thus, it includes activities such as accomplishing a task, making a decision, answering questions, and solving a problem.

Problem solving has been a unifying theme of my professional work (Moursund, 1970). In my teaching and writing I make frequent use of the diagram of Figure 2.

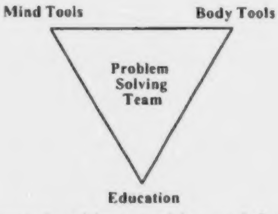

Figure 2. Aids to problem solving.

The central focus in Figure 2 is a 1-person or a multi-person team that wants to solve a problem. This team is assisted by Mind Tools, Body Tools, and the formal and informal education of the team members. This education includes learning to make effective use of the Mind and Body Tools as well as the (human) members of the team. Thus, we have a clear representation of three areas for focus in improving the capabilities of a Problem Solving Team.

ICT provides us with improved Mind Tools, Body Tools, and Education. Moreover, ICT is an aid to integrating these three aspects of problem solving. For example, a Mind Tool or a Body Tool can contain Intelligent Computer-Assisted Learning (ICAL) that "just in time" can help members of the Problem Solving Team learn to use the tools. If the ICAL is sufficiently intelligent, the instruction can take into consideration the specific problem to be solved. We see this in contextual help being built into software applications.

One of the key ideas in problem solving is building on the previous work of others and the previous work of oneself. Throughout my professional career I have studied, written, and taught about problem solving. One of the points that I stress is that ICT provides a new way to build upon previous work. Some types of previous work can be stored in a "The ICT system can do it for you." form. ICT has allowed us to accumulate a huge number of computerized procedures and automated machines that can automatically solve certain types of problems.

Our educational system is severely challenged by the pace of progress in these aspects of ICT. Much of our formal education still focuses on having people learn to do things that ICT systems can do much better than people. Some of this teaching and learning effort should be moved into domains in which people far outperform computers. I often use Figure 3 in discussing this idea in my teaching and writing.

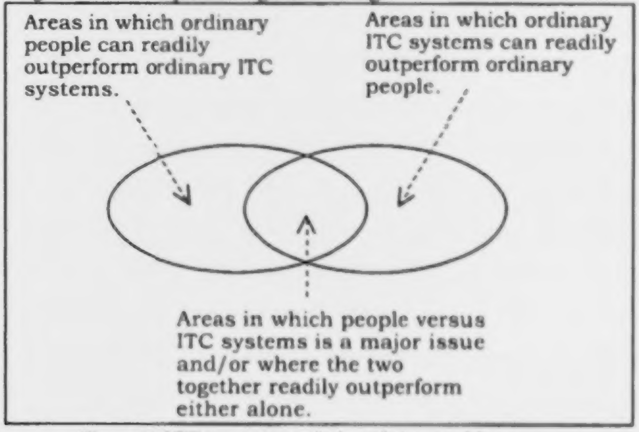
Areas in which ordinary people can readily outperform ordinary ITC systems.
Areas in which ordinary ITC systems can readily outperform ordinary people.
Areas in which people versus ITC systems is a major issue and/or where the two together readily outperform either alone.

Figure 3. ICT versus people in solving problems.

I am particularly interested in identifying teaching/learning situations in which an ITC system can readily outperform a teacher. A simple example is the contextual help that is built into a computer application. A teacher with a classroom of students—each using different components of a computer application and/or different applications—cannot compete with this steadily improving computer capability.

I will close this section with a story from my graduate school days. I was taking a course in Complex Variable, and we were using a text written by the course instructor. However, the professor kept giving us really hard homework problems that were not in his book. Finally a student got up the courage to ask where these problems were coming from. The answer was that these were research problems from papers published about 30 years earlier.

A little thinking about this helped me decide to do my dissertation work in Numerical Analysis. The recent advent of computers made it possible to pose and address new problems. At the same time, it made it possible to solve old problems in new ways. In some sense, I could skip over much of what had been done in the past, moving directly to the frontiers.

This idea, of course, applies to all areas of human intellectual endeavor in which an ICT system is a powerful aid to representing and solving problems. It helps explain why many young people—often without advanced college degrees—have been so successful in the ICT field. They used their brainpower and the new tools to solve new problems, rather than spending so much time and effort learning to solve problems that had already been solved. Readers of this document may want to do some introspection about their own lines of scholarly activity!

Cost/Benefit Analysis

Figure 4 portrays the balance between some of the obvious costs and benefits of making use of ICT in one's professional and non-professional activities.

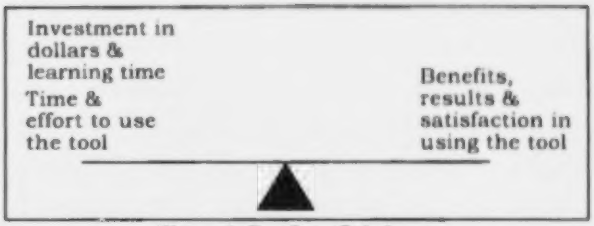
Investment in dollars & learning time
Time & effort to use the tool
Benefits, results & satisfaction in using the tool

Figure 4. Cost/benefit balance.

At a conscious or subconscious level people make decisions all of the time about how to use their personal resources such as money and time. This simple diagram helps explain why many teachers are not making significant use of ICT in their classrooms and in their other professional work. They face a severe shortage of time. Their perceptions of potential benefits to themselves and their students are not sufficient to tip the scale to the right.

I can think of numerous personal examples in which I have made conscious or subconscious decisions that might be analyzed from a cost/benefit point of view. For example, I know that I am relatively inept in dealing with computer hardware and software problems. The time and effort to gain the needed knowledge and skills is not forthcoming. Fortunately for me, my wife is highly skilled in this aspect of ICT.

Thinking along these lines led me to write about Compelling Applications (Moursund, October 2000) of ICT in education. These are applications that are so intrinsically motivating and intrinsically valuable to a teacher (or to someone else faced by the cost/benefit decision) that the scale is heavily tipped to the right. Most teachers are not finding many Compelling Applications.

Learning and Learning Theories

I have no recollection of every having heard about transfer of learning or about any learning theory other than behaviorism during my K-20 education and early years as a university faculty member. In retrospect, this makes a strong statement about our education system. What do we know about learning and learning to learn? Why don't we place more emphasis on this topic in each course that students take? I would think that a math teacher would know quite a bit about how to learn mathematics and would share this knowledge with his/her students. But, I don't recall ever receiving any explicit instruction in this area.

I recall being rather impressed when I first learned about Near Transfer and Far Transfer. But, this "theory" doesn't seem to be very useful in teaching and learning. I was far more impressed when one of my doctoral students worked on Low Road and High Road transfer. This theory seems relevant to teaching and learning. It helps explain why rote memory approaches to education don't work very well, and why teaching a computer application such as a word processor at a keystroke level is not a good approach to facilitating learning that transfers.

In more recent years, one of my doctoral students did his dissertation on cognitive learning theories. I have learned that Constructivism and Situated Learning are all quite important in the field of ICT in education, and that there are many other learning theories (Cognitive Science: Online).

Figure 5 is a model of how a typical person learns to use a Mind Tool or a Body Tool. It is a "learn by doing" model. This model is supported by Constructivism and by Situated Learning. Our formal educational system does only a modest job of following this model. People learning ICT on their own or on the job typically follow this model.

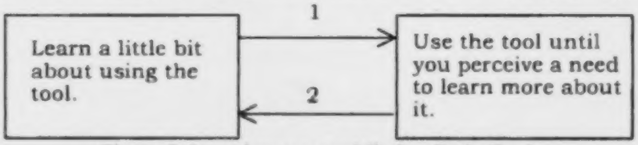
1
Learn a little bit about using the tool.
Use the tool until you perceive a need to learn more about it.
2

Figure 5. Learning to use a Mind or Body Tool.

The teaching/learning model in Figure 5 is highly dependent on the individual learner obtaining feedback on when more learning may be needed. This feedback may come from self, peers, teachers, the tools being used, and so on. As more instructional intelligence is built into ICT systems, more feedback—as well as more contextual, just in time instruction—will occur. In ICT, aids to learning include peers, teachers, oneself, ICT systems, books, reference manuals, and so on. Learning from one's colleagues and fellow students is quite common.

Intelligent Computer-Assisted Learning

When I first encountered the Computer-Assisted Learning (CAL) work being done by Pat Suppes in the 1960s, I couldn't help but laugh. Very expensive computer systems were being used to teach students to do paper and pencil arithmetic. The computer system "knew" how to solve the problems that it was helping students learn to solve. Moreover, even in those days the computer was thousands as times as fast as students, as well as more accurate, at doing arithmetic. Handheld calculators were beginning to be reasonably priced.

However, over the years my attitudes about and approach to CAL have changed. Here are a few reasons for my changing attitude:

- Research on individual tutoring, small class size, and individual education plan (IEP) points to potential changes that could greatly improve the effectiveness of our educational system.
- Studies, metastudies, and a metameta study on CAL suggest that in a wide variety of settings, even CAI of modest quality can produce better learning gains than typical whole class instruction.
- Microworlds, computer simulations, and virtual realities have moved CAI well beyond the behaviorist drill and practice approach to learning.
- Significant progress is occurring in Intelligent CAL (ICAL). This entails increased machine understanding both of the materials to be learned and of the learner. We are beginning to see a significant number of examples of ICAI systems that can out perform a classroom teacher working in a whole class setting. Indeed, some can out perform an individual tutor. See, for example, Fast ForWord's use with sever speech delayed children and with people receiving cochlear implants (Scientific Learning Corporation).
- The cost effectiveness of CAL and ICAL continues to improve both because of research and because of continued rapid decreases in the cost of computation and telecommunication.

During all of the years since first encountering the work of Pat Suppes, I have held onto my amusement about using a computer to teach a person to compete with a computer. In many cases it makes far more sense for a person to learn to use the ICT tools, and then for the person and ICT tools to work together (see Figure 3).

Here is an example of what I mean. Handheld ICT systems (including cell phones, calculators, palmtop computers, etc.) are now small enough, cheap enough, rugged enough, and useful enough so that many people find them and their applications to be compelling. Such devices have had a significant impact on the world. And, of course, the ICT systems need not be handheld. Wearable ICT systems and implanted systems are alternatives. But, they have had minimal impact on education (Center for Highly Interactive Computing).

Distance Education

Over the past two years I have served on the Oregon Department of Education's K-12 and K-20 Distance Education Committees. In addition, I currently have a student doing her dissertation on Distance Education. My experience in this field goes back about 50 years. My parents ran the math education correspondence courses for the University of Oregon. I began grading correspondence course lessons about the time I finished the ninth grade. In more recent years I created some Distance Education courses for the International society for Technology in Education and made use of them in the UO master's and doctorate programs.

Last year it occurred to me that all education is distance education and all learning takes part in a person's head. From a teaching point of view, the issue is how distant the education is, and how interactive it is. A hardcopy library may be both distant and is not very interactive. A large lecture course is rather distant and not very interactive. A small seminar is better than a large lecture both because of the smallness and because it allows a high level of interactivity. A contextual help feature in a computer application is not very distant and may be highly interactive. (Note that much of the interaction may be trial and error on the part of the learner, with feedback coming from the machine and the learner.)

We all agree that one of the goals of education is to help students to gain expertise in being an independent, self sufficient, intrinsically motivated, lifelong learner. This was true well before ICT came on the scene. But, ICT adds Some new dimensions. I see this in my own life. For all practical purposes, I cannot read email without also being on the Web. Many of the messages I receive lead me to looking up stuff on the Web so that I will have a better understanding of the messages received and of the responses I want to send.

Moreover, I find the build in dictionary and thesaurus in my word processor to be excellent examples of Distance Education. They provide me with just in time instruction.

The point I am trying to make is that that most people nowadays think of Distance Education in terms of entire course being delivered over the Internet, over a two-way video network, over TV, or via video tapes and disks. But, the size of the desired unit of instruction is often much smaller than a course—it might well be instruction on the definition or spelling of a word. ICT can help move our educational system toward Distance Education being an integral, every minute component of teaching and learning. As we move our education system in this direction, we can place significantly increased emphasis on the learner becoming increasingly responsible for their own learning.

Computational Science, Social Science, Etc.

I first encountered Computer Algebra Systems while I was still in graduate school. In the 1960s and 1970s quite a bit of work occurred on developing artificially intelligent computer systems that could solve a huge range of math problems. In essence, discipline-specific knowledge and skills is built into the ICT system.

In the 1980s and continuing to the present such work has blossomed. For example, the 1998 Nobel Prize in Chemistry went to a pair of Computational Chemists for work they had done during the previous 15 years or so.

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The change in the sciences is clear-cut. We now have Computational Biology, Computational Chemistry, Computational Mathematics, Computational Physics, and so on. Scientists now tend to be classified as experimental, theoretical, and computational. In all fields of science, Computational Scientists are helping to push the frontiers.

But, this pheromone is not limited to research in the sciences. We have seen major changes in the Mechanical Drawing and Graphic Arts curriculum due to ICT. We have also seen major changes in certain parts of the business curriculum. We have seen scientific and graphing calculators become commonplace in math and science courses. Indeed, students are now allowed to use calculators on some state and national tests.

Still, we have a very long way to go. Take a look at Figure 6. I use this figure in discussing educating in a variety of disciplines. For example, our current K-12 math curriculum appears to place about 75% of its time and effort on students learning to do Step 2. This is, of course, the step that ICT systems do best. If we merely cut this component of math education to 50% of the curriculum, that would allow a doubling of the time spent on problem posing, problem representation, mathematical modeling, meaning making, interpreting the results, and other higher-order processes in math education.

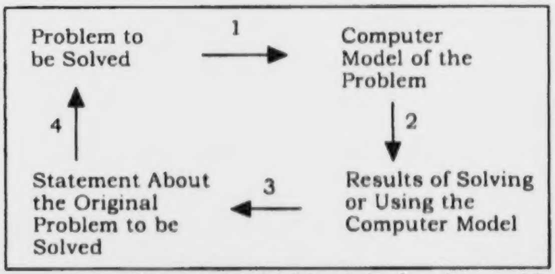
Problem to be Solved
1
Computer Model of the Problem
4
2
Statement About the Original Problem to be Solved
3
Results of Solving or Using the Computer Model

Figure 6. Using Computer Model /Simulation to solve a problem.

I like to think about "profound" issues such as allowing students to use a full range of ICT facilities when learning, doing seatwork and homework, and taking tests. Of course, this topic has been addressed in a variety of science fiction stories that I have read. Indeed, I have found that science fiction has provided me with many interesting ideas. Recently I read Kingsbury (2001), a novel that extends ideas from Isaac Asimov's "Foundations" books, and includes a major focus on people having external computers wired into their brains. I have begun to think of some of my Websites as being parts of my auxiliary brain.

Closely related to this is my contention that each researcher should be developing a Website in which they share their steadily growing expertise with the world. I think of this as an expanded or extended Professional Vita designed to help oneself and others.

Project-Based Learning and Other Books

Earlier I have indicated that "Don't reinvent the wheel." Is one of the most important ideas in problem solving. At the same time I have suggested that in certain cases one might skip over or touch upon quite lightly what is already known in a field. These two ideas seem somewhat contradictory. But, they shed some light on one of the major activities of my professional career.

I write books. This began with my initial teaching at Michigan State University when I repeatedly taught an introductory numerical analysis course for juniors in Engineering. I did not find a book that reflected my newly-learned ideas in this field—ideas that assumed that students would have good access to powerful computers and would learn how to write programs in FORTRAN. So, I enlisted the help of two of my colleagues and we wrote an introductory numerical analysis book (Moursund and Duris, 1967).

Since then I have written a lot of books, some individually and some with coauthors. In most cases what I did was to write a book for a course I was teaching. I would find that the existing books did not adequately reflect my thinking about and approach to the course. I would prepare extensive handout materials during the course, polish them into a draft book, use it the next time I taught the course, and eventually end up with a publishable book.

Perhaps the key to all of this was my feeling that I was "ahead of the curve." That is, I felt that my ICT knowledge and skills in education were at the frontiers. Thus, I believed that whatever I taught should be put into book form, published, and shared with others.

An Example: ICT-Assisted Project-Based Learning

Project-Based Learning (PBL) has a long history, going back to Dewey and earlier. Research supports this as an effective mode of instruction. I can still recall some of the projects that I did in high school.

But, ICT brings some new dimensions to PBL. Thus, it seems "a natural" that in recent years I have written a book in this area, developed courses and workshops in this area, and had supervised a doctoral dissertation in this area.

One of my key thrusts in ICT-Assisted PBL came from a professor in Architecture who was an outside member for a student of mine who did a dissertation on problem solving. At the dissertation defense the Architecture professor asked if I understood the principle of AND. I hemmed and hawed, trying to think about what A. N. D. might stand for that was related to problem solving. Finally the professor explained that Architects solve many problems simultaneously, and often added new problems as they proceeded in solving a problem. For example, designing a fountain for the City of Springfield included addressing the idea that the name of the town came from the fact that there were springs in a nearby field. AND, this region was a center of logging, so the fountain should capture this idea. AND, this was one of the early towns in Oregon, so the fountain should capture a pioneering spirit. And...

Now, apply the idea of AND to anything that you teach. As you become more skilled in a course area, you find more and more ideas that you can weave into the course. This helps you move up the expertise scale (see Figure 7). I use such an expertise scale in discussing roles of ICT in teaching and learning. ICT is a powerful aid to helping a person move up the expertise scale in areas of personal interest.

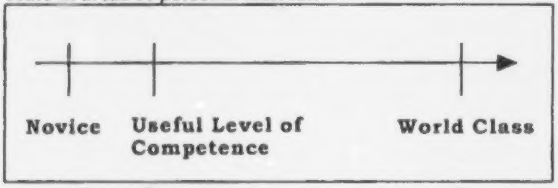

Figure 7. A general-purpose expertise scale.

Now, think about PBL and ICT. It is possible to use PBL in essentially any course. AND, at the same time, students can be learning and using ICT. AND, at the same time students can be gaining skill in cooperative learning, self assessment, peer assessment, problem posing, and so on. AND, a teacher employing ICT-Assisted PBL can be learning ICT, authentic assessment, a wide variety of subject areas, and so on.

A year ago I was asked to do a workshop on ICT-Assisted PBL. This was to be done in a hands on environment, making use of a wireless network. Wow! An opportunity to develop a new type of workshop, and hence a new book. This time, however, I decide that the book should be interactive and made available on the Web. This was my first endeavor in writing a "never ending" book. When the muse hits me, I add to and revise the book. Whenever I do a workshop on the topic, I tend to make significant additions to the book (Moursund, 2001).

Current Project: Math, Brain, and ICT

This past summer I did a workshop with two of my long time colleagues. The workshop was for inservice provides who provide workshops and courses for the Math Learning Center, a non-profit organization located in Portland, Oregon (MLC). I have served on the Board of this organization since its inception in 1976, and I have been Chair of the Board from time to time. The 1.5 day workshop was done by:

- Dr. Gene Maier, who focused on his lifetime learning in math education, with special emphasis on Visual Math.
- Dr. Bob Sylwester, who focused on recent finding in Brain Science and their education implications.
- Dr. Dave Moursund, who focused on roles of ICT in math education.

After the workshop was completed, I reflected about what it had covered and its overall success. It soon dawned on me that the workshop provided a good starting point for my next project. Thus, I am now working in the area of Math, Brain, and ICT (Moursund, 2002). I applied to do workshops on this topic at three different conferences, and I began work on a Website to support my studies and workshops. The workshop, as well as the overall combination of topics, provides a great environment to practice AND.

Final Remarks

Some of you may have heard the foul rumor that I am moving toward retirement. The University of Oregon allows a faculty member to work one-third time for five years as a phase in to full retirement. My current intent is to begin this five year plan starting this next fall.

Meanwhile, I am trying to develop hobbies and other activities that will help to keep me active and involved over the next decade or so. I hope to continue to come to conferences such as this, doing presentations and workshops. I hope to continue to do consulting, lending my advice even when it is not asked for.

AND, I have made a major commitment to a new non-profit organization, the Oregon Technology in Education Council (OTEC, 2002)). Currently I am serving in the volunteer positions of being Chair of the Board and the Web Master. This environment requires me to read widely and communicate with a lot of people. It also allows me to write almost anything that I want to write, and to have an immediate audience. I believe that you and some of your students will find this Website to be quite helpful to your work and learning.

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A Model for Creating an Art Museum-University Partnership to Develop Technology-Based Educational Resources

Bernard Robin, University of Houston, Instructional Technology Program brobin@uh.edu
Sara Wilson McKay, University of Houston, Art Education Program swilsonmckay@uh.edu
Beth Schneider, Museum of Fine Arts, Houston, Education Department bschneid@mfah.org
Sara McNeil, University of Houston, Instructional Technology Program smcneil@uh.edu
Donna Odle Smith, University of Houston, Instructional Technology Program odlsmith@uh.edu

Abstract: The Museum of Fine Arts, Houston (MFAH) and the University of Houston (UH) have collaborated on the design and development of multi-faceted web sites related to both permanent and traveling exhibitions at the museum. Stakeholders from the museum and the university describe the web sites and their various educational resources, including multimedia games and activities for K-12 students. The authors discuss the collaborative efforts from their individual perspectives, including the UH Instructional Technology program, the UH Art Education program and the MFAH education department. The paper also includes an examination of the development of online educational resources for K-12 teachers and students and describes how students and instructors in two graduate IT courses participated in this partnership. The paper includes an overview of the role of technology in art education in general and in art museums specifically to suggest the importance of context in the development of art educational materials.

The University Perspective–Part I: Creating a New Kind of Instructional Technology Course

In the fall of 1997, faculty from the University of Houston (UH) met with representatives of the Museum of Fine Arts, Houston (MFAH) to discuss how the museum could take a small amount of grant funding and develop innovative uses of new technologies that would enhance public access to the arts. Since Instructional Technology (IT) faculty members at the university were searching for authentic and meaningful projects that students could work on as part of their course of study, it was decided that the museum would provide the content that students would use in a web design course. Project-Based Web Design and Development is the name of a graduate IT course which is offered twice a year in the UH College of Education. In this course, students work in small collaborative teams to design and develop online educational resources that the museum wants to make available to a larger audience. Students are challenged to explore authentic investigation techniques and, working with museum staff members, they attempt different creative approaches to presenting museum content online.

The first museum/university collaborative project in which students used content from the museum was the development of a web site for Bayou Bend, the American decorative arts wing of the MFAH. In this project, student designers created the overall appearance and layout of the site. Students worked with museum content experts to develop site navigation, page design, and educational resources to showcase Bayou Bend and its collection. Student teams created searchable databases, produced virtual room tours, and integrated streaming media content into the site. In addition, several students conducted research to evaluate the effectiveness of these technological components as educational resources. The Bayou Bend project is described in greater detail in the paper, *A Museum-University Partnership to Develop Web-Based Educational Resources* (Robin, Jenkins, Howze, & O'Connor, 2001).

Over the last three years, the structure of the course has undergone significant changes and revisions as the partnership between UH and the MFAH has evolved. First, because the web projects that students create are complex and multi-faceted, they cannot be completed in a single semester. Consequently, the course is now offered in both fall and spring semesters to enable work to continue throughout the school year. This poses a considerable challenge as each new semester brings a fresh group of students into the course that must first investigate the work done in the previous classes and then devise strategies for building upon that work. We have dealt with this transition from one semester to the next by employing course facilitators who work with each new group of students. The facilitators come from a variety of sources, including graduate students who previously took the course and want to continue working on the project, other faculty members who are interested in the content, and museum staff members. Facilitators are in charge of different components of the web project and they provide guidance and continuity to the new student teams that continue the work that previous students began. One of the interesting effects of working with the museum is that students participate in a cross-disciplinary exploration of such topics as history, geography, religion, economics, politics, and other cultural influences associated with works of art and artifacts, not the typical type of exploration normally found in a web design course.

Another modification to the course is that students from outside the IT program are encouraged to enroll and participate in these museum-based projects. So far, students from both the College of Education's Art Education program and the university's Art Department have enrolled in the course. These students have been extremely helpful to the success of the project and the course. Even though they often do not possess the same level of technical skill as the IT students, their knowledge of art and art education nicely complements the technology expertise of the other students. In future semesters, it is hoped that students from additional programs, such as history and social studies education, will also enroll in the course.

The Museum Perspective

The MFAH has moved slowly into cyberspace. Developed as a pilot project funded by a small grant from the National Endowment for the Arts, the Bayou Bend web site was the first effort of the partnership between the MFAH and the UH Instructional Technology program. Brochures on Bayou Bend's collection, founder, and gardens, and the newly published catalogue *American Decorative Arts and Paintings in the Bayou Bend Collection* provided important information and images. Also, with access to the Bayou Bend director and curator, UH students and faculty had a wealth of information about Bayou Bend and produced an innovative web site that featured a rich assortment of information and educational resources.

The success of the Bayou Bend project led to discussions between the IT faculty and the MFAH education director about future projects. In all aspects of its programming, the MFAH education department forms collaborations with a wide range of community organizations including libraries, schools, the city parks department and housing authority, colleges and universities, hospitals, and community centers. The education staff recognized the need for a greater web presence and was eager to collaborate with the team of professors and students at the University of Houston.

The next project the collaborators undertook was to develop a comprehensive web site for an exhibition, *The Grandeur of Viceregal Mexico: Treasures from the Museo Franz Mayer* (http://www.fm.coe.uh.edu). This exhibition from the Museo Franz Mayer in Mexico City consists of approximately 130 works that will travel to the MFAH and two other American venues and present the rich artistic heritage of colonial Mexico during the Viceregal period (1521-1821). The museum education team and faculty from the university mapped out the following components as the focus students would work on over four semesters:

1. A thematic exhibition introduction;
2. Resources for teachers;
3. Interactive multimedia games;
4. A comparison of colonial art from Mexico and the U.S., including a comparison of Bayou Bend and the Museo Franz Mayer and their collections;
5. An historical and cultural timeline;
6. Documentation of a cultural exchange between art students in Houston and in Mexico City;
7. Web-casts of exhibition lectures and symposia.

This latest project presented a major challenge–a lack of readily accessible information about the Franz Mayer collections and few images of the works of art in the exhibition. Museum staff members know that images and texts relating to exhibitions often are not available far in advance. However, the students, who began working on this project in the fall of 2000, and newer classes of students who continued this work, needed images and content in order to design and develop the basic structure of the web site as well as the content pages and educational resources. At the beginning of the project, the exhibition curator gave presentations to all classes and discussed a small number of works of art for which the museum had slides. The education director was responsible for providing as much information as was available and researching additional background information. Late in the spring semester of 2001, students had access to catalogue essays and entries and a complete set of exhibition images which greatly facilitated the project.

For the museum, this collaboration has built stronger ties between the university and the museum; introduced students to the museum as a resource for learning; provided web site design services; and supported the museum's commitment to education. The potential of the web site to provide information about the exhibition to a very large audience is of great importance to the museum The collaboration with the university has further enabled the education department to put its teacher resource center catalogue online, to work with middle school students on a pilot museum web site for kids, and to be a partner in a major grant-funded project developed by UH focusing on teaching American history.

The strength of the partnership, its educational focus, was also its major drawback. Students who worked on the project, with a new class arriving each semester, were a very diverse group with little or no background in art or art history. Progress was often slow and frustrating from the museum's point of view, although necessary for the students' learning. In the educational setting of a graduate course, students need to learn to assess their own work and try several approaches before reaching a solution. The museum is both client and teacher, which sometimes becomes a conflicting role. But overall, the project has been a success, as measured by the quality of the web site and the eagerness of students to enroll in the course. In the future, it will probably make sense to focus the partnership on the museum's own collection for which images, publications, and research materials are readily available and deadlines are not as critical.

The University Perspective–Part II: Creating Multimedia Educational Resources

In the second series of IT courses, Collaborative Design & Development of Multimedia, students also worked in collaborative teams, but these students designed and developed multimedia resources using Macromedia Authorware™. Students enrolled in two courses sequentially (fall and spring) that focused on instructional design principles, the application of technology to multimedia design and the use of teams to develop effective instructional initiatives. The challenge for the student teams was to develop a learning module that could be incorporated into the museum web site and presented on a kiosk at the museum.

At the start of the course, students completed an initial assessment of computer skills, multimedia skills and team strategies. In addition, this survey also asked students to rate their multimedia project experience in such areas as designing navigational structures. Students were presented with brief descriptions of projects by the clients and were asked to rank their first, second, and third choices. The second week of class, students were assigned to different teams based on a combination of factors: the skill assessments, the instructor's knowledge of each individual's background, and student preference. Teams were given the job of visualizing, designing, and developing a module to meet the requirements of their client. The team that worked on the MFAH project consisted of five members, each with a variety of backgrounds and experiences ranging from K-12 teaching to corporate training.

The fall semester focused on team building and developing competencies in the authoring software that would allow students to complete the project. The team developed ideas and prototypes for the project and presented these to a representative of the MFAH. It took the team several weeks of meetings to develop a plan and direction for their project, and students soon realized that working in a team and trying to develop a piece of software is an intensive process that requires a multitude of skills. By the end of fall semester, the team had decided to integrate all information in short game-like activities. Based on the previous findings of museum visitor attention spans, and of visitor preference for self-directed learning, the activities were designed to be short in duration, with a menu of individual activities so they could be accessible by choice, and in any order.

During the spring semester, six activities were developed along with a finished menu interface with links to all activities. In the Paper Dolls game, for example, users may select any combination of dress and hair taken from portraits from the Franz Mayer and Bayou Bend collections, and drag those components onto a face on the computer screen. When finished, the program displays the visitors' combination, along with an image of the face in its original portrait for comparison. The Concentration game differs from the original in that the matched pairs are not identical but are conceptual. For example, the cocoa cup from the Franz Mayer collection is a match for a teapot from the Bayou Bend collection, because both beverages were extremely important in social gatherings in their respective countries.

At the end of spring semester, seventh graders in a local school district evaluated the six activities using a survey that included questions that might indicate student engagement as well as the efficacy of these activities for conveying museum content. Student endorsement of the interactive multimedia activities was high and indicated that these users preferred this type of activity to merely reading for content. The highest rated activities, Make a Vase and Paper Dolls, were coincidentally the two activities that allowed the participants the highest measure of individual choice and control. Although the formative evaluation testing was carried out in a classroom setting as opposed to a genuine museum setting, the student responses to the interactive multimedia activities seems to align with the literature about visitor studies regarding interactive experiences in museums. The students expected to learn, but they were also interested in playing computer games to reveal the content and enjoyed the delivery method. This experience appears to parallel the literature indicating that museum visitors come to the museum expecting both to learn and to have an enjoyable experience while there.

These prototypes were developed by the team in anticipation of an increasing presence of interactive multimedia incorporated into museum exhibits. The MFAH is still developing new concepts toward inclusion of projects like these in museum education. The team hopes that these activities will lay a foundation toward on-site testing and evaluation and that we will see a continued development toward capitalizing on the growing strength of technology inside museum exhibits.

The Art Education Perspective: How these Projects Fit into Art Education Pedagogy

The Art Education program at the University of Houston has only recently become a formal component of the fruitful collaboration between the MFAH and the IT program at UH. While a few students from the Art Education program have enrolled in the project-based web design course and have been involved in constructing the exhibition web site, the possibilities for further contributions from the field of art education generally and from considerations of technology in art education specifically are yet to be realized. In light of this, this section will:

- detail some of the early involvement of Art Education program students and faculty in the collaborative project;
- discuss briefly recent pedagogical trends in art education and how the museum collaboration reflects these ideas;
- position the technological development of art-related educational resources within recent thoughts on technology use in art education; and
- propose the strength of broadening the university part of the collaborative structure to include content areas.

An art educator was involved in the museum/university collaboration from the beginning in that an Art Education Professor Emeritus became involved in the collaboration by serving as a team facilitator in the early days of the project. Art Education graduate students then participated in the IT course and served as team members under the direction of the Art Education Professor Emeritus. Additionally, the Art Education program at UH, like the IT program, has made a commitment to focus on real-world projects within its course structures, and students in the program have suggested that their learning is increased because of the authentic nature of the intellectual endeavors. Knowing that the research the students conduct and the lessons they develop will be utilized by area arts organizations and teachers creates a level of motivation that is unmatched by class group projects or other assignments.

In keeping with its commitment to real-world projects, the Art Education program at UH also has a commitment to working with real works of art which further enhances the outcomes for all stakeholders in the museum/university partnership. Because the UH Art Education program subscribes to Discipline-Based Art Education (DBAE) as its theoretical base for learning in the visual arts, working directly with and through works of art in the museum's exhibition coincides with students' pedagogical expectations of sound art education. DBAE is an art teaching methodology that considers a holistic approach to the study of art including its four disciplines: art history, art production, art criticism, and aesthetics (Wilson, 1997). Works of art figure prominently in this methodology asking students and teachers to engage with a work of art in a variety of ways prompted by the strands of DBAE. For example, students expect to consider the art historical provenance of an 18th century portrait and also ask aesthetic questions about the difference between oil paintings and photographs. Art Education students well-versed in these kinds of pedagogical ideas bring depth of content and multiple layers of experience to the courses and the collaboration.

One of the best ways to address the always expanding depth of content and the forever bifurcating layers of experience within the visual arts is through the appropriate use of technology. Art education has embraced technology as both an important art medium and an important forum for considering art virtually. Digital imagery in the art classroom is a 21st century venue for seeing and discussing art. New communication technologies and digital media are changing the practices of making, understanding, and responding to art (Bruce, 2000). The computer age has created a shift from the textual to the visual. Pedagogy of visual pragmatism acknowledges the informal curricula of the World Wide Web and values individualized learning recognizing that the education audience is larger than K-12 teachers and students (Stafford, 1998). The Electronic Media Interest Group of the National Art Education Association has as its expressed goal to promote informed and responsible applications of media and technology in art education, and over 50 sessions at this year's national convention of art educators have a technological focus ranging from using basic technology in the elementary art classroom to considering the museum as a hypertextual narrative.

Conclusion

In extending the museum/university partnership beyond the IT component to include Art Education faculty and students, the collaboration grows in depth through the various layers that the different content areas and viewpoints add to the partnership. Expansion of new projects and the addition of even more content area experts and students will also increase the number of beneficiaries of this endeavor. The partnership has not been without its share of problems and frustrations, it seems almost inevitable that differences of opinion will result with this many creative stakeholders involved. But this model for creating a museum/university partnership has been worthwhile for the museum educators who are learning to harness the power of the web, for the students who are learning to create real-world technology projects while working with actual clients, and for the faculty who are learning to transform their courses into exciting new learning environments that are more challenging and more educationally meaningful than ever before.

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2001: A Cyberspace Odyssey

Julie Springer, Coordinator, Teacher Programs
Department of Teacher and School Programs
National Gallery of Art, Washington
j-springer@nga.gov

Phyllis Hecht, Web Manager
Editors Office
National Gallery of Art, Washington
p-hecht@nga.gov

Abstract: This paper reviews the first stage of a technology initiative to assist K-12 teachers in developing Web projects that integrate K-12 curriculum content and the collections of the National Gallery of Art. A select number of these projects will be made available on the Gallery's Web site (*www.nga.gov*). While the Gallery has offered education resources through the Web site since its inception in 1997, this program marks the first significant effort to provide online teaching resources designed by K-12 educators. The program's goals, design, and evaluation objectives are summarized by the two staff members primarily responsible for its conception and planning.

Program Goals

As an art museum with a national mandate, the Gallery has produced distance learning materials since opening its doors to the public in 1941. Films, slide programs, teaching packets, CD-ROMS, and videodiscs have long been available to teachers and other adult audiences on a free-loan basis. The establishment of the Gallery's Web site in 1997 brought more immediate, versatile, and dynamic means through which to foster awareness of the visual arts and make the Gallery's collections widely accessible. Exhibition literature, teaching packets, lessons and activities, and interactive virtual tours are among the many educational resources available through the Gallery's site (*www.nga.gov*).

This two-year technology initiative (2001–2002) was conceived as creative way of extending our distance learning resources and thus continuing to serve those educators without firsthand access to the Gallery's collections. It was also conceived as meeting teachers needs in the following ways:

- pertinent resources: by having the teachers develop these online projects, they would better match K-12 curriculum content and the more practical considerations of classroom instruction or independent research
- learner-driven models: with their potential for interactivity, online projects would be viable in a school setting favoring learner-driven or constructivist education models
- enhancement of skills: charged with conceptualizing and building their own Web-based curriculum projects, teachers would enhance their skills and encourage the use of online technologies

Instructional Design and Resources

Twelve three-member teams were selected from approximately seventy applications, based on the strength of proposed curriculum projects. (Successful team applicants were those with creative topics that could be taught using works of art in the Gallery's collections). Six teams came to the Gallery for a week-long seminar in July 2001; the other six received the same instruction in August 2001. During the program, teams worked with education and computer technology specialists to begin developing the content and storyboards for their Web resources. Instructors were Gallery staff and outside experts in art, education, and instructional technologies. The course of instruction was sequenced to help teachers explore the potential richness of online resources, analyze and critique select sites focused on art and education, and establish criteria for high-quality Web-site content and design before beginning to build their own projects. Toward this end, teams were asked to prepare for their week in Washington by studying and critiquing a preselected list of Web sites and by reading two books pertaining to online curriculum design. One book (Harris, 1998) was chosen to provide a general introduction to the different types of online projects that might be designed, depending on content objectives and desired outcomes. The other publication (Williams and Tollett, 2000) addressed design issues. This preparatory work allowed participants to arrive at the Gallery with shared knowledge and a framework for group discussion.

During the seminar, teachers were offered training in HTML and Dreamweaver, and were given packages of software with which to develop their projects (Adobe Photoshop 6.0; Macromedia Dreamweaver 4 with Fireworks 4 Studio; and Inspiration 6). Teams also learned more about the Gallery's permanent collections and which objects might best support the content of their online curriculum project—be it related to math, music, Renaissance history, or autobiographical writing—to name just a few of the subject areas chosen. At the end of the week, teams gave brief presentations on the direction of their projects. Each team had a clearer focus for their work, with a better selection of possible works of art and resources to support their theme.

Upon leaving Washington, teams were charged with continuing their collaboration through the completion of their Web projects in April 2002. To support their work in the interim, each team was assigned two mentors with whom to consult about either the content or the technological development of their projects. A listserve was established to facilitate communication with, and among, the groups. In addition, teachers had access to a password-protected Web site that offered easy reference to project guidelines and deadlines, links to educational resources, mentors' and colleagues' names and email addresses, and separate work folders for submitting the individual stages of their projects (Fig. 1).

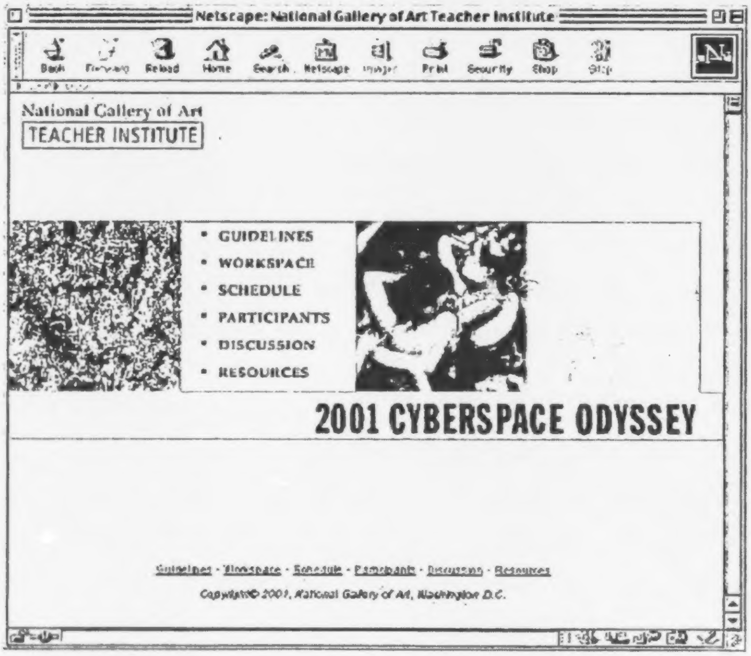
Netscape: National Gallery of Art Teacher Institute
Back
Forward
Reload
Home
Search
Netscape
Images
Print
Security
Stop
National Gallery of Art
TEACHER INSTITUTE
GUIDELINES
WORKSPACE
SCHEDULE
PARTICIPANTS
DISCUSSION
RESOURCES
2001 CYBERSPACE ODYSSEY
Guidelines · Workspace · Schedule · Participants · Discussion · Resources
Copyright© 2001, National Gallery of Art, Washington D.C.

Figure 1: Home page of the password-protected Web site designed to support teachers during the design and construction of their online curriculum projects.

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Team Commitment and Application Process

Educators were asked to apply in teams of three and to submit a joint statement outlining their collective qualifications and the Web project they would develop if selected to participate. They were not required to be from the same school, but had to agree to collaborate with their teammates for the eight months needed to conceptualize, build, field-test, and finalize the project. It was recommended that team members possess different areas of expertise, each of which contributed to their particular curriculum topic. Individuals selected to participate received a stipend of $1,000 with an additional $500 payable on completion of their team's online project.

The successful teams were those demonstrating sophisticated computer and Internet skills, experience with curriculum development, and commitment to teaching through online technologies. Priority was given to creative topics that made meaningful use of the Gallery's collections and targeted a specific grade (or age group), subject area(s), and national standards for K-12 curricula. (Information and an application for the 2002 program can be found at *www.nga.gov/education/cyberworkshop.htm.*)

Evaluation

Evaluation of the 2001 and 2002 programs will seek to measure achievement of two objectives: 1) providing useful Web resources for K-12 educators, and 2) increasing Institute participants' skills and comfort levels using online technologies. Useful Web resources are defined as those published and used on the Gallery's Web site, and those remaining unpublished but actively used in the classroom by their creators. Evaluation will assess both content quality and usability of sites. Methods employed will include direct observation of site use (by either teachers or students, depending on the intended audience), and interview sampling techniques designed to gauge user reaction to content and navigability.

Questionnaires will also be used to solicit participants' affective, or attitudinal, responses to the program and the process of building the Web projects. The first of these, available online at the password-protected Web site, asked participants to evaluate the instructional design of the week-long summer seminar and how well it prepared them for the task of conceptualizing and building their curriculum projects. Participant response to this initial survey was 40 percent.

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Acknowledgments

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INVITED PANELS

National Technology Leadership Initiative Fellows Panel

Lynn Bell, UVa, US

NTLI Fellows

As part of a larger initiative to facilitate interactions among teacher education faculty from different content areas and disciplines, SITE and the teacher educator associations from the core content areas have established the National Technology Leadership Initiative (NTLI) fellowships. The Association of Mathematics Teacher Educators, Association for the Education of Teachers of Science, the Conference of English Educators and the National Council for the Social Studies College and University Faculty Assembly have joined SITE in sponsorship of a technology leader from each content area. The NTLI presentations at this year's SITE conference will feature an exemplary paper in each content area – science education, mathematics education, English education and social studies education.

CITE Journal Editors Panel

Editors from each of the sections of the online journal, *Contemporary Issues in Technology and Teacher Education*, will discuss the goals of the journal and recommendations for publication of articles. Journal sections represented include mathematics education, science education, social studies education, English education, and educational technology. Editors will consult with prospective authors.

SECTION EDITORS:

Ronald Sarner, SUNY Institute of Technology at Utica/Rome
Rosemary J. Mullick, SUNY Institute of Technology at Utica/Rome
Deborah Y. Bauder, Rome (NY) City School District

As we began to put together this year's *Concepts and Procedures* section, we were struck with two observations: first, the number of selections has increased dramatically, and second that the topical coverage in the section is more varied than ever.

Several themes emerged in this year's selections. One cluster of papers deals with concept mapping, visualization, and knowledge representation. A paper by Robert Jones, Caroline Crawford, Ruth Gannon-Cook, and Jan Willis – all from the University of Houston-Clear Lake analyzes concept patterns found in textbooks. A selection by Marino Alvarez, Michael Busby, Geoffrey Burks and Goli Sotoohi from Tennessee State University, entitled "Exploring Minds Electronic Network, describes the use of the "interactive V diagram" to encourage monitoring, reflection, and critical thinking. A Tennessee State colleague, Charles Dickens, has a paper entitled "Metaconceptualizing Knowledge: The Challenge for Teacher Education. In a somewhat different vein, Victor Kasyanov from the Ershov Institute of Informatics Systems in Novosibirsk describes the use of graphs for visual presentation of "complex and intricate" information.

Issues of equity and ethics form a second cluster. In "Technology overload: Are we meeting the needs of the individual student," Steve Jenkins, Cathy Lott, Walter Buboltz, Jr., and Lamar Wilkinson from Louisiana Tech note the challenge that emanates from the increasing demands of technology proficiency on the part of employers and educators in the typical college setting where only half of each freshman class owns a computer. In a provocative essay, Robert Bruen from Babson College discusses the paradox that increased attention to issues of computer security in our courses may have the unintended impact of increasing computer incursions.

Distance Learning was another topic that generated multiple submissions. No fewer than six papers deal with serving the needs of off-campus students. One submission by Robbie Melton of the Tennessee Board of Regents describes their on-line degree programs. Ken Stevens and David Dibbon from Memorial University of Newfoundland discuss the need to train teachers to work effectively with geographically separated students. Assessment in on-line learning works its way into several papers and is the central topic for a paper by an international team of C. Y. Janey Wang from the University of Texas at Austin, Rafael Cota and Guillermo Espinoza from the ITESM Institute in Mexico. In their paper Wang, Cota, and Espinoza present rubrics as a framework for evaluation. Two selections study outcomes in traditional and on-line instruction. Yuejin Xu from the University of Alabama examined transcripts of on-line discussions and contrasted them with face-to-face class discussions that were videotaped. The study examined levels of student contribution as well as an analysis of style, grammar, and sentence structure in both modalities. The same author collaborated with Asghar Iran-Nejad to examine whether one modality is more likely to change student learning perceptions than the other. Finally, Joanne Pelletier, Margaret Brown, and Gregory McKinnon from Acadia University expand upon their earlier work on *cognotes*, a macro-based coding system for interactive discussion.

Several papers focus on web site design, web site and multimedia design tools, and evaluation of web sites. Included in this section is a paper by Jean-Marc Laubin from the University of Valenciennes in France on teaching multimedia design using what he terms a "tri-component model." Terence Cavanaugh of the University of North Florida discusses web site design features to insure that disabled persons are appropriately accommodated.

Another noteworthy thread consists of two papers by Lamar Wilkinson, *et. al.* from Louisiana Tech on technophobia and technostress. In both papers the authors repeat the often-cited observation that the pace of life is increasing, and with it comes a host of medical and social problems for individuals who find it difficult to adapt. In their paper "Computers, Technostress and Breathing" the authors offer suggestions for breathing techniques designed to overcome the physiological effects of stress.

Finally, in what may be a harbinger of what to expect next year, we saw the first paper on the use of personal digital assistants, in this instance as a data acquisition device. We can only speculate with regard to the educational applications for these devices that are likely to emerge in the next few years, particularly when PDAs are used as access points for wireless networks.

Ronald Sarner is Executive Vice President for Academic Affairs and Distinguished Service Professor of Computer Science at SUNY Institute of Technology at Utica/Rome, Utica, NY 13504-3050, e-mail ron@sunyit.edu.

Rosemary J. Mullick is Associate Professor of Computer Science at SUNY Institute of Technology at Utica/Rome, Utica, NY 13504-3050, e-mail rosemary@sunyit.edu.

Deborah Y. Bauder is Executive Director of Technology, Rome City School District, Rome, NY 13440, e-mail dbauder@romecsd.org.

Exploring Minds Network

Marino C. Alvarez
malvarez@coe.tsuniv.edu

Michael R. Busby
busby@coe.tsuniv.edu

Geoffrey Burks
burks@coe.tsuniv.edu

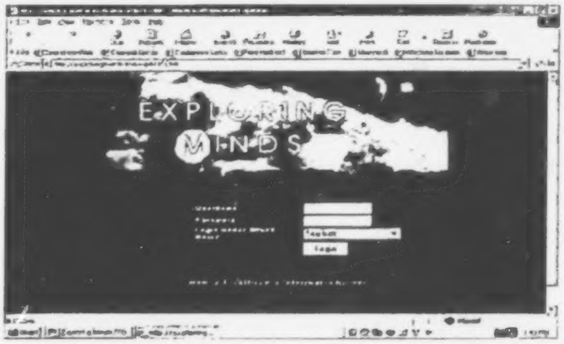
Goli Sotoohi
gsotoohi@coe.tsuniv.edu
Center of Excellence in Information Systems, Tennessee State University
United States

Michael A. Panzarella
Oakwood Systems
United States
mpanzarella@oakwoodsys.com

Abstract: Exploring Minds is an active electronic venue for professors, teachers, researchers, and students to reflect, negotiate, and evaluate the teaching/learning process that enables systemic changes to occur under meaningful and thoughtful circumstances. Ideas are revealed in narrative and visual formats through electronic journals, conceptual arrangement of ideas, and V diagrams so that metacognitive tasks such as self-monitoring, reflective and imaginative thinking, and critical analyses is a crucial part of the learning process. The basic premise that underpins Exploring Minds is that the mind deals with meaning and meaning is the basis for conceptual understanding of facts and ideas.

Exploring Minds Network

Exploring Minds is an educational interdisciplinary project under the auspices of the Center of Excellence in Information Systems, Tennessee State University (http://exploringminds.tsuniv.edu). Exploring Minds is an interactive electronic network that is password protected and contains provisions for teachers, professors, researchers, coordinators, director, and parents/guardians, and students to communicate about their class work and/or research agendas (Alvarez, 2001). The network contains several interactive tools for posting journal entries, constructing hierarchical concept maps and vee diagrams, and storing information (print and nonprint) in a backpack (portfolio). Exploring Minds is a self-contained system that encapsulates transactions between teachers and learning stakeholders over the Internet interactively.



Management System

The management portion of Exploring Minds site is divided into five consoles: Director, Coordinator, Teacher, Researcher, and Students. Researchers at TSU's Center of Excellence in Information Systems and those at affiliated colleges and universities along with teachers and their students manage their own respective students. The Teacher Console enables either the teacher or researcher to assign passwords and usernames, control incoming and outgoing communications between students, and have access to student concept maps, V diagrams, electronic notebook entries, and backpack. Students, once given a password and username by their researcher or teacher are able to construct concept maps, V diagrams, enter notations and thoughts into their electronic journal, notebook, and enter video clips, photographs, journal articles, drawings, simulations, and any other relevant information (print or graphic) into their own backpack or library. Any portion of a backpack can be shared with other students within a given college or university, or school with students at another affiliated colleges, universities, or schools if the researcher or teacher gives permission.

When students want to submit their concept maps or V diagrams for review by their teacher and researchers they submit them directly electronically via the Internet using their account on Exploring Minds. Teachers, professors, and researchers have access to all the features and metacognitive tools available to the students.

Administrative Tools is designed for teachers, coordinators, and director to create, edit, and delete groups (classes) or subgroups within groups with participating members. The Grade Book section permits access to student or participant records of transactions that occur during a semester or year (e.g., assignments, V diagrams, journal postings, etc.). There is also a Profile section where students can change their password and username, enter relevant information (e.g., address, telephone number), and anecdotal information including a photograph. Only anecdotal information is made public and can be viewed by any participant. The Profile allows the teacher, coordinator, or director to access participant records.

Features

Once logged into the restricted section a home page appears that contains newly posted items arranged by group (class). These are messages, journal entries, announcements, threaded discussions, and attachments. Once each message or journal entry is accessed, the teacher or student is taken to the Communications section where the message appears and the option of writing a response that is sent directly to the initiator is accomplished. Likewise if an attached document or V diagram is sent, they are accessed and viewed in the Communications section of the site and can be printed as a hard copy. Every message, once viewed and responded to, disappears from this screen and automatically stored in the Grade Book section under Records. These records are arranged by groups and students alphabetically and each individual's entries can be retrieved by clicking on the name.

A prominent feature of Exploring Minds is a reflective portion containing a journal for students to enter their thoughts and feelings of course content, and an exchange section whereby ideas can be posted and feedback received from professors, researchers, and teachers. Once comments are made and sent back to them, the students then read the response by clicking on the message appearing on the Welcome page. A record (date and time) of each transaction is automatically noted in the students' journal section and also in the journal of the teacher or professor. A notebook is provided to better organize notes taken for a class, a report, or paper. This notebook acts as a storage area and serves the same function as a regular notebook. The difference being that it can be accessed through wireless communication systems such as a laptop computer and information can be gathered from various Internet sources and locations.

Exploring Minds contains an interactive concept mapping component that reveals a visual representation of student thought processes with feedback directly placed on each respective map. A hierarchical concept map is a visual representation of an individual's thought processes. It is a word diagram that is portrayed visually in a hierarchical fashion and represents concepts and their relationships. Students, teachers, and researchers use concept maps as a way to visually display and share ideas using CMap developed at the University of West Florida. Maps developed by participants in our program are stored and accessed on our Exploring Minds server. The V heuristic developed by Gowin (1981) to enable students to understand the structure of knowledge has evolved into an Interactive V Diagram section of the network having a Quick Help menu and a link describing the V components with explanations of the epistemic elements. Also included are instructions for entering information on the V. Information is entered onto the Interactive V Diagram by clicking on the respective field of the arrayed elements and then typing the data. Once the fields on the V template have been completed, the user can review the entries and then electronically submit the information to our base site as an attachment. When received by the teacher or professor, the V diagram is reviewed and comments are made directly on the submitted V. These comments are then sent back by the reviewer to the sender who is then able to read the comments.

A backpack section serves as a repository for student work in progress and contains a files section for importing video, simulations, articles, or any type of pertinent electronic transmissions that is needed by a student. A drawing of the backpack is portrayed with communication, journal, notebook, files, V diagram, and concept map links. These are visually displayed and linked for access.

The teacher has a briefcase from which to navigate the interactive features of the Exploring Minds Network. The features contained in the briefcase that are linked are: grade book, calendar, notebook, journal, V diagram, communications, files, and concept map.

Both the teacher and the student have a study. The study provides a venue by which the teacher creates the reference materials needed for a particular class. Sections of the teacher's library include the files section, reference documents, photo gallery, electronic journals, URL links to relevant sources, movies, articles, and reports. The students can use access these sources and include them in their own library. These items are then stored in the teacher library for student access and retrieval. Likewise, students can use the study and have their own library to collect information and materials for a project, report, or research paper. In this teacher library the materials and references are displayed for student access and retrieval. By clicking on each respective category a display of the requested materials appears and can be viewed or downloaded. The student library enables the student to categorize pertinent information relevant to a specific work within a class or research project.

Conclusions

Exploring Minds provides faculty with a system to communicate more effectively with their students. In addition to the management features (class assignments, class roll, personal calendar, announcements, grade book functions, and course material), the teacher or professor is able to react to student notebook postings on a regular basis and thereby monitor students' thoughts and feelings instead of waiting for end-of-the-semester evaluations. These interactive dialogues, together with visual displays of the concept maps and V diagrams, serve to negotiate the learning process and better serve meaningful understanding between the professor, teacher, and students during the semester or school year.

The uniqueness of Exploring Minds is the active engagement that occurs between teachers, professors and their students afforded through the use of the notebook, concept maps, and interactive V diagrams. In essence, teachers and professors are active learners with their students, and facilitate the learning process by guiding students in their inquires, evoking discussions, and involving their students with other affiliated schools whose students may be engaged in similar research/study topics. Exploring Minds provides a learning context that encourages students to *think about learning* and enables them to learn principles instead of learning prescriptions that they may not understand or partially understand.

Acknowledgements

This paper is supported by the Center of Excellence in Information Systems at Tennessee State University and by NASA through the Tennessee Space Grant Consortium NGT- 40021, Network Resources Training Site (NRTS) NCC5-96, and NASA Center for Automated Space Science NCC5-511. Oakwood Systems was contracted to write the programmatic system for this network.

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Digital Data:
Strengthening the Study of Educational Technology

Savilla I. Banister
Division of Teaching and Learning
Bowling Green State University
USA
sbanist@bgnet.bgsu.edu

Researchers, educators, and businesspeople are engaged in various crusades to encourage or discourage the use of computer technologies in schools. While most of the dialogues in these arenas rely most heavily on the media of verbal and written communication (text), the technologies of the twenty-first century provide other communicative media possibilities, including the use of video, audio, and images, to present and exchange information. An example of a type of research and communication that utilized multimedia technology is examined here.

A year-long study was conducted at a small, urban elementary school, focusing on student and teacher perspectives of computers in their classrooms. Conclusions of the study in traditional textual form were combined with multimedia, CD-ROM technology to produce an interactive compilation of data from the research. An exploration of this product presented during the SITE 2002 Video Festival provided attendees the opportunity to examine this type of inquiry artifact and explore the possibilities embodied in such a process.

Incorporating audio and video data into the research design helped to extend the potential of "thick description". During the times I have shared images, and audio and video clips with the teachers participating in the study, or colleagues interested in my research, they have been very positive in their responses. Actually hearing the emotion and inflection in a teacher or student's voice as they share their ideas, or seeing the students working in the computer lab helps to support the written text. I believe these elements contribute to the trustworthiness of this research.. The CD-ROM appendix containing a collection of this data can be used as verification for the descriptions presented in the text, and also as a prototype for others interested in incorporating multimedia in their research designs.

The presentation and integration of images, audio and video included on the CD demonstrates how data in various formats can be preserved and made available to the scholarly community. By selected "Audio/Video Data" from the menu on the CD, one can navigate to data examined in Chapters Four, Five, and Six. In the Chapter Four section, one can click on "Peer Tutoring" and watch two kindergarten boys in the computer lab guide each other through a new application. In the same section, an audio clip of an interview with Ms. Roberson contains her explanation of how the kindergarten students "help each other" on the computers. In the Chapter Six section, the audio clip of Ginny describing the emotional and physical pain involved in the class's keyboarding lessons is included. In these instances, hearing the tones of voice and seeing the facial expressions of the students enriches the descriptions presented in the text. Such representations allow the reader to juxtapose written interpretations with actual scenes and voices from the research site, encouraging critical review.

In the video clip of Mrs. Sprong's Accelerated Math class work, located in the Audio/Video section, Chapter Five, not only can viewers watch the class process, but they can also see this researcher walking through the room, taking notes. The researched is also visible in the "Centertime" video clip, in the Chapter Four section. Her voice can be heard posing questions on the various audio clips. These examples give the reader a chance to further evaluate the processes used in collecting the data.

Mixing data types can also provide a unique view of a phenomenon under study. In the Audio/Video section of the CD presenting Chapter Five, a link entitled "Printer Problems" is provided. This particular clip combines a time-lapsed video clip of Mrs. Sprong's AM class during the time when the printer stopped functioning; the audio track paired with the clip contains excerpts from a later interview with Mrs. Sprong explaining what transpired when she attempted to get technical support for this problem. Combining these two elements gives the reader a more powerful view of the frustrations students and teachers experience with technologies.

In these ways, the study is expanded and enhanced with digital data. With more publications embracing the electronic format each year, it is possible that journal submissions could include such digital data for distribution, linked with the written text online. Such provisions have the potential to challenge and deepen critical inquiry.

Learning communities: a kaleidoscope of ecological designs

Alain Breuleux
McGill University • TeleLearning NCE (Canada)

Mary Lamon & Marlene Scardamalia
OISE/UT (Canada)

Therese Laferriere
Laval University • TeleLearning NCE (Canada)

Katerine Bielaczyc
Harvard Graduate School of Education (US)

Morten Søby & Vibeke Kløvstad
National Network for IT-Research and Competence in Education, University of Oslo (Norway)

Abstract. This panel brings together scholars and educators who have worked for many years on fostering technology-enabled learning communities with an emphasis on classrooms and teacher education. The session will focus on issues of design for learning communities, examining existing cases of network-enabled learning communities in the classroom, the school, and the school of education. One driving question for the presentations and discussions is: "To what extent learning communities can be engineered, designed, fostered, and to what extent they are a complex organic entities that come about and evolve on their own?" The specific perspectives presented are: a) Knowledge building communities in the classroom, b) Learning communities in pre-service teacher education, c) The social infrastructure framework for learning communities, d) A networked learning community for teacher education at the national level; the case of Norway, and e) The school as learning community; Issues of leadership and organizational change.

This panel brings together scholars and educators who have in common the fact that they have worked for many years on fostering technology-enabled learning communities with an emphasis on classrooms and teacher education. A number of features are beginning to emerge from their work, in line with the work of Ann

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Brown (Brown, 1997) and her colleagues. This panel session will focus on issues of design for learning communities, examining existing cases of network-enabled learning communities in the classroom, the school, and the school of education. One driving question for the presentations and discussions is: "To what extent learning communities can be engineered, designed, fostered, and to what extent they are a complex organic entities that come about and evolve on their own". Because of this tension, our position oscillates between thatof the engineer –to build learning communities– and of the ethnographer –carefully observing and documenting a massively complex phenomenon that largely pre-exists and overwhelms the observer. Depending on where we stand along this continuum of positions, we are at times concentrating on what to do to achieve a certain quality of learning communities in teacher education, at other times wondering what conceptual tools are required to appropriate the complexity and quasi-chaotic nature of the learning communities we see unfolding. And what are the desirable and achievable affordances of technology in such a socio-cognitive engineering project? The experiences shared during this panel will illuminate such questions.

1- Knowledge building communities in the classroom. Mary Lamon & Marlene Scardamalia

The knowledge building classroom shares many of the processes of the classroom as a learning community; but it is more concerned with how students advance beyond present knowledge. They do this through the creation of new theories or the improvement of old ones through innovation, testing, and revision of ideas. Knowledge building classrooms, in their search for constructing cognitive artifacts (new knowledge, new representations, explanations), function in much the same way as scientific research teams operate. These research teams aren't only trying to learn about existing theories, they are trying to advance those theories.

Can you create a knowledge building classroom without information and communications technology? Possibly, but we think that today's technologies make it possible to teach in new ways–to do things differently or even to do entirely different things. One significant way that information and communications technology makes a substantial difference is that it opens up dialogue within communities for a substantive period: Ideas that are thought of and then forgotten can be revisited, revised, added to, and perhaps risen above (Scardamalia, 2000). In support of discourse that transforms a learning community into a knowledge building community, Bereiter and Scardamalia and their team created software, Knowledge Forum®, a problem-centered collaborative knowledge medium that operates over a computer network (Scardamalia, Bereiter & Lamon, 1994). This computer system, perhaps unlike others, was based on cognitive science and socio-cognitive studies about how expertise develops and grows.

2- Learning communities in pre-service teacher education. *Therese Laferriere*

Twelve principles emerge from this multi-year, multi-site design experiment to foster and sustain learning communities in teacher education in Canada and abroad focusing on ICT integration to curriculum and collaborative learning. design-experiment in four different contexts. Key trajectories of these principles are: from material connectivity to social networking, increased or sustained crossings of institutional and cultural boundaries, and the gradual deprivatisation of pedagogical practices.

3- The social infrastructure framework for learning communities. *Katerine Bielaczyc*

Focuses on the social support structures that teachers achieve around computer-supported collaborative tools in order to create environments for classroom learning communities. This "social infrastructure framework" allows us to frame and analyze practices that foster learning communities.

4- A networked learning community for teacher education at the national level; the case of Norway. *Morten Søby & Vibeke Kløvstad.*

Will present the perspective of a national level, with emphasis on the design of web-based tools for the community of innovative teacher education institutions in Norway.

5- The school as learning community; Issues of leadership and organizational change. *Alain Breuleux*

This perspective concerns the specific case of *educational institutions* as learning communities. The key institutions that are examined are the schools and schools of education, and their relevant aspects are: A driving purpose and an actively shared vision, a repertoire of practices (in particular intellectual practices and governance practices aimed at building and sharing knowledge), and systems of values and beliefs. The notion of institution includes different levels diverse realities: from the one-classroom school in the village, the school district, the college, the school of education, and emerging new forms of school networks and institutional alliances between the above. A related issue is the connection and desirable alignment between these different types and layers of institutions, with their specific ways of becoming learning communities. Learning communities at the school or school of education levels will be distinct from other learning communities by a focus on organizational change and, in particular, on issues of leadership. Important questions will include: What is the role of institutional leaders in the strategic transition towards learning communities? How can institutional leaders themselves constitute learning communities that specifically focus on building, learning and sharing leadership practices?

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PDA's and Research: A Brief Report

Walter C. Buboltz, Jr.
Department of Psychology
Louisiana Tech University
United States
Buboltz@latech.edu

Tony R. Young
Department of Psychology
Louisiana Tech University
United States
Tyoung@latech.edu

Lamar Wilkinson
Department of Psychology
Louisiana Tech University
United States
Lamar@latech.edu

Adrian Thomas
Department of Psychology
Western Kentucky University
United States
Adrian.thomas@wku.edu

Abstract: The explosion and infusion of technology into the educational environment has lead to a multitude of new research tools that are available for conducting research. Personal digital assistances (PDA's) are one of these new exciting technologies that can lead to research that taps areas and constructs previously unexamined. Additionally, PDA's may allow data collection that is more instantaneous and focus on the moment when an event occurs. This articles reviews the uses of PDA's and how it may be applied to various research areas.

The explosion and infusion of technology into the educational environment has lead to a multitude of new research tools that are available for conducting research. Researchers have been using the Internet for the past few years to collect large data sets and explore areas that were not feasible using more traditional research approaches. The continued development of technology has lead to another technological breakthrough, namely, Personal Digital Assistances (PDA's) that may open many more avenues for research in the educational and other realms. This paper provides an outline of the uses of PDA's in research and hopefully brings to awareness the potential of PDA's in research.

The use of PDA's in research may over time reveal many shortcomings of traditional paper-and-pencil assessment instruments. Research has shown when individuals recall past experiences, people tend to remember peaks of emotional intensity, or the most recent things, or are influenced by the context, or how they feel at the moment they are completing the assessment instruments. With this in mind, researchers that collect data after events have occurred or ask individuals to report about behaviors and experiences in the past may not be getting accurate data. In response to this researchers are calling for a change in the collection of self-report data. Researchers have suggested that two major changes need to be done to overcome these potential problems and influences. One is that researchers need to collect data at the moment, which takes the time factor into account instead of waiting to collect data about that particular moment at some later data. Second, data collection needs to take into account the environment, thus data collection should occur in the environment where the phenomena is occurring. The use of programmable PDA's may be the research tool that can overcome the shortcomings of more traditional paper-and-pencil data collection.

Personal Digital Assistants (PDA's) have come to market during the past five years as a storm. Initially, only one or two hardware companies made and sold the products. Now virtually every hardware maker, plus several companies that make only PDA's have multiple products on the market. Additionally, as the competition as has grown between companies the capabilities and software available for PDA's has grown exponentially. At the current time PDA's are programmable, have expansion slots and can handle large volumes of data. Due to programmability, survey's can be developed for research and the information collected can be downloaded into data sets that can be used for statistical analyses. This is only the tip of the iceberg, the true potential of PDA's in research lies in the ability of the researcher to collect data at various times or intervals. PDA's can be programmed to cue the research participant to fill out a survey on the PDA at predetermined times, or at random intervals during the day. Additionally, the research participant can be instructed to complete surveys on the PDA during or immediately after an event of particular significance. Through the use of PDA's data collection can occur in real-time within the environmental context of their daily life.

The advantage of PDA's is not just limited to research. PDA's may have widespread implications in the educational realm and for the treatment of many problems. In the educational realm students can purchase PDA's or be provided with PDA's as part of a course. The instructor can then provide students with notes, outlines, and reminders when assignments are due. Additionally, the instructor can have the PDA programmed to help students develop a study schedule and on what materials to focus on. The implications in the educational realm appear endless at this point and need further investigation. In terms of treating problems applications can be developed and used to cue individuals regarding their efforts to change destructive habits of thought and behavior. Additionally, the treating professional can provide the individual with a host of information on a PDA that can be used by the individual to reinforce and encourage treatment compliance between actual meetings.

The use of PDA's in research and treatment is not an easy task and several issues need to be address and tackled before employment should be undertaken. First, researchers should ask, is there a more convenient and cost-effective way to collect the desired data. If there is a more cost effective procedure for collecting accurate data, that avenue should be pursued. Second, can the PDA be programmed to collect the desired data. Due to size of screens and internal memory, questionnaires need to be short and concise. In conjunction with this since collection of data may occur continuously or various intervals during the day, the short the questionnaire or data asked of the individual the less intrusive will be the data collection procedure and higher compliance will hopefully results. Third, can training be provided to subjects on how the PDA works and what needs to be done to have the subject collect the data for the researcher. If these questions can be effectively dealt with, it may be feasible to employ PDA's in the research endeavor.

Once the decision has been made to use PDA's the researcher needs to program the PDA with the survey's or other instruments that will be displayed. Numerous programs available and it would behoove any research to explore the options available and chose a software package that best fits the need for data collection. After that has been accomplished the time frame for data collection must be established, such as daily, three times a day, etc. At this point the PDA needs to be programmed to provide a reminder to the subject to complete the survey or instruments at the desired times.

With the PDA's programmed and ready to go, the researcher now needs to recruit subjects for the research and train them in the use of the PDA and what will be expected of them in the research process. It should be noted that at this point it necessitates that enough PDA's are available for each subject that will be participating in the research. Once subjects are fully trained and understand the uses of the PDA and what is expected of them it may be beneficial to pilot the data collection process to look for possible difficulties that need to be overcome before final data collection commences.

Once the final data collection procedures have commenced the researcher needs to provide technical support to individuals in the study and ensure the continual operation of the PDA's. As individuals complete the research project they turn in the PDA and the researchers is able to download the data collected to a number of programs that will allow analyses of the data and would return to more traditional ways of conducting research.

As can be seen the use of PDA's can be time consuming and difficult to accomplish, but the trade-off to examine areas that have not been previously examined can be tremendous. This paper has discussed some of the issues surrounding the use of PDA's in research and treatment and we hope that we have raised awareness of the potential uses of PDA's in research. The use of PDA's in research and treatment is just beginning to emerge and shows promise as a tool that can go along way to enhance may fields in the social sciences.

College Website Review and Revision

Terence W. Cavanaugh, Ph.D. Curriculum and Instruction, University of North Florida, Jacksonville, FL USA.
tcavanau@unf.edu

Abstract: Websites are becoming increasingly important for schools as support for teachers, administrators, counselors, students, parents, and the community. Jamie Mackenzie (1997) offers four reasons for maintaining effective school websites: introducing visitors to the school; pointing students to useful web resources; publishing student work; and collecting data on curriculum projects. Developing or redeveloping a school's website can become a complex process and it requires careful planning. Investigating who will use the site, what information users will require or appreciate, and maximizing useful ways to present the information are important steps. Who will use the site also brings up the important question of who can use the site? Any revision of a website must include accessibility issues for their content. The US government and the W3C consortium has accessibility guidelines for websites that will assist school website reviewers and designers in adapting their sites so all users have equitable access.

Need

An education college website should have as its mission to recruit, support, and inform current and future students and faculty about the college and the profession, while modeling educational principles. In interactions with users of a local College of Education website, it was determined that the site had become outdated and did not fulfill its mission effectively. The dean assigned the task of revising the website to the college technology committee, and a member was selected as the coordinator for this revision.

In a college that has deaf studies and special education programs, an additional concern was accessibility for disabled users. To that end the college wanted to make sure that its website would model proper application of accessibility guidelines as promoted by the W3 Commission and the US government's Section 508 of the Rehabilitation Act concerning Electronic and Information Technology.

Revision

Guidelines directed by the W3 Commission indicate that to achieve a minimum conformance level of "A," a site had to meet all of the priority one elements concerning the following conditions:

- Provide content that conveys essentially the same function or purpose as auditory or visual content;
- Ensure that text and graphics are understandable when viewed without color;
- Clearly identify changes in the natural language of a document's text and any text equivalents;
- Ensure that tables have necessary markup to be transformed by accessible browsers;
- Ensure that pages are accessible even when newer technologies are not supported or are turned off;
- Ensure that moving, blinking, scrolling, or auto-updating objects or pages may be paused or stopped;
- Ensure that the user interface follows principles of accessible design: device-independent access to functionality, keyboard operability, self-voicing, etc.;
- Use features that enable activation of page elements via a variety of input devices; Provide context and orientation information to help users understand complex pages or elements; and
- Ensure that documents are clear and simple so they may be more easily understood (Web Content Accessibility Guidelines 1.0, 1999).

From the initial analysis of our site it was determined that improvement was needed in alternative text tags, use of framesets, and identification concerning the languages and html formats on the individual web pages.

Research was started to find tools to assist in evaluating the site to improve accessibility. There are several tools available, many of which have no cost. Some of the free tools that were examined were Bobby from

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CAST, HTML & CSS Validator from W3C, A-Prompt from the University of Toronto, and the 508 Accessibility Suite for Dreamweaver. It was decided to use A-Prompt as the evaluation tool because of ease of use and because of its assistance in identification of problems, as well as in guiding and assisting in their correction. An excellent listing of tools to assist in evaluating and repairing sites for accessibility is the Evaluation, Repair, and Transformation Tools for Web Content Accessibility from the W3C Web Accessibility Initiative at http://www.w3.org/WAI/ER/existingtools.html.

The next step was to find out specific ways that users felt the site was not fulfilling its mission. The initial part of this investigation included a series of interviews with faculty members and students to find out what they found useful about the current site, what problems they had, and how they felt that it could be improved. This information was then taken to a professor teaching a course on educational web design. The professor and her students in that class participated by taking the information gathered from the interviews, their research on effective web design, and their own experiences with the college's website and creating an evaluation instrument for the site as a class project. This educational website evaluation instrument contained questions relating to: the design of the site, including the visual elements, layout and ease of navigation; usability and readability, ease of use, user satisfaction; educational value of the appropriateness of the content for its purpose and audience. Also there were open-ended questions concerning new needs, organization, and information. The instrument was given to a variety of individuals ranging from faculty, students within the college, upcoming students, and even high school students who were visiting campus.

From the analysis of the instrument results, the following areas needed adjustment or addition. The college should provide information concerning pre-college requirements about what to take and do for the first two years as an undergraduate. There should be information available about faculty including their teaching and research areas, contact information, links to their web pages and email accounts. Navigation needs to be clearer concerning divisions or sections within the college and their programs and services. A design component that was found needing was to make sure that all college pages had descriptive meta-tags, ensuring that they may be found more easily through search engines.

Each phase of the redesign was reviewed and approved by the college's technology committee using mock up web pages, navigational concept maps, survey and interview results, and accessibility needs. A more efficient method was developed for faculty members to submit content changes through their department. This format is an accountability system for the changes, and a method for responding back to the person making the request. From our college site review process we feel education college sites should achieve accessibility by meeting W3C and ADA compliance standards to reach at least the "A" rating put forth by the W3C commission for accessibility.

Conclusions

College sites should provide information not only to current students, but to prospective and future students. This information can include the programs that are available and the number of hours and courses required for programs, images or photographs of students and facilities spread throughout site, the college mission and vision statement, course descriptions, and especially pre-college information including necessary courses to take during the first two years, important forms, dates, required tests, and any other relative information.

There should also be a notable faculty presence on the college site. At a minimum there should be short pages for all faculty that provide information about the faculty to students and other stakeholders. The faculty pages should include the faculty members' teaching areas, their research areas of interest, how to contact them (including building, office, phone, e-mail, etc.), a link to faculty members' personal pages. Also it is important to include with the faculty the adjuncts that teach at the college.

A committee of the college must direct the maintenance and structure of the college's website. Faculty members need to have input and knowledge of procedures regarding concerns, such as errors on pages, or the possibility of adding new pages or sections. A clear set of directions is needed about site changing procedures. The site committee should include persons who have ongoing interactions concerning the college; it should not be left totally with people who are not intimately aware of the climate and concerns of the college.

Using 'No Tech' Activities to Teach about Technology and Issues of the Online World

Dianne Chambers & Michael O'Brien
Science and Mathematics Education
Faculty of Education
The University of Melbourne, Australia
d.chambers@unimelb.edu.au m.obrien@edfac.unimelb.edu.au

Abstract: Whole class or large group activities using learning technologies can be difficult when IT resources are scarce or in high demand. In response to this challenge creative 'no tech' teaching activities are used that powerfully explore concepts and issues encountered in the online world. In this paper we describe several activities that have been used successfully with teacher education students and with children to develop an understanding of high tech concepts and of issues encountered in the online world. These activities can be used before students go online, to complement online activities, or if no online access is available. These activities demonstrate how students can develop a rich understanding of high tech issues without access to high tech resources.

Introduction

Although many teachers would like to use learning technologies with their students it is not always possible, for instance when IT resources are scarce or in high demand or, in many schools, for whole class or large group activities. This is true not only in developing nations where access to computing equipment may be limited, but also in countries like the United States and Australia where certain schools, institutions and sections of the community have reduced opportunities to participate in the new information-based economy. A 1999 report of US Department of Commerce concluded that Americans on the wrong side of the so-called Digital Divide are about 20 times more in danger of being "left behind" (Irving, 1999). One response to this situation has the teacher demonstrating the available technology at the front of the class, with students looking on, and perhaps taking notes, but not actually engaging with the concepts presented. A challenge, then, for teachers with limited access to high tech resources is to find or develop activities for students that will actively engage them and enable them to gain an understanding of, and confidence about, concepts relating to online technology. In addition, the authors believe that well-designed 'no tech' learning activities can be *more powerful* in developing conceptual understandings than use of high tech equipment. These 'no tech' learning activities and teaching strategies can powerfully explore terminology and issues encountered in the online world. To be effective, these activities must engage students in learning. Following are several 'no tech' activities about concepts relating to the Internet and issues encountered when going online that we have used successfully with teacher education students, with children, and with practicing teachers.

These activities are effective because they start with existing reference points students understand. Abstract concepts such as hosts, packets, glitches, security, anonymity, confidentiality, potential perils of 'chatrooms' and even cyclical redundancy checking become understandable when students used concrete objects such as balls, pens and paper, and each other to explore these issues. By actively engaging in their own learning students gain an understanding of issues relating to being online and how the Internet works, in ways that passively listening to a teacher – or watching a multimedia presentation – cannot. It has been found that, whatever the level of access to technology, these activities develop a good conceptual understanding of the topic, generally much richer than if high tech resources had been used!

Learning about Online Communication

PaperNet is an activity co-developed by one of the authors (see O'Brien & Nicola, 1998) that uses pen and paper to explore issues of online communication. Through participating in the activity participants will understand issues about online chat and email, even of they have never been online. In this activity each participant is allocated a number that represents their email address and participants sit in a large circle facing outwards. Each individual knows their own number and the range of numbers used, but not the email address (number) of the other individuals involved (that is, everyone is anonymous to begin with). The participants send messages to each other, written on paper and addressed (with a number) to the other participants. These messages are delivered by people inside the circle representing the network (the 'networkers').

Because, initially, no one knows who anyone else is, those taking part gain an understanding of being participants in a chatroom. Students can choose to reveal who they are or choose to represent themselves as whomever they wish. In general no guidance about identity is given to participants — the questions about identity and anonymity are raised by the participants as they play the game.

Later, the participants sit facing inwards and repeat the exercise. Because they now know with whom they are communicating, it is more like sending and receiving email. It has been found that some 'networkers' peek at the messages — this leads to discussions about privacy and censorship.

During and following the *PaperNet* activity, very complex issues are raised by questions and are discussed and explored. Issues that have arisen in the discussion during and after this activity include:

- Privacy – did the 'networkers' read the messages? Should they?
- Censorship – should the networkers check the contents of messages for sutability? Should they? Must they? Should the networker be blamed for delivering an unpleasant message?
- Identity – was everyone honest in representing themself? How hard was it to pretend to be someone else? Can we rely on what people tell us online? Should we give our personal details out over the Internet? Should we? Must we?
- Anonymity – what freedoms are there when anonymous? Can these freedoms be abused?
- Safety Online – what things can we do to make using the Internet safer?
- Bandwidth – how could we get over 'log jams' of messages?

When undergraduate education students participated in the *PaperNet* activity and following the debriefing discussion, they were asked to reflect on how participating in such an activity might help a novice user's understanding of online communication. Reflections by undergraduate students included:

> *"The illustration and parallel between the game and the reality of email is really concrete and visible. It is solid demonstration, rather than a teacher just talking about it."*
>
> *"The activity makes a sophisticated "invisible" procedure visible, accessible and easier to understand. The working demonstration of email can integrate into the participants' preexisting knowledge."*

Following are some comments by children aged 10-12 years who played the *PaperNet* game as a classroom activity. At the time none had used email or online chat.

> *"I liked the first Internet game the best because no one knows who you are and you can annoy people."*
>
> *"The Blind game was the best because I couldn't see who I was writing to."*
>
> *"I liked the second game because I got lots and lots of mail."*
>
> *"It was hard being a networker, there was so much mail to deliver I couldn't handle it."*
>
> *"Someone asked me if I was a boy or a girl, and I said that I was a boy when I'm really a girl. It was fun pretending to be someone else."*

Learning about how the Internet Works

These activities are from Stephen Gard's excellent book *The Internet: A Resource for Australian Schools* (Gard, 1998). This book is a fabulous resource for teachers, whether they have access to high levels of technology or no access to technology.

The Robust Nature of the Internet

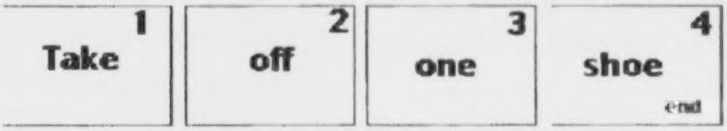
In a game called *Internetball* the participants stand in a large space in a grid pattern. Each participant represents a host in the network and the ball represents a message being passed through the network. The aim of the game is to pass the ball (message) to an adjacent (or nearby) person and get the ball from one end of the grid (network) to the other. Once participants have an idea of how a message (ball) gets passed through the network via the hosts (people) you can create 'glitches' by, for example, getting all green eyed boys to squat down and no longer be a functional part of the network. An alternate path for the message must be found when hosts become afflicted by these 'glitches' and become non-functional. This activity demonstrates the robust nature of the Internet which is a highly reliable system for data communication, because if one host in the system is knocked out, there is always another to turn to and the message will get through

Error Checking of Data

Another effective (and fun) learning activity from *The Internet: a Resource for Australian Schools* (Gard, 1998) is *Packet Panic*, a game that demonstrates how data are passed as 'packets' and are error-checked to ensure that the whole message has been passed and that its parts are reassembled in the correct order at the receiving end.

To begin, play the childhood game where a person is given a message and it is whispered to the next person and so on until the last person tells the group the message they received which, after passing through a succession of players, is usually different to the original message. Discuss the unreliability of sending messages in this way and how the Internet would not function adequately if data were sent in this manner.

To play *Packet Panic* get students to create a short sentence (four to six words) that gives a simple instruction such as "Take off one shoe" or "Stand on one foot". The message is then written onto cards with one word per card and the number of the word in the sentence also on the card. The last word in the sentence has the additional word 'end'.



The cards are shuffled and given to another group (who does not know what the message is). One person has the cards (the 'sender') and the rest of the team (about six people) are in a line with a few metres (yards) between each participant. The first person (the sender) reads one card, goes to the next person in line and whispers the contents of the card (the 'packet' of information) to her, such as "off, 2". The second person verbally 'passes the packet' to the third person up the line, and so forth. When the words gets to the last person (the receiver) he writes down the words received and says what he heard back to the previous person in the line. The message then makes its way back to the sender. If she receives back the same message that she sent, then she puts that card aside, knowing that that part of the message has been received correctly. She then sends the words on the next card. If the message that returns is not the same as the one sent then she resends the message. [Other packets of information (words on the cards) can be sent before the confirmation of the previous has been received, but is not recommended early on or chaos may break out!] The receiver reconstructs the original sentence by putting the words in the correct order and knows how many words there are in the sentence from the 'end' data. Regardless of the order the words are sent in or any errors occurring in sending some of the words, the checking by the sender means that each message will eventually be received correctly. The receiver then follows the instruction to show that the message was received. (This activity can also be set up with teams racing to correctly send a message.)

Where *Packet Panic* differs from the common children's game is that the 'sender' and the 'receiver' maintain a dialogue (via the team) in which they compare notes about what has been sent and any lost or damaged packets are resent until the message is complete and correct. The activity demonstrates that modern data transmission techniques ensure almost error-free message handling (cyclical redundancy checking). This is a concept that would be difficult for most children to develop an understanding of, yet this activity illustrates this complex topic in an easy to understand way.

Conclusions

Activities such as these create a scaffold of understanding and can be useful both when IT resources are scarce or for topics where off-computer activities provide a richer learning environment about high tech issues. There are many concepts relating to IT use that are better explored for understanding when not at a computer, but rather through the use of low tech or no tech activities as illustrated above. The types of discussions raised by these activities are very rich and explore topics that may otherwise be invisible. By engaging in learning activities such as these, students create a scaffold of understanding by operating within paradigms they are comfortable with. Abstract concepts can be explored, discussed, and dissected. Technology novices can gain confidence and awareness of what awaits them in the online world before they have access to a computer or the Internet.

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How One Educational Technology Professor Integrates Teaching, Research and Service

Alice Christie, Arizona State University West, U S

This paper describes how community service, research and teaching can be fully integrated by an educational technology professor by creating a partnership with a K-6 school. It describes the partnership development process, the grant-writing process, and the implementation process. Roadblocks that threatened the partnership are discussed as well as suggestions for overcoming these obstacles. Specifics about the integration process are discussed in depth.

The partnership between a university and a local elementary school serves a low SES population with few home computers and little Internet access. This project uses existing facilities to provide an after-school Community Technology Center where students, parents and other community members can have access to computers, email, the Internet, and computer instruction. In addition, many teachers in the school lack the skills to use technology effectively within their classrooms. The university professor will provide training to remedy this problem. Classes and access to the Community Technology Center are free to all community members.

This collaborative partnership is advantageous for all stakeholders: elementary school students and teachers will benefit from using the Technology Center after school hours; school and district administrators will satisfy parents wishing greater access to technology for themselves and their children; community members will benefit from access to computers and computer instruction; university undergraduate and graduate students will have opportunities will observe K-12 technology integration; several graduate students serving as research assistants will gain knowledge of qualitative research methods; and the university professor will conduct an extensive research study on students, teachers and parents using technology in a community setting. This project therefore provides the university professor with a strategic way to integrate teaching, research, and service.

GWeb Portal

Francesco de Leo, The George Washington University, US

The GWeb Portal is a centralized online environment developed to fulfill the varied needs of The George Washington University students, faculty, alumni, staff and friends. The ability to integrate email, online student registration, courseware software, enterprise data and other existing resources into a comprehensive single-sign-on portal allowed for greater application interoperability, extended usage, and enhanced University wide communication.

The GWeb portal is based upon a mix of academic and personal services to encourage use and promote community interaction. While the University's main purpose is to facilitate academic study, GWeb recognizes that the bond between the student and the University extends beyond the classroom. Considering that bond, services of personal nature, such as weather from around the globe, movie show time listings, comics, and classified ads provide resources that would otherwise require users to search elsewhere for these features. The aggregation of the GWeb services increased usage and therefore the effectiveness of communication between the University and its constituencies.

Today, thanks to its proven infrastructure, more and more applications are being built on top of the GWeb architecture to facilitate the University's operations and academic learning.

Currently, GWeb includes the following features:

- Role-based configuration. Users are presented with applications and communication that are relevant to their affiliation within the University (i.e. student, staff, faculty, alumni, or guest).
- Entertainment: GWeb modules include news from washingtopost.com, weather from around the world, comics, horoscopes, movie show time listings, live broadcasts of GW's radio station, real-time cameras from around campus, and classified ads.
- Role-based polling and surveys. Users are presented with polls and surveys that are relevant to their affiliation within the University (i.e. student, staff, faculty, or alumni).
- Content management and distribution. Organizations and departments within the University can post news and events on the portal and have the same content syndicated out to their own website on the WWW server.
- Online directory: Users can search email and campus addresses for faculty and staff.
- Access to external applications. The portal provides single sign-on to Email, library catalogues, and Prometheus (the University's courseware application).
- Secure distribution: Faculty and staff can now obtain instant, secure access to their personal identification numbers for accessing SCT's BANNER over the web.
- Leave tracking system. Provides GW employees with a method for requesting and tracking leave.
- Employment listings and employment applications. Allows users to browse and apply online for GW employment opportunities.
- Training registration: Allows users to manage GW systems training and other short-term courses.
- Bookmarks and Web Notes. Users can bookmark web sites or save the contents of various web pages through GWeb. These bookmarks and notes can then be shared with other GWeb users and accessed from any computer.

Visit GWeb at http://gweb.gwu.edu

Metaconceptualizing Knowledge: The Challenge for Teacher Education

Charles Dickens, Department of Teaching & Learning, Tennessee State University, USA,
cdickens@tnstate.edu

Abstract: The challenge today in teacher education is not to teach about technology, or with technology. It is, rather, to facilitate a different conception of what constitutes knowledge. Current concepts are still driven by an image of reality that was created over three hundred years ago. The Cartesian and Newtonian assumptions about a universe that can be known by knowing the nature of its component parts is no longer viable. The model for our present understanding of reality is one of particles, uncertainty, and tendencies. This paper explores the relationship between the digital universe and the physical and the necessary changes in our accepted concepts of the principle concepts that we take for knowledge

What is knowledge? What do teachers need to know about knowledge? Why are these non-trivial questions for twenty-first century teachers?

A few decades ago, the premier learning theory adopted in schools was a behavioral one. Learning was defined as an observable change in behavior. Knowledge was assumed to be discrete and generally factual. It was a substantive body of information that appeared to exist independently from those who taught it and those who were to learn it.

In the late sixteenth and early seventeenth centuries the locus of control for this body of accepted knowledge shifted from a the world as interpreted by the Church to a world being redefined by man. Space and time were inextricably and mathematically linked by Descartes's coordinate system of analytic geometry. Bacon's formalization of inductive logic opened the way for the development of science as the only trustworthy path to true knowledge. Newton's remarkable "laws" of motion were mathematically proven and empirically verifiable.

The paradigm of the enlightenment's world view, contributed by M. Descartes, was that the universe was like a great clockwork. It had a mechanical order that could be discovered by considering its component parts. Knowledge of the whole could be apprehended by studying and assembling its parts.

Knowledge was subject to change, of course, but it was a systematic change that substituted some parts for others. The changes did not challenge the underlying assumptions of the clockwork metaphor.

Changes wrought by twentieth century science did begin to chip away at this image of reality. Einstein's relativity reorganized space and time and their relationship to each other. Physicists and mathematicians were creating a radically different view of the underlying structure of reality that has yet to be assimilated into our collective consciousness. We still cling to the Cartesian and Newtonian view and the relative security and certainty it offers us.

In education, Descartes and Newton's legacy was evidenced by the public adoption of a behavioral theory of learning as recommended best practice a quarter century ago. Behavioral psychologists like B. F. Skinner proposed what were purported to be "laws" of human behavior, just as Sir Isaac had thought he was doing for physical science. Today, however, we consider best practice to be based on a constructivist view of learning, especially in recommendations for integrating the use of technology with classroom practice (Grabe & Grabe 2001, Jonassen 2000, Jonassen et. al. 1999).

It is rather ironic that one of the forces that drove the recent shift of focus in learning theory was research into artificial or "machine" intelligence, once a very small and arcane branch of computer science. Models of thinking in the form of sophisticated computer programs were used to test theories about human thinking and problem solving.

Today we have in our homes and schools computers that are far more powerful than those used to develop the first A.I. programs and early "expert systems." We are becoming a wired society and part of a global culture of a metaphorical "cyberspace." Having this technology in the schools means more than the need for teachers to learn new methods of instruction. It is a defining technology that has the potential for altering the ways we think about ourselves and our world. This means teachers will need a radically different notion of the nature of knowledge than they have had. It also means that their students will need to develop their own understandings of what knowing and learning are that will better serve them in the future.

In closing, I want to share a selection of definitions by experimental architect Lebbeus Woods (1991):

> DETERMINATE FIELD: a geometrical field pre-determined by a self-consistent set of rules of operation; e. g., the Cartesian field.
> FREE FIELD: geometrical field unpredictably determined by the complex flux of conditions within the field; e. g., the field of non-linear systems.
> NETWORK: an ephemeral, freely evolving, unpredictable dynamical four-dimensional pattern.
> CIRCUS: a cybernetic state of free interactions; a community of autonomous performers, continuously re-formed by the independent choice of each; a feedback loop; a recursive mechanism.
> PHENOMENON: a description of experience.
> CONSTRUCTION: the invention of reality.
> REALITY: the invention of construction; a feedback phenomenon.
> EXPERIENCE: transformation of reality through perception.
> FREEDOM: a state emptied of pre-conceived value, use, function, meaning; an extreme state of loss within which choice is unavoidable; a condition of maximum potential, realized fully in the present moment.
> STRUGGLE: the essential condition of freedom.
> KNOWLEDGE: the invention of the world in all its complexity and multiplicity of its phenomena.

The winner of the future is not the one with the most toys, but the one who plays with them the best.

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Title: **Integration of Informatics Concepts and Practices into an Existing University Curriculum**

[subtitle: There's no way we can fit another course into this program!!!!]

Within a four year Baccalaureate program of Nursing Education, this educator is interested in successfully integrating several computer skills and a knowledge base of information about the use of computers in healthcare, known as nursing informatics. After five years of informally trying to get students in this nursing program "practice ready" with acceptable computer literacy, knowledge base and skills, this educator recognized the need to formalize the integration of four levels of computer knowledge and practice into the existing nursing program. This paper is the description of the results of that integration project. Although this presentation will refer to a nursing curriculum, these ideas could be relevant to most post-secondary courses where students need to incorporate computer skills into their programs as accessory to their professional development.

This short paper will briefly describe

- the rationale for integrating this subject material into the curriculum as opposed to presenting it in a 3 credit course format.
- the objectives for the exercises and assignments chosen to help students know and practice their computer skills
- the expectations of student performance at each of the four levels
- the faculty development necessary to implement the integration

This paper will be of interest to educators concerned with practical ways to:

- assess student computer comfort and skill levels,
- interest students in using computer skills, and
- prepare students to go out into their career with foundational computer skills and comfort with technological advances.

Resources available with this short paper presentation will include a sample of assignment criteria and guidelines for implementation of computer concepts and practices expected at each level.

The Advantages of an Active Text

Brian Felkel
Department of Mathematical Sciences
Appalachian State University
United States
felkelbh@appstate.edu

R.L. Richardson
Department of Mathematical Sciences
Appalachian State University
United States
richardsonrl@appstate.edu

Abstract: Business colleges have become increasingly disenfranchised with the way Business Calculus courses have been taught and with subject matter included within the course. Over the past year we have developed a text for our class that we make available on a CD. This provides much flexibility and allows us to implement several innovative ideas. Because the text is active, we have inserted hyperlinks to current web data sets that the students manipulate. We have also made compressed videos of examples and exercises found in the text. These videos are available on the CD and hyperlinks to the videos have been included within the text. These ideas could be generalized to courses other than Business Calculus. One could also use these ideas to make his/her own video tutorials without writing a new text.

Introduction

As mentioned in the abstract above, business colleges across the country are beginning to question the worth of Business Calculus as a required course. Several years ago the College of Business at Appalachian State University was among this group. It was then that the mathematics department started using Excel extensively in this course and started focusing on the needs of students in this course. Over the course of this last year the authors set out to improve upon this course by designing an innovative, new text entitled Networked Business Math.

The course already required extensive computer use with Excel and Maple, a computer algebra system. It was natural to try to make use of the power of computing in this new approach. The text, at the time this article was written, is a complete one-semester text for Business Calculus. It was first available via the web but is now available on CD.

Because this text requires the computer just to be read, we were able to make it an active text. Exercise sets at the end of each section have hyperlinks to solution sets. Exercises have hyperlinks to current data, e.g. census or labor statistics data, and thus these exercises remain current. The main innovation is that most examples in the text contain a hyperlink to a video file. This file shows students how to work the example and students can also work along with the video.

In this paper we will discus, in more detail, this text and its innovations. Students' reactions and comments will also be included. Finally, we will point out ways in which others can use some of these ideas without writing his/her own textbook.

Exercises and Solution Sets

Because the text is active, students have links within the text that access web sites containing current interest rates, current U.S. income data, labor statistics, census data, etc. This, of course, is an impossibility with a printed text. An example is included below:

Go to http://www.census.gov/govs/www/state.html and select a year for the Summary table. Download the "Summary Table Spreadsheet."

(a.) Using the state population as the x-coordinate and the total revenue as the y-coordinates, choose 5 states (not your own), plot the data, and find an equation of a curve of best fit.

(b.) Plug in your state's population and predict your states total revenue. How accurate was your prediction?

(c) Repeat a and b above with 20 states

Huge data sets, which are current and applicable to the majors, can be downloaded and then uploaded into Excel within a matter of seconds. As long as the census bureau updates their web page, this problem is a current problem. Also, some self-constructed data sets within the text have been embedded in such a way that students can copy and paste the data into Excel quickly and without copy error. This results in more instruction time and also allows for more intricate and detailed examples within the text.

The exercise sets at the end of each section also contain hyperlinks to solution sets. If the homework requires the use of Excel, the solution file is an Excel file. If the homework requires the use of Maple, the solution file is a Maple file. Because many students do not have a copy of the Maple software, html files can be accessed to show Maple solutions to the homework. These files are truly solution sets and not just answer sets. Students can explore and manipulate their files, in order to check their solutions and, of course, these files are included on the CD.

Video

As stated above, most examples have hyperlinks to a video file. A typical example has the following format:

Example 1: Copy the linear data above and find the line of best fit.
See sec1_4_1.qt. for a video on this concept.

These video files are included on the CD and must be viewed with Apple's QuickTime Player, a free download from Apple's web site.

These videos offer students and teachers many advantages. The pedagogical advantage is more classroom instruction time. If a course requires the use of computer software, classroom time must be used to teach the software syntax. Because the videos show the software "in action," students can see the syntax for themselves and view the cause-and-effect relationship of the commands. The instructor, therefore, does not have to re-explain the syntax, and more time is available for actual course instruction.

The students also reap benefits. These videos should appeal to the visual, auditory, or tactile learner. The students can run the video and software simultaneously. Therefore, a student can work along with the video and learn the material and the syntax. If the video progresses too quickly, the student can pause, rewind, or rerun the video.

These videos are also 24-hour tutors. Students do miss class from time to time or they just miss concepts while in class. Learning class material that has been missed can be difficult. With the use of these videos, students have some help to that end.

Response To The Text

On the lighter side students have commented that it is nicer to carry a 5-oz. CD as opposed to a 10-lb. book. Students who have missed class have pointed out that the videos were a tremendous help in learning missed material and keeping up-to-date with the rest of the class. Student response to this approach has been quite favorable. In fact, two students led a departmental colloquium in April 2001, in which they discussed their (favorable) views of the text.

We have been using this text since January 2001. Since then, about 600 students have used this text at ASU and one community college teacher has used it during the Fall, 2001, semester. Because of the student volume and nature of the text, an (almost) typo-free text has been created.

Students' impressions and comments have been very positive thus far. They appreciate the fact that applicable topics are covered, and some students have reported to us that they have used Maple in other business classes. Because of the use of Excel and Maple, more "real-world" type problems and functions can be analyzed. Students have also expressed much appreciation for the videos and the benefits that they provide.

Generalizations

The authors realize that business calculus is not the only class for which computer software is used. Some of these ideas can be implemented into any class that uses computer software, without having to write your own textbook.

First, understanding how the videos are made is necessary. These videos were created with Snapz-Pro^2 , available at http://www.AmbrosiaSW.com, which is essentially a screen capturing software tool for Macintosh computers. For those using a Windows PC, a similar program, HyperCam, is available through Hyperionics. These programs allow the user to capture between 1 to 30 frames per second and embed audio. The authors use 5 frames per second and the file size is approximately 500KB per minute of video. Most videos are between 2 to 5 minutes in length so, as a result, video downloads are relatively short, even with a 56K connection. However, the computer that one uses to produce the videos needs to have sufficient speed and memory or the video will lag significantly behind the audio. The authors used a Macintosh PowerBook G3 with 333MHz and Mac OS 9.0.

Because this software is a screen capture, virtually any software can be videoed. With this software a teacher can produce his or her own videos and make them available via a web site. Videos less than six minutes in length can be downloaded relatively quickly with 28-56 kb modems. Thus, as long as students have internet access, they have video access. In fact, the authors first used this approach before the new text was written. The authors managed the course using WebCT and it was natural to use this as a storage area and access area for the videos.

Statisticians within the ASU Mathematical Sciences department have started using this type of video to model some statistical software. Instructors can make their own tutorials or work selected exercises from their current textbook. Instructors could write their own supplementary exercises and make them available through the web with links to video. There are many possibilities and instructors can make it as intricate or involved as they wish.

Conclusions

A textbook on CD should be more than simply a transfer of words from one file format to another. It should be an interactive textbook. Networked Business Math allows for this. With the click of a mouse students can access huge data sets or solution sets. With another click of a mouse students can access video and can participate by modeling what they see in the video. In this way the text is truly interactive and students can do much more than passively read the text. In fact, with many math texts students do not even engage in passive reading of the text. This text and style attempts to draw the student into active learning of the material.

As stated above, these approaches need not be confined to Business Calculus. Statistics software, geometry software, computer algebra systems, etc. can be explained through video. An instructor need only post their video tutorials in a web-accessible space and students have 24-hour help.

Web Design through Traditional Subjects

Joanne Fevergeon, Teacher
Ellensburg High School: Ellensburg, Washington
jfevergeon@wonders.eburg.wednet.edu

Anuja Dharkar, Curriculum Specialist
Macromedia: San Francisco, California
adharkar@macromedia.com

Abstract: Web design is a new subject for many teachers. Although Web design teachers have the ability to teach this course, they have not generally come from a Web design background themselves. Having the knowledge or background to teach such a course can be difficult. New teachers of Web design can draw from more traditional subjects, where they might have more expertise.

Web design requires understanding information and its underlying conceptual structure to create Web sites that convey the information in a way that promotes learning. Although it is a new communication medium, teaching Web design can provide an exciting method that combines traditional subjects with the latest communication technologies. Web design can be used to teach subjects such as History, Art, and English and vice-a-versa.

History

Students encounter large quantities of information on the Internet. To be thoughtful consumers of this information, students must learn to discern its validity. The research students conduct and the products they create for the Web also need to contain valid and justified content. Students can learn to assess validity by following the processes they use in other subjects such as history. For example, when documenting historical accounts, expert historians conduct the search for validity by verifying the authenticity of the source, checking for bias, and using corroborating evidence. Similarly, students can utilize these professional methods to distinguish valid Web information from false content. In this session, we will do a number of activities to judge validity by analyzing Web site information with respect to bias, sourcing, corroboration, and currency.

Art

Graphic design on the Web incorporates basic rules of design. Principles of art and design overlap when designing for the Web. Students can be taught traditional art methods to apply to the Web forum. Art principles such as color, balance and the rule of the thirds will help students better understand graphic design.

English

The Web contains written work that is different from writing for print work. The information on the Web must fit into a smaller space and capture the attention of the user immediately. When learning to write in English classes, the topics covered help students organize information and provide specific information. Differentiating these two forms of writing can help students better understand writing for the Web. Teachers linking Web writing to writing in English class can help students easily transition to Web writing. Learning to write for the Web differs, but having strong writing to begin with will help students transform their writing for the Web.

Conclusion

The transition to Web design requires the acquisition of new skills for teachers and students, however the transition can be made smoother by incorporating the use of traditional subjects. Web design, although a new field, can be taught in conjunction with familiar subjects that will produce similar skills. These skills can then be built up beyond their traditional roots.

A Comparison of Online and Regular Learning Contexts in a Course for Teacher Education Students

Asghar Iran-Nejad
Yuejin Xu
Educational Psychology Program
University of Alabama
United States
airannej@bamaed.ua.edu

Abstract:
This paper explores whether online and regular learning contexts differ in their influence in the course of a semester-long intervention aimed at changing the learning conceptions of the students enrolled a multi-section educational psychology course for teacher education students.

Introduction

Changing teacher's conceptions of learning and knowledge is currently viewed by teacher educators as an important component of pre-service and in-service teacher training programs (Cochran-Smith & Lytle, 1999). The way we conceptualize learning has a profound influence on the approach we may take in further learning and teaching. However, little is known about what affects the development of learning conceptions and how different learning conceptions interact with learning contexts and types of instruction. The study reported here explored a semester-long approach to teaching educational psychology to pre-service teachers aimed at getting them to reconsider their own conceptions of learning. The study also explored how well online cooperative learning contexts compare with traditional cooperative learning contexts. Additionally, we explored a new type of instruction which not only provided procedural learning opportunities but also opportunities for indepth grounding of student learning in their prior experiences.

Theoretical Framework

Iran-Nejad (1990) identified three qualitatively different levels of learning conceptions as reflected in existing learning theories. The first level is internalization of external knowledge by means of maintenance rehearsal in which learning is viewed as the storage of ready-made objects. The second level is internalization of external knowledge by means of constructive elaboration in which learning is more likely viewed as the construction of objects via ready-made patterns. The third level is the wholetheme reorganization of the learner's own intuitive knowledge base in which learning is like inventing new designs using one's own intuitive knowledge base. This third level was the goal of instruction for indepth grounding. Such instruction includes the interaction of multiple sets of factors. One set of factors influencing learning has to do with learner's own active and dynamic self-regulation processes (Iran-Nejad & Chissom, 1992). Another related set of factors results from interaction in social and cooperative contexts (Vygotsky, 1978). And yet a third set of factors deals with variables having to with the kinds of learning activities facilitated through instruction. In normal academic learning these factors are expected to work together naturally to bring about future learning. Moreover, following the biofunctional theory (Iran-Nejad & Gregg, 2001), we hypothesized that wholetheme learning facilitate the development critical learning.

Methodology

The students in six different sections of an educational psychology course for teacher education students were randomly (a) divided into groups of 4 to 5 students each and (b) assigned to two cooperative learning contexts. In one context, students met in regular groups in their classroom to engage in cooperative learning activities. In the other conditions subjects used the computer to interact using the same learning activities, computer forums, and online interaction using WebCT. In addition, the students in three of the sections were provided with procedural learning instructions. Students in the other three sections received procedural learning opportunities plus grounded learning opportunities aimed at wholetheme learning as defined above. A conception of learning inventory was used to measure changes in participants conceptions of learning. A multiple choice test measuring different levels of critical reflection was also used. Finally, the learning activities were compiled by the students into a reflective learning portfolio, which will be used as a source of qualitative data.

Results and Discussion

This paper reports the quantitative data from the learning inventory and the multiple choice test. Qualitative data is discussed in the presentation. The scores from each of the three subscales of the Conception of Learning (LC) inventory were summated. A mixed design ANOVA was conducted on the pre-test and posttest inventory scores with three levels of learning conceptions (LC1, LC2, LC3) as a within-subjects factor, two levels of instruction as a between-subject factor, and two levels of cooperative learning as a between-subjects factor. Would the participants in the computer cooperative learning groups in any form of relevant disadvantage as compared to those in regular cooperative learning groups. No significant main effect or interactions involving cooperative learning were found. The multiple choice test contained three types of items. Regular items measuring domain-specific content, critical reflection items based on domain-specific content, and critical reflection items measuring cross-domain inference. A potentially important finding was that the interaction between cooperative learning and instructional intervention was significant only for cross-domain multiple-choice items. No differences were expected between online and regular cooperative learning, and none were found. The finding that the participants in the grounded instruction did better in regular cooperative learning and worse in online cooperative learning was surprising. This finding is interesting, especially since the mean performance for both grounded instruction groups was higher than regular instruction groups.

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Technology overload: Are we meeting the needs of the individual student?

Steve M. Jenkins
Department of Psychology and the Behavioral Sciences
Louisiana Tech University
United States of America
Stevemjenkins@yahoo.com

Cathy Lott
Department of Psychology and the Behavioral Sciences
Louisiana Tech University
United States of America
catlott@aol.com

Walter C. Buboltz, Jr.
Department of Psychology and the Behavioral Sciences
Louisiana Tech University
United States of America
buboltz@latech.edu

Lamar Wilkinson
Department of Psychology and the Behavioral Sciences
Louisiana Tech University
United States of America
lamar@latech.edu

Abstract: Integration of technology and basic computer literacy into our colleges and universities is undoubtedly a necessity. However, little consideration in the literature has been given to specific needs of the student. Educators need to consider the level of incoming technology literacy, and career field of the student when implementing technology training to ensure that individual needs are met without overloading the student. Universities have a responsibility to insure that the integration of technology into courses is not done recklessly, and that all students have an equal opportunity for success.

In today's technology driven world, the integration of technology and basic computer literacy into our colleges and universities is undoubtedly a necessity. However, little consideration in the literature has been given to specific needs of the student. While some students may enter college with the basic technology competencies needed to successfully complete course work, others are often required to master technology that may have little relevance to their particular field of study. The level of computer experience and knowledge necessary varies drastically from job field to job field. Simply requiring students to acquire knowledge of a preponderance of software programs, may be a detriment rather than an asset to college students. In order to adequately prepare college students for a career, without overloading them with non-essential technological skills, universities need to focus on the individual student's specific needs. The main concerns addressed in this article are the relationship between course content, technical proficiency, and influence on social skills.

Virtually all employment opportunities for college graduates require (and even expect) a certain level of technological experience. To meet this challenge, many universities are either infusing the instruction of various computer programs into course curricula, or simply requiring the student to use a variety of technology mediums to complete assignments. Many universities now even require students to own or lease a personal computer that meets the universities' own recommendations. According to Harry Matthews, Chair of the Academic Computing Coordinating Council at the University of California – Davis, "computer ownership levels the playing field for all students" and also assures instructors that on-line assignments are accessible to all students (Justice, 2000).

The fact remains that not all students are on a level playing field. In 2000, only half of all college freshmen arrived on campus with their own computers. These college freshmen were proficient in using

Windows, word-processing software, electronic mail and the Internet (Olsen, 2000). Unfortunately, this suggests that the other half of college freshmen may not have the aforementioned proficiencies, and are at a disadvantage when compared to their fellow students that do own computers. Ultimately, the amount of time for the student to learn the subject material does not change. If the student is not already familiar with chosen medium, he or she may be faced with a significantly larger workload than the technological savvy student. Conversely, if the instructor allots class time for technology instruction, the result may be the subsequent omission of certain course material. There is a struggle been achieving a balance between technology, course content, and social skills learning.

There is no doubt that universities must ensure that students are technologically literate before graduating, since more jobs than ever before require proficiency in technology. Therefore, universities must make an effort to assure that all students are truly on "equal footing" throughout college, and can progressively grow together in their continued, expanded use of technology. An additional issue is the needs of non-traditional students. Many non-traditional students have part or full-time jobs as well as families at home. They simply do not have "extra" time to attend workshops outside of their regular classes.

The vast differences in the abilities of both traditional and non-traditional incoming students dictates a need for intervention. A computer proficiency assessment for incoming students, prior to admission, could identify a need for remedial computer instruction. A class in the use of microcomputers could facilitate an even playing ground for all students. Another way universities could address these needs is by covering computer literacy in freshman seminars as a part of adjusting to college life.

It is also important that the rapid infusion of technology into universities is not executed at the expense of social skills training. Careers in fields such as psychology, where face-to-face skills and the observation of non-verbal cues, are essential to success, an overemphasis on technology could be detrimental to the overall education of the student. According to Rogers (1992) "There must be a warmth of relationship between counsellor and counselee if any progress is to be made". For many individuals, learning the intricacies of computer software and technology may be considerably less important than daily social skills training and application. Early research by Gove and Geerken (1977) indicated that when people have more social contact, they are happier and healthier. Furthermore, research has indicated that there is a positive relationship between social skills and academic achievement (Feshbach and Feshbach, 1987). Universities that require instructors to implement technology into courses need to consider the student's social development and career path.

Today's college student is faced with not only learning traditional course content, but also required to attain proficiency at the use of a variety of technological mediums. Oftentimes professors are using technology such as a web page to supplement course instruction. Students who are less technology literate than their peers are either forced to spend additional "study time" learning how to navigate through a new web site, or forgo the web site material. Hence, if students are overloaded with learning technology, this may be accomplished at the expense of valuable course content. Technology overload may also be affecting the student's social skills training. Many careers require "face-to-face" rapport building skills. Courses that traditionally focus on this type of training may be less beneficial for the student, if class time is dedicated to technology instruction. It is not the intent of the authors to suggest that technological infusion is counterproductive to the student's education. However, universities have a responsibility to insure that the integration of technology into courses is not done recklessly, and that all students have an equal opportunity for success.

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The Dichotomy of the Conquering Hero: Searching for the Pedagogy in the Teaching of ICT

A C Jones, University of Sunderland, School of Education, Hammerton Hall, Gray Road, Sunderland, United Kingdom SR2 8JB
Email: chris.jones@sunderland.ac.uk

Abstract
There are I believe a number of approaches being taken to the teaching and learning of ICT in English secondary schools. Many teachers of ICT are not specifically trained in the subject and so are using tried and tested pedagogies borrowed from their own experiences in the teaching of the specialist subjects in which they were trained. Some of these teachers are imposing their own view of what ICT is about and how it should be taught. Some are recognising that ICT has concepts, knowledge, skills and abilities that need to be taught - but not being sure how to go about teaching these are falling back on a skills transmission model that is appropriate in vocational skills training but which underdevelops the things that students 'need to know'. This paper looks at the strategies that are being employed and looks at where a perceived pedagogy for ICT is emerging.

Is there a pedagogy for ICT?

The teaching of ICT in secondary schools in England has been highlighted as having many weaknesses. Reports on the development and application of ICT in schools during the 1990s highlighted problems with resourcing and the slow-response times to new initiatives (Cox & Johnson, 1993. Stevenson, 1997). The OFSTED report which focused specifically on the inspection of IT teaching in England during 1995/6 identified IT as the least well taught subject in the curriculum (Goldstein, 1997). The situation has changed a little over time, but standards in ICT remain highly variable throughout the country; and do not compare favourably with standards in other subjects.

> Achievement remains unsatisfactory ... in one-quarter of schools in Key Stage 3 and in one-third at Key Stage 4. (Ofsted, 2001)

Goldstein (op. cit.) highlighted the need for the development of a critical pedagogy for ICT. In referring to a critical pedagogy he was mindful of the difference between the teaching of IT skills, the development of IT knowledge, the understanding of ICT concepts and the application of knowledge, skills and understaning in a variety of contexts. For each of these approaches to the development of capability in ICT teachers needed to be aware of the specific teaching and learning methodologies that were appropriate and should be critical and reflective in their choice of pedagogy. He reminded us, also, that in order for the pedagogical and managerial development of ICT as a subject to be successful schools would need access to "high quality national and local support" (p3). He goes on to say that:

> Lessons should be learnt from earlier stages of successful curriculum development in IT in this country, when such support entailed opportunities for teachers and teacher educators to sustain professional networks which addressed the teaching of IT and its uses in the curriculum (p3)

His message appears clear; without support and direction, teachers of ICT begin to "think that technology is the most important factor ... and overlook the pedagogical objectives' (Mason, 1998), and are deflected from starting to think about their practice in terms of appropriate theories of learning and teaching (ngflscotland). The 'technology trap' is one which is at once both appealing and dangerous: personal competency in ICT is a pre-requisite for pedagogical competency (you need as a teacher to know how to use the hardware and software to develop conceptual awareness), but the students in school need also to develop their personal

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competencies before they can use the ICT effectively as part of their learning repertoire - and as such you as the teacher can stick simply to the teaching of personal competency and not get into the development of conceptual awareness and understanding in your students.

There is certainly merit in that train of thought. Skill development often begins the process of conceptual development. The problem that we have with the teaching of ICT and the development of IT capability is that teaching and learning in ICT often does not go very much further than the teaching of skills based courses. So the pedagogy does not, very often, go much beyond drill-and-practice where students merely follow sets of instructions (or work through workbooks) which outline exactly which key presses and manoeuvres a student needs to go through in order to meet the defined task requirements.

The impetus for such approaches to teaching and learning in ICT derives from the technology itself and the pragmatism which lies behind the belief that functional competency in the use of the software alone is what constitutes an effective curriculum in ICT. The pragmatism here is one which ensures that students are successful in functional operations: they can do. They might not understand - but if we only test their abilities to carry out a limited range of operations then understanding is not necessarily important.

If we are to get any closer to a defined and accepted pedagogy of ICT (Goldstein, 1997) we need to analyse and define what is, or perhaps what should be taught as part of the ICT curriculum. We need to identify clearly the components of that curriculum and to identify and describe measures that need to be taken in order to ensure that the delivery of that curriculum is fit for the purposes we require of it.

In her analysis of teaching and learning in ICT, Webb (2000) identifies significant difficulties. The development and transmission of knowledge is "crucial to the pedagogical reasoning process" (Shulman, 1987), but in the ICT teaching community the match of experience and practice to the categories that Shulman defines is not a good one. It is clear from experience that many teachers of ICT lack a well defined subject knowledge (Preston, et al., 2000) and the definition of the subject in the National Curriculum specification for ICT, is couched in terminology which is generic enough to cope with the rapid changes in technology over time, but as a consequence has less clarity than other subjects. Webb (ibid.) analyses the relationship between the pedagogical content knowledge and how the subject itself accepts and utilises general pedagogical knowledge and concludes that they are:

> less well defined for ICT ... and the fairly limited research base of students' problems and misconceptions in ICT means that the knowledge of learners and their characteristics is limited.

This issue about the language of pedagogy and ICT is central to much of the debate, as is the dichotomous relationship between skills and concepts. Ofsted (op. cit) identifies the 'lack of systematic networking of leading teachers and schools' and those programmes which focus 'on the individual teacher's skills in using specific software' as being analogous with the failure to develop an 'effective subject pedagogy using ICT'. The tendency also to 'focus on technical matters' when supporting the role of ICT co-ordinators has undermined efforts to 'engage in professional and curriculum development' (p5).

Passey (1998) identifies a need for teachers to begin to see ICT in the same way that their students do, and in coming to see the technology as part of their natural teaching and learning repertoire will support their own development of a pedagogic competence in ICT. What is interesting in his view is that he firmly places the development of pedagogic competency before that of functional competency.

McCarney (2000) in summarising conference responses to the issue of pedagogy and ICT stated simply that 'there is a clear need to develop the pedagogy of ICT in the curriculum'. Grant (2001) also comments upon the lack of 'an agreed language regarding a pedagogy for ICT'. In doing so, she highlights the significant failure of the education community to deal effectively with the demands made upon it as a consequence of the development and application of a curriculum that is loosely defined and that is dependent on timely responses to technological change.

Identifying the language of the pedagogy is important here. Grant (op. cit), Goldstein (op. cit) and Webb (op. cit) all refer to the way we as teachers talk about and define what it is we are doing in terms of our teaching and learning. Part of this is about identifying clearly what we want our students to learn - the content of the curriculum; and a significant part getting to the 'agreed pedagogy' must be about identifying clearly how we should go about teaching this content.

Responses to technological development, be that the introduction of new hardware or the updating of software, often leads to a temporary de-skilling of the user and a consequent demand for specific operational training that is designed to support functional competency. A study of teachers' skill development in Greece (Makrakis, 1997) determined that personal skill acquisition are almost irrelevant without the development of pedagogical knowledge and understanding at the same time. In the context of Shulman's (op. cit.) knowledge categories competence in using ICT tools is skill application and demonstration without "the pedagogical organisation and presentation" (Makrakis, 1997 p167). Atkinson (1997) goes further and elaborates on the relationship between the technology and the potential for the development of a pedagogical construct indicating that technology lends itself to skills development without the concomitant development of underpinning concepts and knowledge:

> Technological systems are prone to under-theorisation and are often predicated on implicit pedagogical assumptions that do not necessarily stand up to rigorous scrutiny. (p 102)

Selinger (2000) acknowledges, in her analysis of the use of multimedia in schools across Europe, that "virtually all countries recognise that development cannot be effective unless attention is given to teacher training", and that any teacher training undertaken should focus in on the pedagogical application of ICT. Her analysis was further developed by Freeman and Holmes (2001) in their review of national policies for ICT. We have seen in England that the approach taken by the DfES to the development of teacher knowledge and skills in ICT through NOF training has come under criticism from Ofsted (op. cit.) and from teachers themselves (creativenet, 2000). This criticism lays the blame for the lack of appropriate development in ICT firmly at the door of the DfES. The "weakness of government in providing for change" was seen to exist, among other reasons, because there was a distinct lack of will to prioritise the teaching of ICT, and that in over half of schools ICT is neither fully implemented, nor evaluated (Jones, 2001 creativenet, op. cit.)

This lack of national vision and application is not a purely English phenomenon. McKenzie (1993) relates that, even after ten years of computers in American schools, "there is some evidence that we have failed to integrate the use of technologies by all teachers ... in ways that are meaningful, natural and powerful".

Plotting the route for finding both the perceived and projected pedagogies for ICT is not straightforward, though there are clear markers that we can lay down to help us to trace our route. Classroom mythology describes a situation in which enthusiastic students who are willing to learn and who enjoy the structured and staged approach to the development of ICT skills people ICT classrooms. The argument would continue to state that if children enjoy their learning and if we can see that there is a "greater improvement in ICT standards than in any other subject" (Ofsted, op. cit.) then there is nothing inherently wrong with the teaching and learning methodologies employed in ICT classrooms.

However well stated this argument might be the research into effective teaching (Hay McBer, 2000) identifies clear approaches for the development of successful pedagogy in all classroms that is not, as yet, being applied in ICT classrooms. The issue of in-service training is part of the solution, and should be focused not on the development of operational skills but on the pedagogical knowledge required to develop children's learning as fully as possible (Hemmings, 1998). There are other important issues that need to be drawn out here. The majority of teachers of ICT began, as I did, as teachers of other subjects and moved into ICT either as the curriculum changed and 'they had expressed an interest in it', or because they had a gap in their timetable that needed filling. As a consequence there is a large number of teachers of ICT as a specialist subject who have brought with them a pedagogy from their training and experience of teaching another subject. They have general classroom knowledge, but lack the content knowledge, curriculum knowledge and the pedagogical content knowledge (Shulman, op. cit.) to be fully effective in their roles. These terms are important in beginning to identify what it is about teaching a subject that is different for each subject, and are therefore central to the analysis of what it is that differentiates pedagogies. General classroom knowledge relates to the knowledge that teachers have which enables them to manage classrooms and to relate to the students that they teach. Content knowledge is equivalent to subject knowledge and should be seen as an important and essential partner to curriculum knowledge which is the understanding that the teacher has about the structure and content of the curriculum as defined by external agencies such as examination boards and the National Curriculum. What pulls all these strands together is the development of pedagogical content knowledge which exemplifies the whys and wherefores of how to teach the subject effectively.

There are difficulties too in that the National Curriculum specification for ICT is vague in its use of terminology, and is perhaps best described as a wish-list for student development in ICT. It describes what a student should be able to do, but not as in most other subjects, what they should know. This has led to the development of on-line, interactive or prescriptive schemes of skill development and application that foster a classroom pedagogy of what might be termed as 'ultra-facilitation'. Here the role of the teacher is purely that of monitor and assessor. It is the use of software that drives the learning; the focus on the task is supreme and the teacher's input to the lesson is minimal. Such approaches are, I would argue, part and parcel of the pedagogical dilemma facing teachers of ICT. There are 'successful' commercial schemes that offer certification and structure to teachers, schools and students which require very little in the way of actual subject knowledge on the part of any of the participants. Under these circumstances, why is pedagogy important at all? Schools can fill the students' time constructively, they can meet targets for student achievement, and they can deploy teaching staff effectively using existing resources.

One might counter this with the argument that quality assurance systems that monitor the effectiveness of the educational process will promote student learning and enable teachers to identify curriculum weaknesses and to move forward in a cycle of school self-improvement. This might well work in other curriculum areas but in ICT the inspection framework at school report level is not forceful enough in responding to its own judgements when schools are failing to meet National Curriculum requirements for ICT delivery (Jones, op. cit., Goldstein, op. cit., Ofsted, op. cit.).

There is a distinct need to develop the curriculum content of the ICT curriculum and to specify the range of teaching and learning experiences that children should expect to benefit from as a consequence of schooling. (Webb, op. cit.) This is beginning to happen since the publication of the QCA schemes of work for Key Stages 2 and 3. Very little analysis of the impact of these schemes has taken place. In a very quick hand count, of the 57 teacher trainees beginning their school practicum element in October 2001 only 4 were going to be involved in any form of teaching ICT in a framework which corresponded to that published by the Qualifications and Curriculum Authority. Subject knowledge is the main barrier here to pedagogical development and change in ICT classrooms. The focus on functional competency, which enforces particular pedagogical concepts such as drill and practice, could be minimised if teachers teaching ICT but qualified in other subject areas were "encouraged to study the theoretical aspects of the subject rather than focusing predominantly on practical issues" (ibid.).

The development of the ICT capable school, one which acknowledges the curriculum importance of ICT and which invests in the training and development of staff in ICT, is an important step towards defining the pedagogies appropriate for the ICT classroom. An approach to the development of ICT in schools has been identified by a UNESCO project (unesco, 2000) and has proposed four stages of school development and defined the learning pedagogy appropriate/characteristic of each stage:

Emerging	Applying	Integrating	Transforming
Teacher centred Didactic	Factual knowledge based learning Teacher centred Didactic ICT as a separate subject	Learner centred learning Collaborative	Critical thinking and informed decision making Whole learner, multi-sensory, preferred learning styles Collaborative Experiential

Table 1. Approaches to ICT Development in Schools (ibid.)

This perhaps allows us to plan our journey. Many schools would however misinterpret the focus of the table and place themselves in a higher domain than would be appropriate based on an analysis and observation of teaching styles. If we build this model into the four stages of pedagogical informing (Woods, 1993) then we can see that, although the context is appropriate (ICT has dedicated suites), the lack of a fully defined content in the lower school, and the lack of open and grounded inquiry pose barriers to progression from one pedagogical domain to another. It is my belief that many schools would claim to be applying the concepts of learner-centred learning and that because ICT was already a separate subject that they were progressing from application to integration. Indeed, we can see elements of integration taking place as far as the facilities and resources are concerned, but in relation to pedagogical development most schools are stuck between emergence and application, and until teachers are more familiar with and confident in the concepts which underpin ICT they are not going to progress into the development of a pedagogy appropriate to ICT, and will continue to apply those pedagogies which are clearly not serving themselves or their students well.

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Title: Graphic Conceptual Organization: Metaphorical Representations of Understanding Within a Conceptual Framework of Understanding

Authors:

Robert Jones
University of Houston-Clear Lake
Houston, Texas
jonesr@cl.uh.edu

Caroline M. Crawford
University of Houston-Clear Lake
Houston, Texas
crawford@cl.uh.edu

Ruth Gannon-Cook
University of Houston-Clear Lake
Houston, Texas
gannoncook@cl.uh.edu

Jana Willis
University of Houston-Clear Lake
Houston, Texas
willis@cl.uh.edu

Topic: Concepts and Procedures

Abstract:

Unlike the highly individualized mapping process developed and popularized by Novak and Gowin, the Jones-Steinbrink model produced invariant maps with recognizable conceptual patterns. This outcome allowed researchers to produce concept maps and related instructional materials in an orderly, systematic manner that allowed students to efficiently and effectively learn the concepts presented in science and social studies lessons.

Proposal:

This paper presents a summary of the research and development efforts in graphic conceptual organization of curriculum materials conducted at the University of Houston-Clear Lake by Robert M. Jones and John Steinbrink during the 1980s. In a series of projects conducted by masters degree candidates, they were able to identify and validate four basic conceptual patterns in nonfiction science and social studies textbooks. Using the four basic patterns which they labeled main idea-supporting detail, summary and generalization, process or sequence and cycle, they and their graduate students were able to conceptually map all lessons and chapters in contemporary science and social studies textbooks. Unlike the highly individualized mapping process developed and popularized by Novak and Gowin, the Jones-Steinbrink model produced invariant maps with recognizable conceptual patterns. This outcome allowed researchers to produce concept maps and related instructional materials in an orderly, systematic manner that allowed students to efficiently and effectively learn the concepts presented in science and social studies lessons.

The graphic technology software available in the late 1980s consisted mainly of drawing programs and each individual element of the concept maps had to be drawn. Jones developed a series of coded templates in an attempt to improve this situation but the process was still slow and expensive in terms of human resources and time. This resulted in the development of only a small number of demonstration lessons and units. The technology was so complicated and time consuming that researchers found it easier to hand draw the maps using flow chart templates.

Recently several new generation programs with excellent conceptual mapping capabilities have been developed and are currently readily available for use by curriculum workers and teachers. This paper presents several lessons from a contemporary science textbook that have been conceptually mapped using the Inspiration software. Lesson concept maps with reading organizers, conceptual worksheets, aligned review and assessment tasks and other graphic teaching/learning products are presented. These products utilize the Jones-Steinbrink patterns and can be easily constructed using Inspiration. In addition to solving the technology problem faced by the earlier generation of researchers, the current software allows the instructional materials to be quickly and efficiently produced.

The Inspiration software also allows for the utilization of advanced interactive techniques that were conceived of but could not be demonstrated by the early researchers. For example, the lesson concept map can be presented in an uncluttered manner using only a few descriptive words for each conceptual element. By using the note feature of the software, each element can be opened to present descriptive text to the learner. This should allow for focused reading and concept pattern recognition by learners. Numerous other features of the software and their use in conceptually organizing curriculum materials are currently being investigated. These are presented and discussed.

Focus First: Strategic Planning and Front-End Development of an Online Teacher Resource

Cathy Bonus Lalli
Northeast and Islands Regional Educational Laboratory
The Education Alliance, Brown University
United States
Cathy_Lalli@brown.edu

Abstract: This paper addresses the critical steps that contribute to the strategic planning and front-end development of a new Web site. The process included an interdisciplinary team that worked to define the project in terms of purpose, objectives, target audience, and style, using modified versions of established Web development guidelines. The team also gathered information that would define and prioritize the content. This process was undertaken in a way that economized limited resources in the early stages, but allowed for future expanded development.

Background

As part of a contract award from the U. S. Department of Education, the Northeast and Islands Regional Educational Laboratory (LAB), a program of The Education Alliance at Brown University, agreed to develop a Web site entitled "Teaching Diverse Learners." This award was due in part to The Education Alliance's expertise in the areas of equity and diversity and a long history of technical assistance experience that has contributed to the knowledge-base of effective practices in classrooms, schools, and districts.

Preliminary Planning

An interdisciplinary Web site action team was assembled to begin defining the project. The team, consisting of equity and diversity experts, an editor, and an educational technologist, followed a modified version of Web development guidelines ((Lynch & Horton, 1999; Burdman, 1999; IBM, Design section, Web Guidelines). The task of planning the site began by addressing the strengths of the organization. Based on these strengths and informed opinion, the Web site action team drafted a rough mission statement and tentative objectives for the potential site. Then, a competitive analysis of nearly 100 equity-related Web sites was conducted to identify their purposes, nature of content, and intended audiences. This information was used to identify gaps among existing diversity Web sites and to align a gap with the expertise of The Education Alliance, in an effort to avoid a duplication of existing resources.

From the results of this analysis, the action team discovered that there was little information available to assist teachers of English language learners (ELLs) in the classroom. With this information, the team was able to identify the primary target audience for the Web site and to modify its purpose and objectives.

Needs Identification

Once the primary audience was identified, the action team administered a needs assessment survey to define user interests and needs. Surveys were distributed to teachers through Equity Assistance Centers across the country. The results of the survey would drive the content to be developed, help in setting measurable strategic goals for the site, and inform the final refinement of site purpose and objectives.

At the same time, the action team discussed design concerns with the technical development team. These concerns were around the issues of accessibility across platforms, older hardware and software, and dial-up connections. All team members had a clear understanding that this site would be designed in a minimalist style that would maximize access for those using low-end technology. In addition, the team established that the content would be developed in a Web-friendly style that was clear, concise, direct, and professional.

These steps were essential to finding the focus that would guide the production process of a new Web site. They provided a solid foundation for defining the audience, purpose, and style of the site, and continue to be used to guide ongoing content development.

Site Development

Priorities for first-year development included a simple architecture that would adapt easily for future expansion. The content development of the site and the maintenance of its interactivities were initially undertaken with limited resources. Therefore, a "Layers-of-Necessity" model (Tessmer & Wedman, 1990) was adopted for the site in order to facilitate a modest launch and to accommodate future development, as additional resources became available. In addition, the minimalist style of the site in its initial stages was consistent with the evolving concept of the model from simple to complex over time.

The efficient use of time and resources limited the extent of testing in the early stages. Prototype and user testing were economized (Nielson, 1999; Tessmer & Wedman, 1992) in order to focus time and expertise on content and technical development. However, user reaction to the prototype helped to guide the development of usability heuristics for the final product.

Summary

New technologies have simplified the development process for Web sites, making it possible for anyone with a computer and online access to author a site. The downside of this convenience is a proliferation of well-meaning, but unfocused sites. Strategic planning for the "Teaching Diverse Learners" Web site provided a definition and blueprint that served as a foundation for the initial and future development of the site.

The steps included:

1. Forming an interdisciplinary action team to define the project
2. Identifying the strengths of the organization and drafting a rough mission statement and objectives for the site
3. Conducting a competitive analysis of related sites
4. Identifying a gap in existing resources and aligning the gap with the strengths of the organization
5. Defining the niche and target audience
6. Assessing needs and interests of target audience to identify and prioritize content
7. Refining purpose and objectives
8. Determining design concept, style, and strategy for technical development of site
9. Soliciting user reaction to the prototype design to guide product development
10. Defining user heuristics for the final product.

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Teaching Multimedia Design Using the "Tri-Component" Scenario Model and Associated Methods

Jean-Marc Laubin
Laboratoire des Sciences de la Communication
Université de Valenciennes et du Hainaut Cambrésis, France
jmlaubin@calasoft.com

1. Introduction

Despite the fact that many computer science students master complex techniques, like programming and technology integration, they are still unable to cope with the demands of multimedia project design. Clearly more emphasis should be placed on concept development given that content production is more a question of good ideas and targeting, than pure technical expertise.

The first part of the paper examines the challenges that the behavior of inexperienced students poses when they start to create a multimedia application. The second part looks at the basis of what makes up a multimedia application and the way in which its design is taken into account by our "tri-component" scenario model and associated methods. The final part demonstrates how using this method can help teachers deal with some of the challenges of teaching multimedia creation.

2. Problems Encountered by Students Starting a Multimedia Project

2.1 Misidentification of the scope of the "multimedia" concept: When asked, "What does the word 'multimedia' mean to you?", my computer science students regularly use one of the following answers: images and sounds on a computer; images, sounds and texts on a computer; images, sounds and interactivity on a computer; or images, sounds, texts and interactivity on a computer. The example of books, and more particularly roleplaying gamebooks (e.g. http://directory.google.com/Top/Games/Roleplaying/Gamebooks, retrieved 12/27/2001), is usually not identified by students as a possible "multimedia" system. Then there is the case of my engineering students who thought they were creating "multimedia" products because they were producing a 3-D film.

In fact, the use of images, sounds or even the computer are criteria that are neither necessary nor sufficient to define the specificity of a "multimedia" system, as will be defined below (section 3.1).

2.2 Inappropriate vocabulary for communicating within a team and misidentification of project levels: The word "interactivity" is used very often and with different meanings leading to frequent confusions such as the mixing of several phases of work. The word "interactivity", for example, is used in place of "interface elements" (e.g. "Here the interactivity is a button that can be clicked"). In fact, the concept of interactivity is related to the nature of messages exchanged and not to the way they are emitted or acquired.

2.3 Confusion between specification and implementation: Very soon into the project many of my computer science students verbalize their intentions, for example, by saying things like "the user can click a 'Stop' button to exit the activity". This kind of specification already suggests an implementation (a button). The problem here is that this over-hasty decision may not necessarily be the most effective one.

2.4 Omission of the specification phase: Using a non-directive approach (Rogers 1973), one of my three students groups, last year, was working on the subject "What can an adaptive Web-TV be?" and they encountered several problems in not following the recommended method. Error 1: Due to an inappropriate definition as to the nature of multimedia, they had decided, without further reflection, that a Web-TV is a mere Web site where users can view videos on demand which could possibly be "interactive". Error 2: In Week 2, I discovered the students had shot some videos without a written out script. They had rushed to the camera because, it seems that, it was an "attractive activity". Error 3: Having first neglected to create a scenario, the students finished with tons of unused rushes and presented an incomplete reply to the initial question, resulting in a good final report but a very poor prototype.

3. The Tri-Component Scenario Model

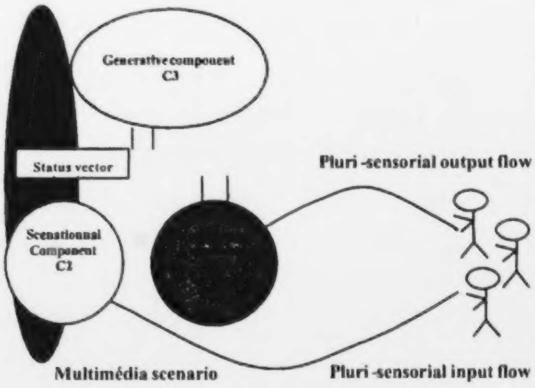
3.1. Basis of the model - an operational definition of multimedia applications based on their communicational functions: *«A multimedia application is a conceptual activity consisting of a pre-formatted informational content and allied explicitation procedures. It is destined to be exposed to the meaning and actions of one or of several interactors via an interactional[1] loop. This is made up of two non empty information flows, one of which enters while the other exits, each of which consists of one or several mono- or pluri-sensorial canals »* (Laubin 2001).

3.2. The structural outline of the tri-component model: The model of representation of, what can be called, the "tri-component scenario model" (Figure 1) ensues directly from the above definition of "multimedia" and is proposed for the design of multimedia projects, both as a methodological aid and as a basis for software tools that implement it. The model is influenced by the work on "Multiple Intelligences[2]" (Gardner 1996) and covers all the design aspects of the *Scenistic Approach* (Leleu-Merviel, Vieville & Labour 2002).

The multimedia product is presented as a communicational[3] object with particular features that can link up interested parties (authors and interactors) in an asynchronous way. The schematic representation of the tri-component scenario model is a direct transposition of the definition as a formalized model of setting the scene (*scénarisation*) after having taken into account two current features of multimedia applications. These features are not linked to the definition, as they are absent in certain cases (namely in books), but they have demonstrated their qualitative importance (Durand et al.1997b) in the two following ways.

First, there is the capacity to memorize a context when the work is put into practice (namely the paths of the interactor) without which one would have to list exhaustively all the possibilities of the scenario. This leads to a myriad of combinations in the number of situations that could be described, and in so doing this can hamper the author's work. This necessitates a "status vector" (see section 3.4 below) in our model.

Second, there is the crucial element that characterizes the ability of multimedia applications to change the content of their memory according to specific rules. These rules can be related or not to the interactor's behavior and necessitates a generative component in our model.



Besides the three components (Fig. 1), the scenario includes a formalised description of the data collection as well as the structural specifications (the document is broken up into fragmented elements logically organised at different levels).

There is also a status vector that is the only mechanism of memorization and inter-communication available for the three components.

The interactional loop is entirely defined by the expositional and scenational components (C1+C2) which describe the input and output flow of information of the external canals of communication.

Figure 1. Structural outline of the tri-component model

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[1] Definition: By *interaction* is meant a series of exchanged "messages" between interactors in a given "communicational" (see below, Footnote 3) context (Watzlawick, Helmick & Jackson 1967, sections 2-2, 2-41). The concept of interaction can also be defined as a "system", where interactors are engaged, or have engaged, in defining (negotiating) the nature of their relationships (*idem*, section 4-22).

[2] The point being that intelligence is not unitary but complex and multi-facetted. For Gardner a human being can be intelligent in various ways, and this includes linguistic intelligence, musical intelligence, logical-mathematical intelligence, spatial intelligence, bodily-Kinesthetic intelligence, intra-personal intelligence, and inter-personal intelligence.

[3] Definition: For Watzlawick *et al.* (1967, sections 2-23, 2-34) *communication* is not just transmitting a message. It also implies a certain level of commitment and is defined in the way the sender sees his/her all-encompassing relationship to the recipient of the message.

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The expositional component (C1, see fig 1) describes all that can be sent to the interactor. This is done by way of basic directives that send signals to different output canals. The proposed model is very open, and does not specify the way the basic directives must be described. This can refer to the corpus data of a multimedia product. For example, "Play IntroSound on the Sound output canal N° 2", or "Display film Intro.mov on the help window of the main screen", or even "emit smell maritime_pine.od for 10 seconds on the Smell output canal".

The scenational component (C2, see fig 1) (Durand et al. 1997a) describes the potential flow of information from the interactors to the multimedia application. This is done by using the notion of an "actional link" (what the interactor can do) defined in terms of four major elements: a) a condition under which the link exists, expressed in terms of the status vector; b) the title of the link; c) the consequence of the link; and d) as an option, the appropriate communication canal (if not present the link is said to be "abstract"). The consequence of the link lists the ways, by the order of priority, that the application can react to an interactor's choice. Each case is described by a context (conditions about the status vector), by the new resulting fragment and by the modifications of the status vector.

The generative component (C3, see fig 1) describes the rules of intrinsic development of the multimedia application. It is essentially made up of fragments called "generators" that do their work as background tasks and can require complex calculations. Basically they can read and modify the status vector or modify the corpus data used by the application. The proposed model remains open without specifying the way of describing the generators. Besides the generators themselves, the generative component also includes the activation instructions of the generators.

3.3. Structure of the scenario document: Without entering into details here, the scenario is broken up into fragments, which consists of the basic communicational unit. One can distinguish two types of fragments. First, the "Multi" fragments are linked to the interactional loop and can contain the directives of the expositional (closely linked to the notion of audiovisual scenario) and interactional components, as well as the activators of generators of the generative component. Second, the "Gen" fragments are the generators themselves that cannot send or receive signals to and from canals, but modify the internal state. There are also, two mechanisms to structuring the scenario document, one is supra-fragmentary (chaptering) and the other is intra-fragmentary (temporal synchronization).

3.4. The status vector, mechanism of communication of the three components: The purpose of a status vector is to memorize all information that needs to be kept or transmitted among the components. It is through it that one can see the idea of synchronization among the different components. The status vector is made up of seven sections to administer various elements from contexts that are different in their very nature. Each section can be read or updated by different components in a very precise manner, but this feature cannot be gone into in this paper for reasons of space. Suffice it to say there are:

- Two sections concerned with the profiles of the interactors:
  - *The constants of the profile* (or interactional constants) e.g. "I am a certain age"
  - *The variables of the profile* (or interactional variables) e.g. "User never chooses red links"
- One section concerning rhetoric control:
  - *Global evaluation statements* e.g. "Acquiring the notions of chapter 3 done"
- Two sections are concerned with the manipulation of data by the different components:
  - *States of the communication canals* e.g. "No sound received on input canal Sound N° 1 for 48 sec."
  - *Content Variables* e.g. "Key to room X in inventory", "Chapter 3 consulted"
- Finally, two sections deal with the follow through of the interactor's path, and serve to memorize the presence, the order, or the number of the passage of given fragments. The situation is modified by the two components that administer the interactional loop, while the histories are automatically generated without any intervention from the three components.
  - *Situation* (current fragment)
  - *Instant history and statistics* e.g. "Link # x of web page xx.html selected seven times

4. Contribution of the Tri-Component Model to Teaching Multimedia

4.1 : How does the tri-component model help solve the problems we have identified?

Misidentification of the scope of multimedia: Our model establishes clearly the type of product that students have to take in account in creating a multimedia project. The model is closely linked to a systemic approach for designing multimedia products. It can also help to ensure the successful achievement of pedagogical goals: The status vector description is essential and allows one to check if students have a real understanding of the situation that they are building. Interactors' actions should have multi-level goals, and both the control and communication processes have to be well defined, the former by the generative component and the later by the expositionnal and scenational components.

Inappropriate vocabulary for teamwork and misidentification of project levels: Returning to the example used in 2.2, as part of a *Scenistic Approach*, the "tri-component" model allows for a more unambiguous and appropriate vocabulary among team members, for example, "The user will have the ability to stop" (abstract input channel, primitive at scenario level). For this purpose the interface is a mouse-clickable area on the screen (interface level) in which a message "Stop" must be displayed (output channel, primitive at scenario level) taking the form of a button with the text message as title (implementation or production level).

Confusion between specification and implementation: One can enrich the interface level by a verbalized choice (using voice recognition technology) with everything else staying the same. Taking the example above, the interface is both a mouse-clickable area on the screen, and a verbalized choice that recognizes the word "Stop" (interface level). In this way one can present a unique abstract scenario with several possible implementations.

It is vital to ask students to start with writing a scenario first so to help them focus on the design and to split their work into smaller and simpler tasks. The scenario can eliminate the dangers of students "designing as they go along" and it allows subsequent evaluation, both by the teacher and by students, to see if the implementation is happening according to the initial specifications or not.

Omission of the specification phase: In Week 2, the "Web-TV" group's work was partially saved by an in-depth explanation of the "tri-component" model and then by asking them to produce the required scenario documents to guide the team along for the rest of the tasks to be done.

4.2. Discussion

In this section we present how our model is used and how it compares to several other works. At the very beginning of a project, or preferably one month before it starts, the «tri-component» model can be presented along with a classification of the various cases of the interactional loop (interactional degree), of the generative component (generative degree) and the ability to use and recontextualize parts of the information.

The student's projects are organized at a group level, with each group having 12 to 14 students. The whole project is conducted as a situational problem (Delattre 1993, Dewey 1938/1968) which has a very general theme as a starting point and whose final goal is to produce a working prototype. The pedagogical aim is to construct knowledge by self-discovery and by using several kinds of tools in being aware of constraints, limits and errors. It also involves measuring the gap between intention and final result. Every step is learner-centered with the teacher having to continuously reevaluate the degree of success, the quality of the communication within the students group, the needs of specific tools (software, development kits, computers and audio-visual equipment). The main difficulty for the teacher is to guarantee the right type of success for the project, and in some cases s/he has to convince the students to break down their objectives into smaller, more manageable ones. This approach, inspired by Bruner[4] (1966), has proven successful with six groups during the last two years.

The tri-component method is used at the beginning of the multimedia creation course and is compared to methods dedicated to design work like those of Landow (1994) and Levy (1992). Our method offers an easier teaching framework. First, the students note down all their ideas in an unstructured document. Second, the students fill out a skeleton scenario to cover all the required aspects reusing their initial ideas. Third, the students add any missing content. Fourth, they define in detail the status vector content and associated tasks (communication, rhetoric control, etc.). Fifth, the scenario is validated by simulation tests. All these steps are then iterated (spiral method).

The tri-component model formalizes the writing constraints of the objects in the designer's universe (places, characters, objects, etc.) and their interaction with the user. It also allows a pragmatic and step-by-step work on the multimedia product. Another very important point is the syntax of the language used to support the model that provides a scenario-based approach *viz.* Wimberley (1996), Garrand (1997). However, their scenario models are not appropriate and need alternative choices (Laubin et al. 1999). The chosen format and syntax for our underlying *ZebraWriter language* (Laubin et al. 1999), whose updated specification will be published later this year, satisfies the following characteristics, in order of importance: easy reading, self-explicatory text, good simulation capacity, a good navigation capacity, easy update procedures, tool for structuring and rhetoric construction control. The next step will be to introduce into the project process a writing and prototyping software that implements the *ZebraWriter* language and provides various functions for scenario analysis and validation.

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[4] For Bruner (1966) a theory of instruction should: (1) be focused on learners' needs, (2) present a body of knowledge in a way that is understandable to learners, (3) propose a systematic approach to presenting instructional resources and (4) be clear about the system of rewards and sanctions.

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The method can also be applied to teacher education both for inexperienced multimedia teacher in the same way as described above for students as well as for inexperienced teacher wishing to produce a multimedia version of their courses. Indeed for this latter case the tri-component method can enhance existing constructivist inspired pedagogical approaches.

5. Conclusion

The underlying idea of using the "tri-component scenario model" for multimedia teaching is to ensure a good methodological environment for helping the teacher and the students to succeed in a very open situation-problem. In these kinds of projects the most important is not the result but the encouraging the appropriate strategies to achieve set tasks, such as to:

a) explore a multimedia problematic (ability to construct step by step from scratch and to later structure and refine)
b) delimit a feasible goal according to the time given (the fragmented structure help identify and measure sub-tasks)
c) organize the work and communication within the student groups (the scenario is a common specification and reference document)
d) finalize an actual multimedia work done (the use of *ZebraWriter* associated language provides a prototype on paper without any other work and production steps can start fairly late when the prototype is fully validated)

Abstract: During the last two years as a project coordinator of computer science students experiments were conducted into the teaching of multimedia design. This has led to the observation that many students are not able to cope with the initial phase of designing a multimedia project. Our proposal for solving this basic problem is based on a constructivist approach related to the *Scenistic Approach* in our research laboratory. The approach is learner-centered and focused on strategies that students develop for the project. Learners start with a step-by-step creation of a detailed scenario that they wrote for a multimedia application according to the "tri-component formalized model ". The second phase is the realization of the project when the group has to organize itself according to the diverse abilities of its members. For the future these methods appear to be particularly useful for experienced teacher educators in the multimedia arena.

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Exploring the "Why?" of Educational Technology

S. George Mastroyanis
School of Education
University of Alaska Anchorage
United States of America
afgsm@uaa.alaska.edu

Abstract: The I.T. skills needed by the students we teach demand experiences which are outside the educational mainstream.... (We need) an education commensurate with each student's ability to learn. (Sandra Kaplan)

My session seeks to focus on the individual relationship between the teacher and each student, with special reference to Martin Buber's "I-Thou" relationship and to move away from the I-it/I-them" way of education. This is the means to fulfill any student's greatest need - to be loved and respected for who they are - an individual person who is different. It is my convinced belief that this is the starting point in serving students effectively to enable both the teacher and the individual student to make meaningful contributions for the future. It is in fact to fulfill the conference's goal as expressed in its title. In the interactive session, I will begin by inviting the teachers to examine the assumptions that underpin their philosophy – with special reference to their understanding of reality, truth and values in their own lives and then in the lives of their students. In this connection, educators will be challenged to be aware of the importance of relevance for the future and also discuss ways to determine each student's needs for the future.

When these have been explored, then, their relationship to education, with particular reference to the conference's educational goals, content, method and values, will be dealt with in detail. In view of the wide range of geographic, social and economic backgrounds of teachers attending the conference, (and the students they serve) each teacher will be assisted to create a one page summary that can serve as the basis of their educational technology philosophical framework to ignite their students' potential at their schools. The session will encourage each teacher to harness personal qualities, interests, experiences and expertise to create this clearly defined framework and, at the same time, be flexible to meet the needs of a diverse population. Accordingly, the essence of the session is to place excellent and relevant tools in teachers' hands – tools that can equip them with the knowledge of what clear plans to utilize in serving each individual student.

I am convinced that the "why" of education greatly facilitates and enriches the "what" of education and technology.

Promoting Student Inquiry: WebQuests to Web Inquiry Projects (WIPs)

Philip E. Molebash
San Diego State University
United States
molebash@mail.sdsu.edu

Bernie Dodge
San Diego State University
United States
bdodge@mail.sdsu.edu

Randy L. Bell
University of Virginia
United States
randybell@virginia.edu

Cheryl L. Mason
University of North Carolina, Chapel Hill
United States
clmason@unc.edu

Abstract By the earliest definition (Dodge, 1995) a WebQuest is "an inquiry-oriented activity in which most of the information learners work with comes from the web." WebQuests are defined first as being "inquiry-oriented," but are they truly an example of inquiry or are they something else? The majority of WebQuests fall under Herron's (1971) category of structured inquiry, but there are higher levels of inquiry desired by educators that are difficult to promote using the WebQuests model. Based on a spiral path of inquiry, Web Inquiry Projects (WIPs) are designed to promote such higher levels of inquiry, specifically Herron's levels of guided and open inquiry.

Introduction

In early 1995 the WebQuest was developed by Bernie Dodge and Tom March as a way to help learners focus on using online information rather than looking for it. By the earliest definition (Dodge, 1995) a WebQuest is "an inquiry-oriented activity in which most of the information learners work with comes from the web." WebQuests are defined first as being "inquiry-oriented," but are they truly an example of inquiry or are they something else?

Defining Inquiry

The answer to this question might depend on how you define "inquiry." It has been said that if you ask ten different educators to define "inquiry" you are likely to receive eleven different definitions. In an effort to produce a definition that represents the needs of every content area, the Exploratorium Institute for Inquiry (1996) developed the following definition: "Inquiry is an approach to learning that involves a process of exploring the natural or material world, that leads to asking questions and making discoveries in the search for new understandings."

An inquiry approach to learning can look markedly different depending upon content area. In the social studies, inquiry might require learners to analyze primary source materials in developing an understanding of historical events and how they are relevant to today. Inquiry in science might involve learners in observing and describing some natural phenomenon that is new to them, or in testing scientific hypotheses through systematic laboratory investigations. No matter the content area, regardless of the role inquiry plays in any given learning situation, it should give learners an opportunity to solve real-world problems, overcoming authentic obstacles in solving these problems.

On one extreme, this process can be significantly scaffolded, requiring learners to follow a prescribed path toward a preset solution. On the other extreme it can be open-ended to the point of being defined and solved completely within learners' interests and efforts. Between these two extremes exists intermediate levels of inquiry. Teachers and curriculum developers have a tendency to project more inquiry into their instructional activities than is warranted. Accurately determining the level of inquiry reflected in a particular activity is, therefore, a critical first step to inquiry instruction. Although not currently in widespread use, Herron (1971) developed a simple and practical rubric for assessing the degree to which activities promote student inquiry. Based partly upon the writings of Schwab (1964), Herron's Scale describes four levels of inquiry, each differentiated by the information and support given to students prior to or as they complete the activity.

Four Levels of Inquiry (Herron, 1971)

0. **Confirmation/Verification** – students confirm a principle through a prescribed activity when the results are known in advance.
1. **Structured Inquiry** – students investigate a teacher-presented question through a prescribed procedure.
2. **Guided Inquiry** – students investigate a teacher-presented question using student designed/selected procedures.
3. **Open Inquiry** – students investigate topic-related questions that are student formulated through student designed/selected procedures.

When an activity is evaluated for its level of inquiry, a simple table establishing what is given to the learner determines at which level of inquiry the given activity resides—the less given to the learner the higher the level of inquiry (see Table 1).

Level	Problem?	Procedure?	Solution?
0	✓	✓	✓
1	✓	✓	–
2	✓	–	–
3	–	–	–

Table 1: What is given to the learner?

Early Internet Inquiry: The WebQuest

While WebQuests are touted as being "inquiry-oriented" activities, just where in Herron's inquiry hierarchy do they fall? Originally WebQuests were intended to be structured inquiry (Level 1), as students are given a task (problem) and a process (procedure) to complete the task. Of the WebQuests produced to date, many do not qualify as "inquiry-oriented." In fact, a portion of what creators are labeling as "WebQuests" can easily be confused with less sophisticated, non inquiry-oriented Internet Scavenger Hunts. These "non-inquiry" WebQuests typically require learners to answer given questions, usually listed on a worksheet, and going to specific web sites to answer these questions.

The San Diego State University WebQuest Page includes a database of links to hundreds of created WebQuests. The WebQuests listed in this database were pre-screened for quality but were not investigated as to which level of inquiry each resides. Recently, 75 sampled WebQuests were investigated,

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25 from each major schooling level. From this sample, zero WebQuests were Level 3, 12 were Level 2, 45 were Level 1, and 3 were Level 0. Additionally, 15 did not qualify as being inquiry-oriented, but instead qualified as Internet Scavenger Hunts. Unfortunately the widespread acceptance of WebQuests as a valuable educational tool has, in some cases, compromised their original purpose.

Level of Inquiry	Elementary (K-5) n=25	Middle (6-9) n=25	Secondary (9-12) n=25
Not Inquiry	6	3	6
0	1	1	1
1	16	15	14
2	2	6	4
3	0	0	0

Table 2: WebQuest levels of inquiry

WebQuests were developed as an early step in answering the question, "How can Internet resources be effectively used in the classroom?" When the WebQuests concept was created over six years ago, there was no formal method of using the Internet to support "learners' thinking levels of analysis, synthesis and evaluation"—important components of inquiry-based learning. WebQuests can, if created and used correctly, promote inquiry-oriented learning, particularly structured inquiry (Level 1). WebQuests will continue to serve as an important component of web learning, but it is now time to take the training wheels off and consider where the WebQuest concept can lead, especially with regard to promoting higher levels of inquiry-oriented learning.

Guided inquiry (Level 2) requires learners to design and select procedures, and open inquiry (Level 3) also requires that learners formulate their own topic-related inquiries. With no preset procedures and perhaps no teacher-defined questions to drive an activity, is it possible to develop a model similar to WebQuests that is more open-ended?

Some Early Thoughts on Web Inquiry Projects (WIPs)

Web Inquiry Projects (WIPs) are intended to meet this need. Promoting higher levels of inquiry in the classroom requires that less specific guidance be given to students. This fact alone makes it difficult to produce a model that is used by students in the way that WebQuests are used. Therefore, WIPs will be used primarily as a teacher resource, providing loose structure and guidance to teachers wishing to make good use of the wealth of available uninterpreted online data. Such data can be found at thousands of web sites, an excellent source being Digital Resource Centers (Center for Technology and Teacher Education, 2001). Digital Resource Centers "have the potential of transforming university teaching and learning" and "are relevant for K-12 education." Such collections include the Library of Congress' American Memories, the Virginia Center for Digital History's Valley of the Shadow, the National Climatic Data Center, and the U.S. Census. Social studies teachers might use a WIP to help teenage students use primary source materials to determine what life was like for a southern family during the Civil War (Mason & Carter, 1999). A science teacher might use a WIP to help students use historical rainfall data to determine whether or not El Niño had an affect on their local weather during the winter of 1997-98 (Bell, Niess, & Bell, 2001). WIPs created from these examples are available at http://edweb.sdsu.edu/wip.

WIPs are intended to be used as inquiry roadmaps for teachers desiring to promote higher levels of student-centered inquiry, specifically by leveraging uninterpreted online data to answer inquiry-oriented questions. Unlike WebQuests, which provide students with a procedure and the online resources needed to complete a predefined task, WIPs will place more emphasis in having students determine their own task, define their own procedures, and play a role in finding the needed online resources. The WIP concept is based upon and designed to support a spiral path of inquiry (adapted fromThe Inquiry Page, 2001). WIPs will provide teachers with six stages of scaffolding as they lead students in a web-enhanced inquiry project. While an inquiry-oriented activity might start at any of these stages, WIPs will be designed to initiate student inquiry at the Reflect stage.

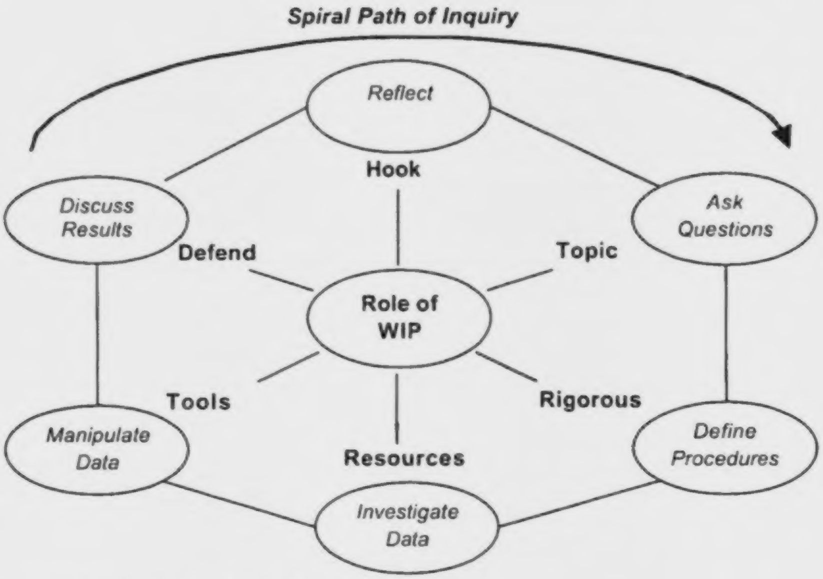

Figure 1: Teacher support of spiral path of inquiry

The six stages in this path, including the proposed role of WIPs in these stages, are as follows:

Stage 1
General description of stage: Teachers leverage previous activities or start anew by sparking students' interest in a topical area. At this stage teachers are to provide a hook, causing students to reflect upon the topic.
Student Role: Reflect on previous or new material.
Teacher Role: Provide a learning hook.
WIP Role: Provide ideas and resources for topical hook.

Stage 2
General description of stage: Based in the students' interests sparked by the hook, the teacher leads students to ask questions related to the topic.
Student Role: Ask questions related to topic.
Teacher Role: Keep questions on topic.
WIP Role: Provide potential topical inquiry-oriented questions.

Stage 3
General description of stage: After questions have been asked by the students, the teacher assists them in defining the procedures for investigation. Here the teacher's role is to ensure that the procedures are rigorous enough, according to the rules defined by each content area, to provide adequate evidence to support potential answers.
Student Role: Define procedures.
Teacher Role: Ensure procedures are rigorous.
WIP Role: Define potential procedures, including type(s) of data needed.

Stage 4
General description of stage: Students seek online data that will be used to answer their questions. At this stage the teacher must provide guidance on the relevancy and reliability of data. Here also, the teacher might participate with students in finding resources or have pre-selected resources in mind in the event that resources are difficult to find.

Student Role: Investigate data.
Teacher Role: Assist students in finding and assessing credibility of data.
WIP Role: Provide list of potential resources of online data.

Stage 5

General description of stage: When data is found the teacher must ensure that students have facility with the tools needed to manipulate data. If numerical data must be manipulated then students will likely need facility with a spreadsheet application. If data is non-numerical, then concept mapping or database software might be required.
Student Role: Manipulate data.
Teacher Role: Teacher provides data manipulation tools and training using tools.
WIP Role: Provide an example of manipulated data.

Stage 6

General description of stage: No conclusion is meaningful unless communicated appropriately. After students have manipulated the data, they discuss and defend their results with each other and the teacher. Here the teacher must support students' efforts in presenting their results in writing, through graphical presentations, and through rhetoric. At this point, new inquiry -based questions might be asked as students reflect upon their results, restarting the process.
Student Role: Discuss and defend results.
Teacher Role: Teacher supports students' efforts in presenting and defending results.
WIP Role: Provide example of defended results. Provide example of new inquiry -oriented questions.

Conclusion

In the last five years WebQuests have proven to be useful in promoting Herron's Level 1 of structured inquiry. At a time when educators struggled to provide an effective way to make good use of the Internet, the WebQuest model supplied the scaffolding needed by both students and teachers. WebQuests will continue to be an important component of inquiry-oriented learning.

Being heavily scaffolded, WebQuests prevent learners from participating in higher-level inquiry activities. Now that both teachers and students have more facility with the Internet, scaffolding from the WebQuest model can be removed, leading us to Web Inquiry Projects. If used appropriately, WIPs will help educators promote guided and open inquiry, Levels 2 and 3, respectively.

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Curriculum, Competence, and Confidence: A *3C* Approach to Teacher Preparation for Technology-integrated Practice

Michael Nord
Willamette University Department of Music
mnord@willamette.edu

Abstract: Effective teacher preparation addresses issues of curriculum, competence, and confidence. Interactive in technology-integrated classroom practice, these "3C"s should be actively intertwined and accounted for in teacher preparation pedagogy. This paper outlines a 3C approach used in both graduate level music teacher preparation classes and in-service workshops. The approach is rooted in the notion that good teaching, not simply good machines, makes for meaningful technology integration.

Overview

Schools are embracing the integration of technology. Teachers and students have the potential to engage in meaningful activities previously unavailable. Music technology, for example, offers practical classroom access to authentic materials and processes that had previously been limited to those with highly specialized skill sets and instrumental resources. Regrettably, schools are not yet enjoying the full potential of technology. This is, I believe, particularly true with regard to music. Impediments to the effective integration of technology into classrooms may be structural or pedagogical in nature.

Structural impediments to the integration of technology include a lack of current hardware and software, lack of appropriate space, limitted access to computer labs, administrative disinterest, and insufficient technology support (Hasselbring et al, 2000; Young et al, 2000; Drost and Abbot, 2000). Pedagogical impediments center on lack of the teacher preparedness to confront the new paradigm of technology-integrated practice (Dunnigan, 1993; Dudt, Yost, & Brzycki, 2000; Whetstone and Carr-Chellman, 2000; Uszler, 1996). The overlap of these structural and pedagogical impediments manifests itself in the lack of opportunity for preservice teachers to observe the kind of *in situ* modeling that will inevitably affect their future practice (Moursund and Bielefeldt, 1999, Carlson and Gooden, 1999).

Those of us who are teachers of teachers have limited opportunity to directly confront the structural impediments that exist in various locales. However, we should strive to *prepare* teachers for the highest levels of technology integration because of the value it brings to schools.

Effective teacher preparation addresses issues of curriculum, competence, and confidence. Interactive in classroom practice, these "3C"s should be actively intertwined and accounted for in teacher preparation pedagogy. As with strands in a rope, a fray in one leaves the others vulnerable. Tripartite models have been described in relation to both the teaching of elementary classroom teachers to teach music (Jeanneret, 1997) and to teach with technology (Merideth & Steinbronn, 2000). This paper will outline a 3C approach as it has been used in both graduate level music teacher preparation classes and in-service workshops. The model is rooted in the notion that good teaching, not simply good machines, makes for meaningful technology integration.

The 3C's

"Curriculum", as used in this discussion, encompasses content and pedagogy. Technology offers new opportunity with regard to both of these curricular dimensions. There is a ring of truth to the old aphorism: "We teach like we were taught." In other words, *all* of our behavior as teachers is modeling. Therefore, teacher education should model practice consistent with that which the teacher educator wants her students to bring to their classrooms (Jeanneret, 1997; Dudt, Yost, & Brzycki, 2000). That practice should account for technology potential in the crafting of a new curricular paradigm, rather than simply

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plugging the computer into an old one. Teachers, not technology, must craft the new paradigm (Riel et al, 2000).

Technology-integrated teaching requires that teachers develop their own strength in technology use (Pan, 1999; Uszler, 1996)). "Competence," as used in the 3C model, refers to a teacher's practical ability to use and troubleshoot both hardware and software. In many, if not most, schools technical assistance is not readily available. Staff responsible for technology maintenance and training is typically spread thin. Children in classrooms with teachers who are self-reliant are more likely to have consistent access to current *working* technology. Developing competence must also include developing the tools for managing classroom technology use (Duran, 2000).

"Confidence" refers to teachers' *sense* of personal ability and preparedness to the use of technology. Teachers who do not themselves feel comfortable or capable with computing are unlikely to integrate it in any significant way. Whetstone and Carr-Chellman (2000) note that preservice teachers did not see the importance in their own roles in classroom implementation. Significant gender differences exist with regard to self-confidence with technology (Bauer, 2000; Weinman & Haag, 1999).

Curriculum

We want our education students to enter the profession with an inclination to take a step back and ask: "What aims and goals do I have for my students, and how might technology contribute to them." Naturally, as their models, we must do the same, pointedly making content, pedagogy, and the thinking behind our choices explicit. The model we provide will serve our students as a point of departure in their own practice.

Modeling is the single most potent communicator of pedagogy. We teach them "method" by doing with them something analogous to what they will do with their students. In a sense we are trying to nurture their perceptions to both sides of the teacher/student experience, first by putting them in the "role" of their future students, and secondly by later giving them opportunity to put each other in that role. Organized reflection is the glue that binds the pieces. The operative concept is to *do what you would have them do in their future classroom,* rather than describe what you would have them do.

For a music curriculum, Wiggins (2001) advocates the goals of musical literacy, proficiency, and independence. Like other constructivists she suggests that students achieve these goals through problem-centered interactions with authentic materials (Brooks & Brooks, 1993) or situated learning (Duffy& Jonassen, 1992). Specific topics return at ever increasing levels of complexity and interaction (Bruner, 1960; Thomas, 1971). With these perspectives as a philosophical base, the 3C approach focuses on using technology to provide unique opportunities for exploration and problem solving *in* the materials of music. In other words, music technology is most potent when used as a "tool" (as opposed to as a "tutor") allowing students to engage and manipulate the basic building blocks (see Thomas, 1971) of musical works; pitch, timbre, rhythm, form, and dynamics. Classroom teachers craft the focus, sequence, and design of problems. Figure 1 below illustrates some general examples.

complexity/sequence

low/less experience *higher/more experience*

FOCUS	form	pitch	timbre	integrated
SOFTWARE/ HARDWARE	Rap, Rock'n Roll headphones, speakers	Songworks, QT musical instruments	Micrologic AV/ MIDI kybd. System	Micrologic AV/ MIDI kybd. System
PROBLEM	Using an RRR style of your choice, create an ABA form arrangement where the A and B sections are contrasting musically and unequal in length.	Using the supplied chord progression, create a melody using only chord tones	Re-orchestrate your file of Ravel's Bolero, using the General MIDI soundset. Create 2 contrasting versions.	Create a rounded-binary form sequence using separate tracks and timbres for each of two independent voices.

Figure 1 : Curriculum content progression.

Successful integration of technology requires that teachers take students beyond the immediate cognitive and musical products of their interaction with that technology. The lesson, from the perspective of our students being in the role of their own future students, is not over when the machines are turned off. Organized examination of their products (technological or otherwise) is a central element of constructivist practice. Finally, they need to be guided through a reflective review as what happened in their role as "students" and its implications for their future practice.

Competence

In order to successfully integrate technology into their practice, teachers need to know how to use and choose hardware and software. They also must have a repertoire of trouble shooting skills. They must have technique in technology classroom management. In the 3C approach these issues are addressed in lessons and "in process." A good rule of thumb is to take nothing for granted.

With regard to hardware lessons, a number of my own students reported that actually assembling a system in class was invaluable to them, even if they had done it at home. MIDI based music systems are especially complex with their extra hardware and software. A thorough review (and consistent use) of terminology is valuable. My experience suggests doing all of this at the beginning of a semester.

With regard to software lessons, going through installation routines is also valuable. Again, MIDI systems have extra layers of complexity.

Situated learning is the key. Students develop competence by using, and often struggling, with software and hardware. Our goals should center on our students gaining independence. While we are modeling a constructivist curriculum approach that they might use with their future students, they are similarly engaged on another level aimed at *their own* technology skill development.

Some ideas follow:

- Start with unstructured time to "play."
- Don't hand out step by step guides. This teaches them to type, not develop independence.
- Demonstrate a technique or tool and then present them with a problem to solve.
- Be a guide and scaffold, but let them work through their own difficulties.

It is here where the "in process" dimension is at the forefront. For example, after "play" (read exploration) have them demonstrate their discoveries. Everyone discovers something, and the pool of discovery is usually greater than any one individual or team comes up with. Treat "I don't know how I got here" as an invitation for the class to figure it out together. Have individuals or teams present their solution process as well as products. Create an atmosphere where students are comfortable questioning and answering each other. Students should be constantly teaching their peers. The inevitable freezes, glitches, and miscues of technology should be viewed as opportunities for the development of troubleshooting skills. Guide students, but do not solve technology problems for them. Where a student is unable to navigate a particular issue, or that issue is one that you want the entire class to have experience confronting, bring them into the search for a fix. Bear in mind that the goal is to teach them strategies for independent trouble shooting, rather than simply providing a top 10 list of problems and solutions.

We want our students to be independent in their ability to choose software. Once more we need to equip them with a strategy rather than a list. In focused lessons, students must be familiarized with the notions of usability, acceptability, and efficacy. Teams of students can be provided with a question guide that they use to evaluate specific software. Both general and contextual perspectives should be taken. Students can also be asked to formulate and share their thinking behind new questions addressing usability, acceptability, and efficacy. In process, planned and spontaneous examination of the three categories should take place in the context of the activity students are engaged in at that moment.

A final area of competence described above is management. Obviously there is a great difference between the university lab and the elementary school music room. Absent the opportunity for *in situ* modeling/observation opportunities, our students will rely on the modeling we provide in our classrooms, and the anecdotes we can share from our experience. Familiarizing them with the use of management software will be useful. Opportunities for students to take the role of teacher in your classroom, followed by group and individual reflection may be your single most potent means of nurturing their development of management skills.

Confidence

Technology confidence must be actively nurtured in the teacher education classroom, intertwined with the curriculum and competence issues. Confidence is an empowering sense of personal ability in negotiating curriculum and competence issues. While it is a natural by-product of the independence described earlier, we must be active in assuring that it is there. The 3C approach takes the view that one doesn't teach confidence, one teaches *for confidence*. Students must first internalize the notion that it is not the machines that teach, it is they who are teaching with the machine as their tool. In other words, it is they who are in control of the situation. Situations get out of control because of inadequate lesson planning and implementation, and/or technical difficulties.

Lesson planning and implementation is addressed by the models you provide (see Jeaneret, 1997) and the process of reflection that accompanies each experience. Model use of, and create formal reflection time for the "try it yourself first" strategies. We should exemplify the habit of first ourselves trying the creative problems we will assign students. This will not only prepare us to more effectively guide their trouble shooting and negotiate unexpected outcomes, it will provide opportunity to share your own work in the planning, implementing, assessing. Sharing your experience, and especially its hang-ups, will help them change the "it's me" stance to an "it's the nature of the beast and I know how to work with it" stance.

Computers crash and behave erratically just as chalk breaks and nails scratch the board. Confidence with regard to technical issues is addressed by students developing personal learning and troubleshooting strategies through guided confrontation of technical problems in their own and classmates' work. The teacher educator must assure that *all* students learn to solve their technical problems, and assist others. This requires a commitment and patience on the part teacher and class. Be particularly vigilant with female and older students. Taking care of problems *for* your students may allow them, and probably you, more comfort, but it diminishes their independence and thus confidence. Nonetheless, as always, balance and sensitivity should guide decision-making.

Confidence in confronting lesson planning and implementation, and/or technical difficulties is synthesized by our students through their actively assuming the role of teacher to their peers, and multi-leveled roles as students. All students must experience all roles. As their teachers, we must be vigorous in our sensitivity to their concerns and devise focused strategies that give them practical experience in confronting those concerns. Let no one passively (or as Holt might suggest, actively) slip by.

Promoting a realistic multi-dimensional sense of confidence in our students will contribute to a school classroom atmosphere where children are freed to explore with technology, guided by teachers unintimidated by the unpredictable.

The 3C Approach

Teachers of technology-integrated education courses should consider curriculum, confidence, and confidence when developing their syllabi. This applies to planning for both individual lessons and for their sequence. While lessons may emphasize one strand, we teachers of teachers should always account for each of the 3C's and aim for their seamless integration.

Conclusion

A discussion of technology and teaching must reflect the notion that it is not merely the presence of technology, but rather it is the means by which it is engaged wherein lies the potential for improvement in learning. The 3C model seeks to operationalize the view that effective teaching is more likely to occur when teachers have been nurtured in their own capabilities, the sense of their own capabilities, and the processes and products of meaningful lesson building.

The ideas in this paper represent a synthesis of theory and practice as explored by my own teaching in graduate and professional development classrooms. The approach will be applied in undergraduate classrooms next year. While some former students report that they have successfully integrated technology into their own classrooms, formal study remains to be done. Research should look at the integration of technology, efficacy of that integration with regard to the achievement of teaching aims and goals, and the manner in which the 3C teaching approach affected those issues.

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The PDCA Model: A Basic Evaluation Tool

Catherine A. Offutt, Outside Evaluator, University of New Mexico – Gallup, USA, mclcat@nm.net

Connie J. Casebolt, Business Dept., University of New Mexico – Gallup, USA, conniejc@unm.edu

Abstract: The PDCA model allows any grant-funded project to make a comprehensive bridge between the project logic model to the daily workflow model of managing for success. The PDCA model offers an organized way to explain the processes through which the project has evolved and points directly to methods, which are either effective or ineffective. The PDCA model of formative evaluation provides Project Managers, Partners, Evaluators, etc. with a document which keeps the information about a given project organized, timely, and comprehensive.

Most grants require both formative and summative evaluations to be performed over the life of the funded project. Most recipients of grant funds struggle with the efficient application of evaluation methodologies, within the scope of the funded project. Few agencies prescribe the specific formats for conducting evaluation. Striking the proper balance between process evaluation and impact/outcome evaluation can be tricky and time consuming. A method, which follows the flow of the project, yet allows for critical evaluation and restructuring of problem areas can be most helpful.

PDCA stands for Plan, Do, Check and Act. The PDCA model allows every project, whether it is a PT3, Technology Challenge or in a totally unrelated area, to make a comprehensive bridge between the project's logic model to the daily workflow model of managing for success.

Collaborative partnerships appreciate this model because it allows each Partner to showcase their contributions while keeping them informed of the activities of other Partners. Further, it provides a basis, when used in conjunction with a project logic model, for optimizing creative solutions to problems as they arise within the project scope.

The PDCA model offers an organized way to explain the processes through which the project has evolved and points directly to methods, which are successful, as well as those which are problematic. The project's federal Program Manager can easily see what has been accomplished and what remains to be completed. Additionally, areas, which are difficult to manage, can be identified and technical help can be applied where necessary. The PDCA model facilitates the creation of interim and annual reports to funding agencies.

The PDCA model should, ideally, be completed at the time of grant application and used to facilitate the funder's review of the grant proposal. However, the PDCA model can also be completed following the grant award. The objectives of the proposal need to be translated from the grant application to the PDCA form and then a step-by-step listing of activities necessary to accomplish each of the objectives are listed and prescribed a responsible party and timeframe for accomplishment. Each item that is developed will be assigned a status, as of a given date, which tells the reviewer which issue the item pertains to and what priority the item has been assigned. Then each item within the PDCA model is periodically (usually quarterly) evaluated, based on reports of activities conducted and logs of dosage data. Once an activity and/or objective is successfully accomplished, the procedure becomes standardized, the success shared with others and the status of "Resolved" is assigned. Should the activity not be accomplished given the initial strategic plan and assignment of resources, the "ACT" column becomes the place where new ideas and revised strategic plans can be documented until success is achieved.

Utilization of the PDCA form of process evaluation helps Project Directors/Managers develop, organize, implement and monitor the multiple objectives of any given project. Used in conjunction with the project's logic model, the PDCA form also facilitates the identification of problem areas, the engineering of a new strategic plan for solving such problems, and highlighting areas where technical assistance from the funding agency may be beneficial.

This model is easy to use and lends itself to capturing the ebbs and flows of project management over time. Mostly, the PDCA model keeps the flow of information about a given project organized, timely and comprehensive.

PT3 Project Performance Improvement Tracking Log as of 10/31/01

MISSION: To support the transformation of teacher preparation programs into 21st century learning environments that prepare technology-proficient educators to meet the needs of 21st century learners.

VISION: To improve the knowledge and ability of future teachers to use technology in improved teaching practices and student learning opportunities, and to improve the quality of teacher preparation programs.

GOAL: To modify and enhance the current early childhood, elementary and secondary teacher preparation programs offered through the University of New Mexico – Gallup Campus.

ISSUE RELATIVE TO WHICH ELEMENTS (Check all applicable):
#1 – UNM-G Faculty Training #2 – UNM-G Pre-Service Teacher Training #3 – Zuni In-service teacher training
#4 – Zuni K-12 student accomplishment #5 – Curriculum Development/Re-development
#6 – Partnership Development #7 - All elements

PRIORITY CODE: **#1 = Most Important** **#2 = Next Most Important** **...** **#N = Least Important**

STATUS CHOICES: R = Resolved U = Unresolved RDP = Resolved to Degree Possible RM = Resolved but Continue to Monitor

GPRA Std. #	Issue #	Priority Code	PLAN Description of issue to be accomplished, as outlined in original grant application.	DO What is the solution or action you are trying? (Responsible Party; Timeframe)	CHECK Evaluation of Action (Site evaluation tool as reference.)	ACT Are you ready to standardize the action you took and train all who are affected?	STATUS CODE
N/A	7	N/A	Secure funding for TTEL initiative.	Dr. Helen Zongolowicz submitted PT3 grant application in April 2001. $181,847 in PT3 funds awarded for performance period beginning 7/1/01.	Final documents received and accounts activated 10/01. Additional $21,000 added 10/01.		**R**
1.4, 2.1, 3.1, 3.3	7	2	Form triads comprised of one college instructor who has responsibility for educating pre-service educators, one classroom teacher who will mentor a pre-service educator, and one pre-service educator.	Project Directors to identify TTEL participants and execute contracts with each to secure grant compliance by 12/15/01.	Review of executed PT3/TTEL contracts.		U

Critical Thinking and Electronic Discussion

Joanne Y. Pelletier, PhD
School of Education
Acadia University
Canada
joanne.pelletier@acadiau.ca

Margaret Brown, EdD
School of Education
Acadia University
Canada
margaret.brown@acadiau.ca

Gregory R. MacKinnon, PhD
School of Education
Acadia University
Canada
gregory.mackinnon@acadiau.ca

Abstract:. Certain processes of coding electronic discussions have been shown to improve the quality of argumentation styles in online discussions. This paper addresses a) a teacher education course in physical education where cognotes are used to prompt students to consider more substantive electronic discussion interaction b) an inclusive education course "aligned in time-frame" to the physical education course such that the transfer of skills to other courses (without prompting) can be judged.

Introduction

Since Is inception, electronic discussion has been used primarily to offer an asynchronous environment for casual exchange of ideas between students. In recent years this has evolved to more thought-provoking exchanges promoted in part by improved professor interaction.

With regard to evaluation, early uses of electronic discussion amounted to participation grades which gave little credence to the quality of the discussion. Efforts to improve the quality of discussion have included the design of analytical rubrics that gauge broad styles of student interaction. For example if a student responded to an instructor's prompt and raised a new question they may be awarded a passing grade for the electronic discussion.

Current Practice

Acadia University created in 1997 an institutional network called Acadia Courseware Management Environment or ACME where students participate in electronic discussion groups (hereafter EDG's) within undergraduate courses. Most recently, MacKinnon & Aylward (2000) have designed a macro-based coding system for electronic discussions called cognotes. These cognotes highlight specific aspects of critical thinking and higher-order argumentation styles. To date, several limited studies have been undertaken namely: (1) teacher-coding of student discussions in a science education class (Aylward & MacKinnon, 1999) and (2) student coding of peers in a middle school education course (MacKinnon & Bellefontaine, 2001). Results from this last study has indicate that cognotes as a teaching strategy has the potential to improve communication patterns within a context where students apply the codes electronically to evaluate their peers.

The purpose of this study was to further examine the link between our electronic EDG's and critical thinking necessary for substantive student discussion. Part A of this study addresses a teacher education course in physical education where the cognotes are used to prompt students to consider more substantive electronic discussion interaction, rather than actually applying the codes electronically. Does the introduction of cognotes as a teaching strategy prompt students to improve their electronic discussion communication patterns? Part B of this study addresses an inclusive education course "aligned in time-frame" to the physical education course such that the transfer of skills to other courses (without prompting) can be judged. Do students who have been introduced to the strategy improve their electronic discussion group communication patterns in others courses? Are these communication patterns more substantive than those from students who have not been introduced to the cognote teaching strategy?

Part A: Electronic Discussion Group Setting With the Introduction of Cognotes

Setting

This study began within a teacher education course in physical education where students were invited to construct new meaning about teaching from engaging in electronic discussions stemming from learning activities experienced in class related to physical education content and teaching strategies. Students, in groups of 4 or 5, initially engaged in an electronic discussion prior to being introduced to the cognotes developed by MacKinnon & Aylward (2000). "Cognotes" are used as student prompts to consider more substantive electronic discussion interaction. Students (a) were introduced to cognotes, (b) distinguished between critical categories and (c) created their own statements for each category in a teacher-led exercise. Students were then invited to assess an earlier EDG using the coding system as a scaffold to determine the nature and level of their entries. The process of self-assessing one's entries was also part of the assessment system at the close of each of topic with the intent to challenge students to ensure that they were engaging in high-level discussions by the end of the semester. Data was gathered from all 52 students in the Bachelor of Education Elementary Program (B.Ed.) enrolled in this Physical Education in Inclusive Elementary Schools methods course. Data consisted of all EDG entries captured from the first and last electronic discussion prompt introduced in class during the fall semester.

Analysis

An inductive analysis of student entries was conducted based on the coding system developed by MacKinnon & Aylward (2000). This analysis indicated that a significant number of students offered their unsubstantiated opinion as opposed to engaging in more substantial argumentation patterns such as cause & effect, compare/contrast, idea to example/example to idea etc.

"Phys Ed teacher should teach overall fitness awareness, basic skills that will help students be active, and develop a positive attitude towards a physically active life (opinion). In teaching Phys Ed. An instructor needs to be able to match the skills and activities to the lesson to the physical capabilities of the students (opinion). Activities should be fun with the focus on students learning skills rather that on performance (opinion)."

Students also sent messages agreeing with others people's messages and essentially only repeating what someone else said.

"Sandra ... I thought your point about teaching physical education as a life style not a subject was excellent especially in light of the fact Canadian Children are becoming increasingly inactive" (agreement).

Meanwhile there were instances where students did support and extend their ideas. "Learning, whether it takes place in the classroom or in the gym is more effective when it is fun (opinion). When learning is fun students will be more engaged and are therefore likely to retain what was taught (building a point). Thinking back on early school experiences, I remember even now the good, fun learning times such as the puppet play we put on to retell a story. I don't recall as much on what was taught to me in the lecture format except that it was boring and I spent more time watching the school clock waiting for the bell than that doing any real learning. I don't' think its is a question of whether we should develop skills or have

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fun. A better question would be, how do we as educators incorporate fun into our lessons so that more learning can be accomplished"

On a few occasions it was clear that students were not only providing support for their way of thinking, they were furthering the discussion by building on points that other students had previously made.

" Dan made a great point. P.E. and fun should go together (agreement). If the activities are fun, the children will enjoy learning the skills and develop a better outlook on skill development and active living (building a point). For me, gym was always fun. Some drills may have been more tedious, but if they were made fun with a competitive edge. Students would enjoy and look forward the classes" (idea to example).

Table 1 shows the distribution of discussion patterns in the electronic discussion for the Physical Education Methods course.

Students	Proving opinion or agreement			Providing support for one's thinking			Building on other's thinking		
	?	=	?	?	=	?	?	=	?
Physical Education only (N= 52)	10	5	37	37	5	10	33	9	10

Table 1: Distribution of elementary program students according to their discussion group patterns within the Physical Education Methods course.

By comparison to earlier work done by Aylward & MacKinnon (1999) these results are not surprising. In the aforementioned research above, students were not evaluated on the quality of their participation. They were encouraged to participate in EDG's in more substantive ways however, their response to this was not reflected in a grade. This is in contrast to the work of Aylward & MacKinnon (1999) where in fact students were graded based on a hierarchal "cognote" grading scheme. The Physical Education course data then corroborates the dilemma that MacKinnon (2000) posits, i.e. grading the discussion may provide incentive to improve argumentation styles but is the impact long-term? This then leads to the question of whether improved discussion patterns transfer to other courses. This then constitutes the second component of this paper.

Part B: Electronic Discussion Group Setting Without the Introduction of the Cognotes

Purpose

Part B of the study of electronic discussion groups (EDGs): 1) searched for evidence of transfer of discussion skills from one course to another without prompting students using coding categories (Group A), 2) examined inherent skills in a control group that had no prior instruction (Group B), and 3) examined skill growth over time in both groups.

Study Groups

Group A were B.Ed. Elementary Program students (n = 16) concurrently enrolled in the Physical Education in Inclusive Elementary Schools methods course and in the Issues in Inclusive Schools foundation course. Group B were B.Ed. Secondary Program students (n = 43) enrolled in the Issues foundation course but not in the PE methods course.

Both courses used EDGs and as noted, Group A students were introduced to cognotes and their particular use in stimulating higher levels of critical thinking in the PE course. However, no such instruction was given to either Group A or B in the Issues course beyond the mechanics of using EDGs and the value of critical thinking in their work. All entries from the first and last topics assigned in the electronic discussions comprised the data for this analysis.

Analysis

Using the coding system developed by MacKinnon and Aylward (2000), the analysis grouped students' EDG entries according to the following response types. P1 indicated off-topic or faulty logic; P2 indicated agreement with others, expression of opinion, asking a question, simple compare/contrast with no significant new information; P3 indicated clarification with new information, building on a point, making inferences, describing cause/effect consequences, ideas illustrated by examples, and examples leading to new ideas, that is essentially carrying the conversation forward to a higher cognitive level. The growth in discussion skills (as defined here) over the duration of two electronic discussions is noted in Table 2.

	Group A (Elem: n = 16)			Group B (Sec: n = 43)		
	Topic 1	Topic 2		Topic 1	Topic 2	
P1	2.8%	4.4%	(+ 1.6%)	3.3%	4.9%	(+ 1.6%)
P2	56.0%	48.2%	(- 7.8%)	69.4%	50.3%	(- 19.1%)
P3	41.2%	47.7%	(+ 3.5%)	27.3%	44.8%	(+ 17.5%)

Table 2: Skill Growth: Topic 1 Discussion to Topic 2 Discussion

Skill growth in both A and B Groups was shown by increases in (P3) higher level responses, decreases in (P2) lower level responses, and countered by slight increases in off-topic (P1) responses. However, Group A consistently had a higher percentage of P3 responses and a lower percentage of P1 responses than Group B, indicating a greater initial skill level in Group A as well as continued skill growth.

From Table 3, over time, response frequency for Group A showed a slight increase, while a definite decline was noted for Group B.

	Group A (Elem: n = 16)			Group B (Seco: n = 43)		
	Topic 1	Topic 2		Topic 1	Topic 2	
Mean	13.6	14.3	(+0.7)	16.9	13.9	(-3.0)

Table 3: Response Frequency: Topic 1 to Topic 2

Discussion

It appears as though some students are retaining the electronic discussion skills gained from one course and applying them in another. Despite being prompted with the variety of patterns they might access, many students are choosing not to seriously improve their electronic discussion. From earlier work (MacKinnon, 2000) it seems quite evident that scoring the EDG quality could significantly enhance the number of students that consciously improve their argumentation patterns.

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Reality Based Teaching: Sci-Tech Research Projects

A proposal submitted to AACE by
Kecia Ray, Ed. D.
Education Technology Development
Vanderbilt University Medical Center

Scientists at Vanderbilt University Medical Center work in teams each day to conduct valuable medical research. The Sci-Tech Research Project encourages middle or high school students to assume the role of various types of medical research scientists working in research teams at Vanderbilt University Medical Center. Students participate in this classroom project by establishing teams of four and choosing to be Primary Investigator (Ph. D. or M. D.), Lab Director (Master Degree), Lab Technician (Bachelor Degree) or Fellow/Graduate Student (Ph. D. or M. D.) within their team. Only one Ph. D. and one M. D. is on each team. Students must determine which position they want to hold within the team, recognizing the qualifications and responsibilities of each position.

Vanderbilt medical researchers present hypotheses to each team. Students work in teams to test the hypotheses within a designate period. Vanderbilt research scientists will use videoconferencing technology in order to communicate with the Sci-Tech Research Teams answering questions and providing guidance. Each group will use a Compaq IPAQ handheld to record findings and create a presentation based on these findings. The culminating activity includes team members of the Sci-Tech Research Project visiting a science lab in the Vanderbilt University Medical Center, presenting their findings to the researchers who posed the hypotheses and meeting their research scientist counterpart.

Participating in this project incorporates skills related to understanding the scientific method process, utilizing technology to collect and record data, team building, speaking to a group, utilizing technology to present findings, and skills related to the hypotheses, which are curriculum connected. This teaching strategy combines project-based learning, technology and reality-based teaching in an effort to increase student interest not only in science and technology but also in pursuing careers in the health sciences.

Ethics in Technology: Crucial Considerations

Fidel M. Salinas Ed.D.
Denise M. Smith, Ed.D., CCC-SLP

This study posits ethical issues in a technological world and their impact on education, business, industry, and government. Major topics included in this discussion include:

1. Ethics in curriculum development for Face-to-Face or Distance Learning environments on the Internet. Survey of Intellectual Property, explores the following: Who owns what, where, and when, domestically, and on a global basis?
2. Impact of licensing technological applications in a Global economy and on individual and social behaviors beyond software piracy.
3. Technological ethics issues and their impact on education, both, in academic institutions, and the industrial communities.
4. Global perspective of the impact of technology on the emergence of requirements for a new code of ethics on Global free speech, privacy rights, libel, slander, and ***Netiquette*** practices.

Intended audience members for this presentation are educators and administrators pre-K through adult.

A New Dimension of Teaching in Digital Learning Environments - Teaching Teachers to Teach Between Schools

Ken Stevens,
Director, Centre for TeleLearning and Rural Education
Faculty of Education, Memorial University of Newfoundland
St Johns, NF Canada A1C 5S7
stevensk@mun.ca

David Dibbon
Associate, Centre for TeleLearning and Rural Education
Faculty of Education, Memorial University of Newfoundland
St Johns, NF Canada A1C 5S7
ddibbon@mun.ca

Abstract: The integration of information and communication technologies and, in particular, the increasing presence of the Internet in teaching and learning, challenges traditional educational considerations of time, distance and location. It also challenges traditional notions of the school. The ubiquity of information and communication technologies in education systems enables teachers and learners to form new teleteaching and telelearning relationships. The development of Internet-based technologies and the choice these provide of synchronous and asynchronous teaching and learning has encouraged some teachers to reconsider the organization of schools as well as the nature of their classroom work. This paper considers issues in the integration of information and communication technologies in teaching and learning for the organization of schools in the context of a shift from distance education to telelearning. A case study of senior high school students in selected small, rural Canadian communities who have been provided with opportunities to learn university-level Science and Mathematics within virtual classes located within a digital intranet provides the background for this paper.

Introduction

The urbanization of the Canadian landscape along with falling birth and fertility rates have combined to pose a threat to the ability of small rural schools to offer a high quality education program to the school-aged children they serve (Dibbon and Sheppard, 2001). As rural communities and schools decline in size educational policy makers often question their viability and as a result new educational structures suitable for delivering quality education to rural schools are being developed. The introduction of telelearning in schools in Canada, as in other developed countries, has been particularly noticeable in rural areas and has been largely influenced by declining enrolments and limited fiscal resources.

The rapid growth and educational application of the Internet has led to a challenge to traditional ways of teaching and learning at a distance that were based on paper and the postal system. TeleTeaching is Internet-based and does not require the degree of central control that distance educators have traditionally had. Teleteaching at the present time involves a search for appropriate pedagogy to enable teachers and learners to gain maximum advantage from the devolved, flexible and increasingly collaborative ways of organizing learning that are now possible between teachers and learners in multiple networks.

TeleLearning for Rural Canadian Communities

Thirty one percent of schools in the province of Newfoundland and Labrador are designated "small rural schools" (N=122) and 75 of these have fewer than 100 students. Seventy of the small rural schools in this province are classified as "all-grade" (K –12) which means that they must offer a senior high school program that meets the provincial certification standards. The concern expressed by educators in many of these small schools is that they do not have the capacity to provide quality programs in all areas of the school curriculum. Therefore, the large proportion of small schools located in rural communities requires special consideration in the development of new, electronic educational structures. The search for appropriate new educational structures for the delivery of education to students in rural Newfoundland and Labrador has led to the development of Digital Intranets, within which virtual classes have been organized. In the process of developing teleteaching within digital Intranets, several challenges have had to be met.

Preparing Advanced Placement Science and Mathematics for the Internet

The development of Advanced Placement (AP) Web-based courses in Biology, Chemistry, Mathematics and Physics took place within subject area teams. A lead science teacher in each discipline was paired with a recent graduate in each of the disciplines of Biology, Chemistry, Mathematics and Physics who possessed advanced computer skills including web page design, Java and HTML. The lead teacher and the graduate assistant were advised from time to time by Faculty of Education specialists at Memorial University of Newfoundland in each curriculum area and, where possible, scientists from the Faculty of Science. The extent to which each web-based course was developed by a team of four people varied. Most course development took place through interaction between lead teachers and the recent graduates. Although at times professors had different opinions as to the most appropriate approach to the design of the courses, this model enabled the four courses to be developed over a sixteen-week summer recess period in time for the 1998-1999 school year. Minimum specifications were adopted for computer hardware and network connectivity. All schools involved in the project had DirecPC satellite dishes installed to provide a high-speed down-link. In most rural communities in this part of Canada, digital telecommunications infrastructures do not enable schools to have a high-speed up-link to the Internet. Appropriate software had to be identified and evaluated for both the development of the resources and the delivery of instruction within the Intranet. Front Page 98 was selected as the software package. Additional software was used for the development of images, animated gifs and other dimensions of course development. These included Snagit32, Gif Construction Set, Real Video, and similar packages. Many software packages were evaluated and finally WebCT was selected. This package enabled the instructor to track student progress, it contained online testing and evaluation, private Email, a calendar feature, public bulletin board for use by both instructor and student, a link to lessons and chat rooms for communication between teacher and student. For real - time instruction, Meeting Point and Microsoft NetMeeting were selected. This combination of software enabled a teacher to present real-time interactive instruction to multiple sites. An orientation session was provided for students in June 1998, prior to the implementation of this project in September. Students had to learn how to communicate with each other and with their instructor using these new technologies before classes could begin.

The Development of a Digital Intranet

The electronic linking of eight sites within the Vista School district to collaborate in the teaching of AP Biology, Chemistry, Mathematics and Physics created a series of open classes in rural Newfoundland that became known as the Vista School District Digital Intranet. The creation of the Vista School District Digital Intranet was an attempt to use information and communication technologies to provide geographically-isolated students with extended educational and, indirectly, vocational opportunities. This has been part of a broader pan-Canadian initiative to prepare people in Canada for the Information Age (Information Highway Advisory Council, 1995,1997). The development of the Digital Intranet within a single school district involved the introduction of an open teaching and learning structure to a closed one. Accordingly, adjustments had to be made in each participating site so that administratively and academically, AP classes could be taught.

The Vista school district initiative challenged the notion that senior students in small schools have to leave home to complete their education at larger schools in urban areas. By participating in open classes in real (synchronous) time, combined with a measure of independent (asynchronous) learning, senior students were able to interact with one another through audio, video and electronic whiteboards. Because this

Intranet comprised a single school district and because the students lived within 60 miles of each other, from time to time they were transported to a central location where they were able to get acquainted with each other and their tele-teacher. While AP courses are a well-established feature of senior secondary education in the United States and Canada, it is unusual for students to be able to enroll for instruction at this level in small schools in remote communities.

From Closed to Open Teaching and Learning Environments

The major change in instruction for the students in the first Digital Intranet in Newfoundland and Labrador was the provision of learning in a flexible manner, building around the geographical, social and time constraints of individual learners, rather than those of the traditional school. Students from eight different communities had the opportunity to study advanced science subjects and mathematics as members of open classes from their small, remote communities. Instead of meeting in traditional classrooms, the Digital Intranet provided students with simultaneous access to multiple on-line sites, as well as the opportunity to work independently of a teacher for part of the day.

The advent of the Digital Intranet had implications for students who began to interact with teachers and their peers in a variety of new ways. Many students experienced difficulty expressing themselves and, in particular, asking questions in open electronic classes when they did not know their peers from other small communities. The organization of social occasions for students learning science in open classes in the Intranet helped overcome these problems. The need to prepare for classes before going on-line became increasingly apparent to both teachers and students if the open, synchronous, science classes were to succeed. As the commitment to come to class fully prepared increased, students became more comfortable with one another and inhibitions such as asking questions on-line were overcome. Also, as their studies progressed, the students were increasingly subject to scrutiny by their peers as they responded to questions and concerns through chat-rooms, audio, video and with their AP on-line teacher. In future, interaction in the Vista Digital Intranet will be both synchronous and asynchronous.

The need for increased technical support for this new, open structure has become increasingly urgent for teachers and students who are using information and communication technologies to teach and learn across dispersed sites. Both have to be provided with expert advice and instruction in the use of new applications. A particular problem has been the difficulty in securing and maintaining instructional design expertise in the preparation and upgrading of courses delivered through the Intranet. Since these instructional design experts are not available to the school system on a full-time basis tele-teachers need to work closely with instructional designers on a skills transfer program that will enable these tele-teachers to keep their courses up to date and relevant.

Teaching Between Schools (Sites) in Rural Communities

In the process of developing teleteaching and telelearning within Digital Intranets in rural Newfoundland and Labrador, teachers, learners and administrators had to adapt to a new, electronic educational structure in which teaching and learning took place between, as well as in, it's constituent participating sites.

In the open teaching and learning environment of a digital intranet, participating institutions academically and administratively interface for that part of the school day during which classes are being taught. This is a different educational structure from the traditional and, by comparison, closed educational environment of the autonomous school with its own teachers and its own students. There is a potential conflict between a school as an autonomous educational institution serving a designated district and schools which become, in effect, sites within electronic teaching and learning networks. Issues related to governance, teacher allocations, teacher and student scheduling, work load and training and development will need to be resolved before open teaching and learning model can be fully adopted.

Principals and teachers appointed to the closed, autonomous learning environments of traditional schools frequently discovered that the administration of knowledge requires the development of open structures within which they are increasingly expected to collaborate with their peers located on a range of distant sites. Some now find that the positions to which they were appointed in traditional (closed) schools have become, in effect, locations within new (open) electronic schools and some of the teachers actually spit their teaching assignment between the open and closed model of school.

An essential aspect of the development of open electronic classes is the coordination of both hardware and software between schools. Without coordinated technology, schools cannot fully participate in electronic networks. However, the purchase of appropriate hardware and software is a matter of confusion for many principals, teachers and School Boards who seek support and advice. Many rural schools with open electronic classes realized that the successful administration of a network required local technical support. Unless adequate technical support systems can be established, electronic networked classes could be curtailed by teachers who could argue, with justification, that there is insufficient back-up to justify their investment in telelearning.

In small and remote Canadian communities the assurance of adequate technical backup is often particularly difficult to provide for teachers and their senior students. In schools in Newfoundland and Labrador, the majority of which are designated rural, telelearning often depends on the goodwill of one or two teachers with enough technical knowledge to develop and maintain school networks and to troubleshoot when malfunctions occur.

Pedagogy for TeleLearning

Although it has yet to be shown that open Internet-based classrooms suit the needs of all students, particularly those at junior levels, they do provide rural schools with choice in the way they can access educational and, in particular, curriculum opportunities. Teaching in classrooms that are electronically linked to other sites requires different lesson preparation and delivery skills from teaching face to face. For teacher – student interaction in a new electronic structure to be effective, the strengths and weaknesses of the new environment have to be understood by everyone who participates.

Students often have more independence in managing their learning in open electronic classes but most have to be assisted by teachers in the setting of goals, the meeting of deadlines and in evaluating their progress. Teachers are effective in open electronic classes if they can be flexible in ways they enable students to participate in on-line lessons. Audio-graphic networking has in the recent past provided schools participating in regional electronic networks with a simple and flexible way of accommodating the diverse needs of learners (Stevens, 1994). The student's need to concentrate on the audio lesson to fully participate in it when conducted in an open electronic class between several sites was noted by several participating schools in earlier research in New Zealand (Stevens, 1994). Students cannot anticipate when they will be asked a question over the audio network, something that encourages preparation for classes conducted with teachers and peers who are not physically present (Stevens, 1998; 1999).

The nature of Tele-learning requires dedication and discipline on the part of learners and they must be motivated to complete and participate in all aspects of the learning program. As a result, high quality interaction with learning materials and interaction between teachers and other learners is essential for effective learning. With the right support, tele-learning has the potential to open new and exciting worlds to more and more students, at all levels.

Strategies and protocols for on-line teaching have to be developed between participating schools if all students are to be able to fully participate. The introduction of a rural school to an open electronic network considerably improves its resource base for both teachers and learners but does not solve all of its problems. It is often difficult to coordinate the timetables of networked schools and a considerable measure of inter-institutional and intra-institutional cooperation is required to develop detailed and effective plans for collaboration.

There are several immediate pedagogical challenges to be considered for effective teaching in a Digital Intranet: Teaching face-to-face and on-line are different skills and teachers have to learn to teach from one site to another. This is fundamental to the success of teleteaching. Teachers have to learn to teach collaboratively with colleagues from multiple sites and educators have to judge when it is appropriate to teach on-line and when it is appropriate to teach students in traditional face-to-face ways. These judgements have to be defended on the basis of sound pedagogy.

Conclusion

The introduction of inter-school electronic networks has added a new dimension to education in Canada and is bringing new challenges for teachers and learners (Collis, 1996; Hobbs and Christianson, 1997) and administrators. The teachers and researchers who are collaborating in the development of new electronic structures for delivering education to dispersed, rural sites in Atlantic Canada are very conscious of being pioneers.

In rural Newfoundland and Labrador the open learning model challenges the closed model of schooling by questioning the need for appointing all teachers to schools, rather than, in appropriate cases, some teachers being appointed to networks of schools. It questions the appropriateness of learners engaging solely with their peers within their own, physical classrooms, and, it questions the very notion of the school.

Technically, tele-learning is defined as the asynchronous or synchronous (real-time) delivery of training and education over the Internet to an end-user's computer or Internet appliance. Philosophically, tele-learning signals a shift of epic proportion in the way we will approach learning in the future. If we are prepared for the opportunities this type of learning presents we will be better prepared to meet the needs of all our students. If not, we may miss or delay the greatest potential changes in learning and the subsequent empowerment of people that the world has ever witnessed.

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Rubrics for Online Learning Evaluation – Learning, Experiencing, Developing, & Applying

C. Y. Janey Wang
University of Texas at Austin
janeywon@mail.utexas.edu

Rafael Cota
ITESM Institute, Mexico
rcota@campus.her.itesm.mx

Guillermo Espinosa
ITESM Institute, Mexico
GEspinoz@campus.her.itesm.mx

Abstract: This presentation provides information garnered from a post-faculty development workshop survey regarding the use of evaluation rubrics. Rubric discussions at the UT-ITESM faculty development workshop (in June 2001) focused on six facets of understanding, seven steps to rubrics development, and the employment of rubrics as an alternative assessment method. This paper presents the post-workshop survey and results, as conducted by the researchers, while workshop participants' rubrics samples and assessment strategy suggestions will be presented during the oral presentation.

Introduction

Evaluation of online collaborative learning has been the subject of increased attention in recent years. Online collaborative learning involves both task and social aspects of learning. A long tradition of methodology and approaches regarding task evaluation, including knowledge and skills, exists. Social aspect evaluations, including communication and group collaboration, present special challenges to instructors, and opinions regarding online learning evaluation cover a wide spectrum. Some commentators have proposed "the need for standardized evaluation," while others have emphasized the importance of considering the context and the characteristics of users (Crawley, 1999).

Rubrics are "a type of scoring guide" used to assess more complex and subjective performance, according to Mary Rose (1999). She said rubrics provide "authentic assessment" so the evaluations of student performance are "closer to the challenges of real life than isolated tests." Rubrics that "communicate detailed explanations ... not only benefit students in making them more conscious about their own learning outcomes and process," she said, but teachers also benefit by their ability "to provide an objective basis for assigning grades" and to "involve students more effectively in the evaluation and assessment process" (Rose, 1999). A plethora of literature in support of such measurements abounds. Topics discussed include using rubrics as an alternative assessment (Marzano, 2000), as assessments of authentic and contextual learning (Huffman, 1998), and as performance assessments in an outcome-based system (Mitchell, 1997).

This report was initiated by an instructional designer serving as a facilitator of a three-week cross-discipline and cross-institutional online collaborative learning workshop, ITESM Summer Institute, and is based on a collaborative effort of two workshop participants, a high school principal and a higher education school administrator. The major objectives of this report are to explore workshop participants' perspectives toward the use of rubrics as an alternative assessment tool following their engagement in using rubrics for self, peer, and product evaluations after collaborating in groups. A post workshop survey was conducted to investigate participants' perspectives, experiences, and attitudes toward its future use. A few rubric samples produced by some workshop participants are also presented and analyzed.

ITESM Summer Institute – Discussions on Evaluation

On May 28, 2001, forty-eight ITESM (Monterrey Institute of Technology and Higher Education System) faculty members from throughout Mexico gathered at the University of Texas in Austin for the "ITESM Summer Institute." Hosted by U.T. Austin, this intensive three-week professional faculty development workshop emphasized the integration of technology into curriculum and instruction. Three major aspects of the workshop were cooperative learning, collaborative learning, and faculty development.

The discussions on evaluation were conducted by one of the three major workshop speakers, Dr. Paul E. Resta, a professor at the University of Texas at Austin. Various perspectives and approaches in using rubrics were explored. Workshop discussions included the relevancy, validity, reliability of using rubrics, as well as design considerations and strategies involved in rubric use. According to Resta, an awareness of the varying levels of student understandings is essential when planning the use of rubrics to evaluate online collaborative learning; he identified six facets of understanding to include explanation, interpretation, application, perspective taking, empathy, and self-knowledge.

In collaborative learning settings, students need to explain and communicate their ideas by making their knowledge public. They also must be open to review, discussion, and revision of their ideas within this setting. Through dialogue and discussion, students are able to achieve deeper understandings of conflicting ideas. The second facet of understanding is interpretation. Students need to hear meaningful stories that relate to their real-world experiences. In collaborative learning settings, students need to make their interpretations and understandings public while instructors should provide opportunities for clarifying and contrasting interpretations while promoting exploration and examination of self and others' interpretations. Through this process of exposure to multiple interpretations, students are enabled to modify their interpretations.

The third facet of understanding is application. Learners should ideally be able to demonstrate what and how they have learned and employ their knowledge in complex contexts. Through the provision of real world problems and authentic, collaborative, and complex context within the learning environment, learners should be able to more effectively apply their knowledge and skills within the context of peer monitoring and cognitive apprenticeships. The fourth facet of understanding is the ability to take critical and insightful stands and the ability to provide reasoning and evidence to explain a particular phenomenon. In a collaborative learning situation, students are exposed to diverse viewpoints and conflicting ideas. Instructors who are able to facilitate critical analyses assist students in recognizing the strengths and weaknesses of their ideas, ultimately enabling more meaningful learning to occur.

The fifth and sixth facets of understanding are empathy and self-knowledge. Given the presence of divergent worldviews, students must be able to discern others' values and understand others' viewpoints when collaborating. Through discussion, assumptions are made explicit and further discussion and learning is enabled. The collaborative learning instructor should indicate the limits of the individual's personal understanding and encourage multiple perspectives and dialogue among collaborators, with one of the end results being that all students should come to the realization that they are blinded--to some degree--by ignorance, prejudice, or habitual thought patterns. Based on such understandings, the instructor should have a better understanding of rubric utilization, inclusion factors, and rubric incorporation into instruction.

Seven steps to rubric development were discussed. These are: (1) Determine learning outcomes; (2) Keep it short and simple (include 4-15 items; use brief statements or phrases); (3) Each rubric item should focus on a different skill; (4) Focus on how students develop and express their learning; (5) Evaluate only measurable criteria; (6) Ideally, the entire rubric should fit on one sheet of paper; (7) Reevaluate the rubric (Did it work? Was it sufficiently detailed?). Dr. Resta suggested that instructors should select an authentic and engaging collaborative learning project that results in a real product. In considering the relevancy of the project, the instructor should specify curriculum areas covered and how they relate to students' academic and/or professional goals. The instructors should focus on elements of knowledge that are important and worthwhile to students. Other considerations include: having a clear idea about "learner outcomes;" "learners' entry skills and knowledge;" "project goals and expectations;" and considering how to promote students' higher-level cognitive and critical thinking skills such as reasoning, analysis, problem-solving, critiques, and reflection. In addition, the instructor should promote creativity and divergent thinking by challenging students in authentic activities where students engage and solve problems collaboratively. In determining the rubrics development procedure, Dr. Resta suggested that outcomes should be considered first. The rubric statement should be "short and simple." Items listed should have a particular focus on essential skills and knowledge. In addition to comprehending and mastering knowledge and skills, it is essential that students are able to communicate their ideas and understandings. The instructor should "focus on how students develop and express their learning," and provide proper guidance.

To assess online collaborative efforts, Dr. Resta suggested that self, peer, and product evaluation should be included. Collaborators should be held accountable to each other in order to enhance optimal performance. In order to enhance accountability, members' contributions and quality of work need to be assessed by peers. Instructors should also provide comment sections so students can provide rationales for their rankings and qualitative ratings. In order to enhance product evaluation, individual and group products should be assessed. Instructors should also require students to maintain a portfolio of their contributions, specify items to be included in the portfolio, and identify criteria to be used for portfolio evaluation, Resta said.

Rubrics for Assessment

The merits of using rubrics for assessment are well-documented. Caroline McCullen (1999) refers to rubrics as excellent tools that offer a way for every student to succeed. Students can refer to a specific project or learning activity rubric and discern their ability to work at some level of proficiency. At the same time, students can discover for themselves modes to enhance future performance and proficiency in similar learning activities or projects. Rubrics also provide a way to make subjective activities such as group work, research processes, and presentations objectively evaluated (McCullen, 1999). Social skills and group behaviors are often not amenable to assessment and objective means of evaluating these skills and behaviors are often lacking. Rubrics allow teachers and students to easily outline and evaluate levels of proficiency.

Rubrics can be employed as both an evaluation and a teaching tool. Standards can be set for students' work and used as guidance to assess students' progress and performance. Finson & Ormsbee (1998) said that rubrics refer to specific guidelines on how to score all or parts of an assessment or activity. They identified two forms of rubrics: analytic and holistic. "Criteria that determine the specific type of rubric designed or selected may include the focus or intent of the assessment, the type of instruction preceding assessment, and personal preferences of the individual doing the assessing," they said (p. 80).

Analytic rubrics are used to award points for very specific responses. Analytic rubrics are extremely objective because teachers critique each student response and score the response according to established criteria. These rubrics are more process-oriented than product-oriented. Holistic rubrics are used when overall quality is the focus of assessment. Holistic rubrics are more product-oriented than process-oriented and are primarily concerned with the total performance or product rather than with the individual steps taken to arrive at the final product. In its purest form, a holistic rubric is not used to award points; instead, student products are simply rated according to designated indicators.

A Post-workshop Survey about the use of rubrics

A multiple choice survey was conducted by this study's researchers to discover workshop participants' prior knowledge and use of rubrics as well as their plans to use rubrics for evaluation in their instruction. Participants' plans to use rubrics to evaluate group collaboration, tasks, or overall performance were also surveyed, as were their specific plans on rubric use, the relative likelihood of using rubrics for students' self-evaluation, peer-evaluation, or teacher-evaluation, and the target populations of rubrics employment.

Method

The main purpose of this survey is to gain an understanding of participants' prior knowledge of rubrics and to survey their learning of rubrics through workshop experience in self and peer evaluation using pre-developed rubrics. Further, how workshop participants intend to apply what they have learned about evaluative rubrics in their classroom teaching were explored.

The survey, conducted through a free online survey Web site (http://www.freeonlinesurveys.com), was sent to 46 workshop participants (two of three researchers were not included in this survey). Only 15 responses were obtained because most attendees were on summer vacation. Survey results were automatically calculated and shown on the Web.

In addition to the multiple-choice questionnaire, participants were also asked to provide additional comments via e-mail, telephone, or on-line chats with the researchers. Rubric samples produced by three participants during the workshop were obtained.

Survey questions were in Spanish because 95 percent of the workshop participants are native Spanish speakers. The survey questions were translated into English.

Translated Survey Questions and results

1. Prior to attending the UT-ITESM Summer Institute, were you using rubrics as evaluation tools? Choose only one option.

a. Yes (26%)
b. No (73%)

2. Do you anticipate using rubrics as evaluation tools in future courses? Choose only one option.
   a. Yes (100%)
   b. No (0%)
   c. I don't know (0%)

3. If you do anticipate using rubrics as evaluation tools in future courses, which aspect of the task/project/activity will your rubric focus on? Choose all the options you consider applicable.
   a. Process (group collaboration) (53%)
   b. Results (Product) (40%)
   c. Results Presentations/Evaluations (40%)

4. If you do anticipate using rubrics as evaluation tools in future courses, what do you want to evaluate? Choose all the options you consider applicable.
   a. Abilities (80%)
   b. Attitudes (86%)
   c. Values (46%)
   d. Knowledge/Content (100%)

5. If you do anticipate using rubrics as evaluation tools in future courses, how many levels of competencies do you anticipate using? Choose only one option.
   a. Two (0%)
   b. Three (26%)
   c. Four (73%)
   d. Five (0%)
   e. Six (0%)
   f. Seven or more (0%)

6. If you do anticipate using rubrics as evaluation tools in future courses, under which of the following modalities do you anticipate using your rubric? Choose all the options you consider applicable.
   a. Self-evaluation (26%)
   b. Peer evaluation (53%)
   c. Teacher Evaluation (93%)

7. If you do anticipate using rubrics as evaluation tools in future courses, at what educational level do you anticipate using your rubric? Choose only one option.
   a. High School (26%)
   b. Peer evaluation (40%)
   c. Teacher Evaluation (0%)
   d. Continuous Education (0%)

Results

Survey responses indicate participants' consensus on the value of using rubrics for evaluation and suggest that UT-ITESM Summer Institute attendees are united in their perception that using rubrics in collaborative learning is an effective motivator. Of the 15 participants who responded, 60 percent planned to use rubrics with high school students and 40 percent planned to use rubrics with undergraduate students. The results show that only 26.67 percent of the participants had used rubrics as evaluation tools prior to attending the Institute and that the majority (73.33 percent) had not been familiar with the use of rubrics prior to the workshop. Following the workshop, however, all respondents indicated planning to use evaluation rubrics in their courses.

Regarding task aspects and anticipated rubrics use, about half (53 percent) said they would use the rubric to evaluate the group learning process, 40 percent would use rubrics to evaluate results or products, and 40 percent would use rubrics to evaluate students' presentation of their products. These results demonstrate that while the majority of the participants plan to use rubrics as a tool for evaluating group work, some remain focused on such tangible end products as tests or papers. Many of the teachers' responses, nevertheless, reflected an interest in examining group interactions and collaboration. Many participants said they anticipate using rubrics to evaluate teacher-set benchmarks of proficiency. This demonstrates that many participants anticipate teaching in a more structured environment where cooperative learning is utilized, but not the more loosely structured collaborative learning environment. According to Panitz (1996), a collaborative learning approach differs from cooperative learning mainly in the way the learning environment is structured and in the teachers' control of activities.

Regarding future use of rubrics for evaluation, all respondents indicated planning to evaluate knowledge and content; 46 percent planned to evaluate values, 86 percent planned to evaluate attitudes, and 80 percent planned to evaluate abilities. All respondents endorsed the idea that rubrics are an appropriate evaluation tool for assessing content and specific knowledge. The majority thought that rubrics might also be used to evaluate observable behaviors, competencies, and attitudes. Regarding who should conduct evaluations, 93 percent said that teachers should conduct evaluations, 53 percent said that peers should conduct evaluations, and 26 percent said self-evaluation should be employed. This suggests that most participants will continue to evaluate their students on their own, while some will incorporate peer evaluations and students' self-evaluations. Three or four levels of competencies were the only respondent choices, in terms of the levels of competency to be evaluated in designing rubrics, with 73 percent preferring four competency levels and 26 percent preferring three competency levels.

Conclusions

Based on the post-workshop survey responses and participants' rubric samples, it appears that participating teachers are seriously considering using rubrics as an alternative assessment in their classes. These evaluations, participants indicated, extend not only to evaluating students' product, but also to evaluating communication processes and abilities, as well as the ability to present ideas and products. Participants endorsed the inclusion of a wide array of aspects besides knowledge and skills, such as ability, values, and attitudes. Evidence was found to indicate an evolving concept of who should assess students' performance. Participants realized that assessment is not solely the teacher's responsibility, but that peer- and self-evaluation should also be employed. In general, ITESM participants exhibited their new found understanding that rubrics are not only an evaluation tool, but also an instructional tool to be used for scaffolding students' learning, monitoring students' performance, and promoting meta-cognition and critical thinking.

A reform process is currently underway at ITESM, Mexico, centered on emphasizing a student-centered approach, values and attitudes in teaching, and the implementation of technological integration. The institute expects its faculty members to understand the learning process, the relationship between knowledge and the social-emotional aspects of learning, and the role of technology in learning. The institute expects teachers to demonstrate progress in their instructional design utilizing strategies learned, resources explored, and realization of the changing roles of teachers. Throughout the investigation of the paper, we discovered participants' evolving attitude toward evaluation and their willingness to incorporate rubrics for various types of assessment in their classrooms.

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THE CRUCIAL ROLE OF INFORMATION TECHNOLOGY AND KNOWLEDGE-ECONOMY FOR TEACHER EDUCATION

Tsung Juang Wang
National Taipei University of Technology, Taiwan
(e-mail) tjwang@ntut.edu.tw

ABSTRACT:
This paper describes the current status of restructure development in technological and vocational education. The discussion covers Knowledge economy (K-economy) along with "global village" needs, and is supported by information about technology standards combined with notions of curriculum, career, ethics, and tradition. The concepts of Information Technology (IT) and K-economy development require input from all mankind, but teacher education professionals can play a particular role here; their reform motivation can often be a decisive argument for their education and workforce development.

Introduction

Life-long learning is the key to education in the 21st century; schools must depend on the directions they plan to take. Such decisions can be difficult especially when schools find themselves faced with the influx of rapid changes, both in society and in the school environment, characterized by the many changes that "move in so many different directions" (Drucker, 1992; 351) so no matter which direction one takes and what pressures we receive from different sectors, education needs to be customized, school-based, relevant, readily available and learner-centered. For this to happen, the place of technology is vital in providing the tools to access information from all corners of the earth, yet this information is useless unless the teachers help the students to turn this into knowledge, and through reflection in time.

In order to answer the challenges of the coming knowledge economy, Taiwan's education system needs to undergo wholesale reform. However, educational reforms need to be accompanied by adjustments in the education system. What are the main difficulties currently being encountered by Taiwan's educational reforms? What kind of social foundations should we be laying for future education?

As the age of the knowledge economy approaches, how should we reform education so as to best answer its challenges -- particularly the reform centering on education legislation? Educational reform in Taiwan has been going on for over a decade, and in fact, its overall direction complements some of the particular needs of the age of the knowledge economy very well indeed.

The Inter-relationship of K-economy and IT in Taiwan

As the technology, the systems, and the economics of education reform advance, we must not lose sight of what education is for. The argument began with is about its moral purpose. The recent economic adjustment is in many ways a blessing in disguise. It reinforces our conviction that we must diversify our economy and promote high-tech, high value-added industries. It is also a timely reminder that our ability to respond to the challenges of the future world depends on how well we can equip our young generation today. We firmly believe that the starting point is education. But, what is the education needs in the new millennium, life-long learning, creativity and devolution of our education system? Our education system must ensure that all our students are information technology (IT) literate, with some of them having the potential to become leaders in the field. This is because IT and the teacher education have changed and will continue to change the world in profound ways with lightning speed. We live in an information age, which offers immense opportunities. And our students have to learn to embrace them.

There must be flexibility in the education system to promote diversity and excellence, and nurture creativity in our students. The system must allow room for schools and educators to innovate, and to respond to the changing demands of parents. It should encourage competition among education providers, and give all stakeholders a proper say in the delivering process.

K-economy and IT Impact upon the Teacher Education

In a knowledge-based economy, the ability of our people to continually learn and upgrade their skills and knowledge is vital to our development and competitiveness. At the basic education level, we offer adults part-time courses ranging from primary to senior secondary. On the vocational side offer part-time skill upgrading courses.

At the tertiary level, we have an Open University, which plays an important role in our efforts to promote life -long learning.

In the past, our education system was very intolerant of different opinions, and shut out non-mainstream educational patterns, and so as we advance towards the age of the knowledge economy, we must put special emphasis on the social foundation that the knowledge economy must have. At the same time as promoting cooperation between industry and education, should we also set up a mechanism to allow participating researchers, or even all of society, to have the chance to share in the fruits of investment in public resources? Then again, that's maintaining social justice, and the knowledge gap may produce many social problems, and so we should formulate some measures, such as making the internet even more widely available, and even cheaper, maybe even expand opportunities for digital education by making it free of charge, and so cut down on the occurrence of related problems.

Educational reform continues to expand in quantity, but we've still yet to see much of an improvement in quality, and the key reason for this is that in the past, compulsory education only ensured nine years of schooling, it didn't promise that you'd have learnt anything after these nine years, and so many junior high school graduates would be doing their military service without even being able to write their names very well. It's very important that we solve problems to do with teaching staff, teacher education. Our teachers are using yesterday's knowledge to teach today's children how to handle the society of the future, and if teachers don't treat further self-improvement as a duty and an obligation, how will the students that they teach be able to answer the demands of contemporary society?

In ongoing policy discussion of educational reforms, people emphasize the impacts of globalization and try to make every effort to adapt their education system as well as curriculum and pedagogy to prepare for it. Unfortunately they often ignore the necessity and importance of localization and individualization or they put these three processes in a contradictory position. Without localization in education, they will be unable to meet the local needs, involve community support, and enhance site-level motivation and initiatives (Kim, 1999; Cheng, 1996). Without individualization in education, all efforts of reforms will be unable to meet the needs of students and teachers and to motivate them to be effective in teaching and learning. In other words, they will not be able to elicit the necessary initiative, imagination, and creativity from school members and community members, and to make contribution to the process of globalization, not just receiving its impacts. Therefore, globalization, localization, and individualization all are necessary components in current educational reforms.

Conclusion

We need to rethink and re-engineer our school education and teacher education. If we believe our world is moving towards multiple globalizations and becoming a global village with boundless interactions among countries and areas. Our new generations should be expected as a contextual zed multiple intelligence person in such a fast changing and interacting global village. The development of the society should be multiple towards a learning multiple intelligence society. The aims of education should be to develop students as a multiple intelligence citizen who will creatively contribute to the formation of a multiple intelligence society and a multiple intelligence global village with multiple developments in technological, economic, social, political, cultural, and learning aspects.

If IT is to bring a real added value to education, then its success lies in the innovative methods for designing, planning and conducting network actions in which innovation lies not just in the mere presence of a new technology but rather in revising certain teaching processes or in creating new ones based on the new technology. Furthermore, IT in most of the countries was seen as something that should be added on to the curriculum rather than an integral part of curriculum planning.

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Utilizing *Blackboard* to Engage Teacher Candidates in Higher-Order Thinking

Saundra L. Wetig
College of Education
University of Nebraska at Omaha
United States
swetig@mail.unomaha.edu

Abstract: The infusion of technology into classroom activities has been demonstrated to enhance student learning (Christopherson, 1997; Roblyer, 1998). The value added comes from the potential for anytime/anywhere learning, student communication, and increased access to multiple sources of current information. During the Fall 2001, a web program titled *Blackboard* was made available to all students and faculty members across the University of Nebraska at Omaha (UNO). This paper highlights how *Blackboard* will be implemented in a level I field experience course in the College of Education for the Spring 2002 semester. This work-in-progress is not an empirical study, but instead, an attempt by the instructor to help students think more critically regarding classroom observations made in a level I field experience course.

Background: *Blackboard*

Today's education landscape is characterized by a greater demand for anytime/anywhere learning. As we move into the 21st century, technology has become a significant part of how we train teacher candidates. The new millennium requires teacher candidates to practice both the art and science of teaching in new and different ways. During the Fall 2001 semester the UNO Information and Technology Service (ITS) provided faculty and students with the opportunity to utilize the web-based server software system titled *Blackboard*. *Blackboard* serves 5.4 million active users, with more than 1,900 'live' institutions. UNO is one of eleven educational institutions in Nebraska utilizing *Blackboard*. A sample of tools available through *Blackboard* include:

1. *Calendar* – Users may manage their course, organization, institution and events through this tool.
2. *Tasks* – Organizes projects, defines task priority and tracks status.
3. *Course Documents* - An area to place documents of various types for students to view.
4. Assignments – Lists the due date and description of class work. Quizzes and exams can be placed in this area for students to access.
5. *Discussion Board* – Instructors may add forums, and allow students to read messages that are organized into threads. Students can read and respond to both the instructor's posts and the posts of other students in the class. This is a great tool to promote discussion among students about class subject matter outside of class. Participants do not have to be logged on at the same time.

Integrating *Blackboard* into an Instructional Systems Course

The College of Education (COE) at UNO has undertaken a review of its course offerings in response to emerging national standards. The faculty of the college has designed a program for teacher education candidates that utilize a systematic, experience-based approach to develop and demonstrate requisite knowledge, skills and dispositions. The outcome of this curriculum is "The Teacher as Orchestrator of the Learning Environment." Instructional Systems is a course, which acquaints teacher candidates with the basic aspects of curriculum design and implementation. Topics integrated into the course include: a) instructional delivery strategies based on the assessment, prescription, implementation, and evaluation (APIE) model of the COE, and b) educational technology selection, design, production, utilization and evaluation. Instructional Systems seeks to help teacher candidates understand the role of a teacher as the orchestrator of the learning environment and the integral part these topics play in that role.

Students in Instructional Systems are required to complete twenty observational hours in an assigned school setting. The placements are made in socio-economic diverse elementary, middle, and high school settings. Throughout the twenty hours, teacher candidates are required to complete field reports.

The field reports are guided by questions based on the clinical aspects APIE model. Candidates turn their reports in as word-processed document to which they receive feedback only from the instructor. During the Spring 2002 semester student reflections will use on-line submission through the Discussion Board tool.

Data Collection Through *Blackboard's Discussion Board*

Discussion Board will be utilized as an additional communication tool, moving students beyond routine class discussions. Following observations and participation in the schools, teacher candidates will be required to respond to threads (set up in forums) based on the elements of APIE. Students will post their responses to each thread in *Discussion Board*. In addition to personal posts, each student will be required to respond to three classmates threads. An example forum based on the elements of assessment and prescription:

1. Element: Assessment: Topic: School and Learning Environment
   DESCRIBE the environment of the school itself (hallways, teachers' lounge, administrative offices, classrooms, etc.).
   OBSERVE the classroom environment (teacher's desk, students' desks, seating arrangements, walls, windows, attitudes, etc.).
   ANALYZE the answers you wrote to the first two questions above. DISCUSS both the possible advantages/disadvantages to the two environments. Provide insight as to how your future learning environment might look like.
2. Element: Prescription: Topic: Classroom Procedures and Routines
   DESCRIBE the schedule for each day of the week in you classroom.
   DESCRIBE the routines used each day (lining up for recess, lunch, naps, etc.).
   ANALYZE the structure and routines of the day and explain how and why you think they are conducive to learning. If you think the procedures inhibit learning, explain why and how.

The discussion board will be used in a manner similar to a virtual chatroom. A benefit of *Blackboard* is that it was designed for asynchronous use. Users do not have to be available at the same time to have a conversation. A key feature of the discussion board is that user conversations are logged and organized. Conversations are grouped into forums that contain threads and all related replies.

Conclusion

During the next semester efforts will be concentrated in engaging teacher candidates in higher-order/conceptually based dialogue based on the their observations and the observations of their classmates in a level I field experience. By requiring students to engage in self-reflection and evaluation it is hoped they will begin making connections regarding the pedagocial aspects of assessment, prescription, implementation, and evaluation.

As we move into the 21^{st} century, we have an obligation as teachers to help our teacher candidates become higher-order/conceptually based learners/thinkers. It is critical for teacher educators to continue personal modeling of technology as an aid to instruction and as a tool to engage students in higher-order/conceptually based dialogue. Jackson (1986) says in his discussion on transformative teaching, "it is essential to success within that tradition that teachers who are trying to bring about transformation changes personify the very qualities that they seek to engender in their students" (p. 124). It is hoped that as teacher candidates are engaged in purposeful, yet guided online dialogue that they will begin in their own ways to become higher-order/conceptually based learners in the experience.

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Computers, Technostress and Breathing

Lamar V. Wilkinson
Department of Psychology
Louisiana Tech University
United States
Lamar@latech.edu

Walter C. Buboltz, Jr.
Department of Psychology
Louisiana Tech University
United States
Buboltz@latech.edu

Barlow Soper
Department of Psychology
Louisiana Tech University
United States
Soper@latech.edu

Tony Young
Department of Psychology
Louisiana Tech University
United States
Tyoung@latech.edu

Lori Lindley
Department of Psychology
Louisiana Tech University
United States
Llindley@latech.edu

Abstract: Although technology continues to flourish at an unprecedented pace and influence society, its impact on society and individuals is just beginning to be investigated. As a result of technology becoming an integral part of everyday life, research findings indicate individuals are experiencing a great deal of related stress and anxiety (technostress) concerning technology. Presented are breathing techniques that help individuals cope effectively with technostress and a rationale of why they work.

Political, social, and economic issues, as well as technological advances, are generating major changes in individuals' behavior and society. In this age of computers and electronic media, researchers have been investigating the impact of technological changes on individuals. This paper will illustrate an effective way of coping with technostress by helping individuals understand the importance of breathing.

Modern life has become so complicated, harried, and crowded that individuals feel as if they must constantly scurry to survive.. Developing world events, concerns about the future and technologically driven everyday life has created tremendous strain on society, and specifically for individuals using or expected to use technology. Physical, social, and mental boundaries essential for our well-being are being constantly assaulted by technological stimuli. Individuals' senses are being bombarded with technological sounds and sights (beeps, pagers sounding off, cell phone ringing, and unsolicited conversations at any time and place digital alarm clocks, programmable toasters, smart credit cards, ATMs, computers, Internet, video games, VCR programming, etc.) leaving us irritable, distracted, unable to concentrate. Technological bombardment has generated tremendous technostress for some individuals.

Negative consequences of technology and computers may be pandemic. Yet, stress is not limited to technoexposure or threat of exposure Timothy Jay (1981) discusses extreme forms of technostress, i.e., abject fear of computers, and coined the term "computerphobia." Weil and Rosen (1997) found that one-third of university students were computerphobic. Craig Brod (1984) coined and defined the term technostress as "a modern disease of adaptation caused by an inability to cope with the new computer technologies." However, Weil and Rosen (1997) think of technostress as any negative impact on attitudes, thoughts, behaviors, or body physiology caused either directly or indirectly by technology. Individuals must begin to learn and make use of ways to help feel less frustrated and pressured, while coexisting with the rapidly expanding world of technology.

Individuals struggling with technological changes respond with extreme muscle tension and instinctive restricted breathing which causes individuals to breathe shallowly, more in the chest than from the diaphragm, reducing oxygen intake and exhalation of toxins. Aware of this process, many eastern philosophers believe that natural, healthy breathing is a powerful antidote and coping mechanism for mediating everyday stress. Natural breathing techniques can be applied and used in almost any setting at nearly any time thus decreasing and controlling technostress levels. Individuals must relearn how to breathe correctly, set aside effective breathing time each day and make deliberate, conscious choices to regaining their natural way of breathing. This involves awareness of, focusing on faulty breathing patterns and replacing them with correct, healthy ones Correct breathing before, during, and after any experience, situation, or simply while sitting at the computer will facilitate calm, warm and energetic feelings. Thich Nhat Hanh*(1975)* indicates that mindfulness is the life of awareness which we can master and use to restore our breathing. Breathing is a natural and extremely effective tool that can help focus ones mind and maintain mindfulness. As the mind becomes scattered or the body becomes tense, one may use healthy breathing to take hold of life and moderating technostress.

Even though the healthy breathing process appears to be elementary many do not do it when it can be most helpful; yet, the resultant advantages of relearning to breath can have a profound effect on individual lives. In today's technologically advanced society, mastery of breathing is extremely important for living. The dynamics of breathing and various breathing techniques available deserve much more attention in Western society. Wilkinson, Buboltz & Mathew(2001) presented numerous breathing techniques for easing test anxiety. One breathing technique example, a few minutes devoted to "slow diaphragm respiration" (SDR) invigorates the body and shifts thoughts to a relaxed state. A person can make use of SDR while sitting at the computer desk. SDR begins by closing the mouth and breathing deeply through the nostrils. One places a hand on the diaphragm just below the ribcage and takes deep breaths so the hand moves out and back as the lungs inflate and deflate. The shoulders should not lift, but remain stationary. While paying close attention to what happens, one draws in breath and lets it out. If while practicing one encounters excitement or nervousness about breathing, simply relax and think of something pleasant for a moment. After thinking of something pleasant, and when breathing has slowed to normal, resume the exercise. The slowing down respiration technique has very important implications for alleviation of muscle tension, anxiety and reducing technostress.

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Technology and Technophobia: Method for Overcoming

Lamar V. Wilkinson
Department of Psychology
Louisiana Tech University
United States
Lamar@latech.edu

Walter Buboltz
Department of Psychology
Louisiana Tech University
United States
Buboltz@latech.edu

Eric Seemann
Department of Psychology
Louisiana Tech University
United States

Jonathan Schwartz
Department of Psychology
Louisiana Tech University
United States

Gina Gibson
Department of Psychology
Louisiana Tech University
United States

Abstract: Individuals are being bombarded with new and ever changing technologies in today's society. Research appears to have focused primarily on the use of technology to enhance education and productivity. Little research has focused on how, for some individuals, technological usage may have a negative impact on their attitudes, thoughts, behaviors or bodily physiology. This article reviews the development of Technophobia and the use of Wolpe's Systematic Desensitization methodology to help individuals overcome their computer fears.

Today, there is more technology than ever before existing at home, at work, and play. Individuals are being bombarded with new and ever increasing changing technologies, just to make it through a routine day. However, there are millions of individuals who are not comfortable with technology. The purpose of this paper is to illustrate how increased technological usage has created for some individuals, technophobia. In order to help these individuals overcome their technophobia, Wople's Systematic Desensitization has been found to be an effective method to help individuals overcome their fear of computers or other phobias.

The increasingly sophisticated technology (in the workplace, home, and play) involves the use of machines by all individuals. Technologies are altering people's lives in a very positive way for most individuals. Yet for others, technology is having an adverse effect by creating stress in their lives. Jay (1981) found some individuals had an extreme fear of computers and coined the term 'Computerphobia." Later, Brod (1984) coined the term "Technostress" for individuals having difficulties with technology and defined it as "a modern disease of adaptation." However, Weil and Rosen (1997) do not consider it a disease but define it as "any negative impact on attitudes, thoughts, behaviors or body physiology that is caused either directly or indirectly by technology. These authors perceive "TechnoStress" as an irritation that individuals feel as their boundaries are constantly being invaded by technology. In their investigation of individuals experiencing technostress, Weil and Rosen found that people's reactions to technology typically fall into three "Techno-Types" (1) Eager Adopters love technology, first to buy new technology equipment, and find it challenging and exciting. These individuals expect to have problems with technology and solve the problem or find someone that can. Eager adopters usually make up 10 to 15% of society; (2) Hesitant "Prove It" does not find technology fun or challenging, hesitate to invest in technology and have to be proven its worth to use it. If you can convince them they will consider it. Hesitant makes up 50 to 60% of society; and (3) Resisters avoid technology; they want nothing to do with it; they feel intimated and embarrassed as well as inadequate when handling new technology. In fact, any difficulties make them run further away each time sometime else goes wrong. The resister makes up 30 to 40% of society. The Resisters are individuals who have strong fears toward technology (technophobic).

For some individuals technological changes create problems that prevent them from becoming technological competent and were called "Computerphobic."; however as other products of technology has become common, the term evolved into "Technophobia". Both these terms describe an individual's negative reaction to technology. An excellent example of a technophobic individual was illustrated in Wilkinson's (1997) article entitled, "An educators journal toward technical competences". In his striving to become technologically competent, several stages evolved that were identified and recognized as helpful for individuals overcoming fear of computer usage. They are: (1) need for a firm commitment to learn about computers; (2) recognizing the importance of learning computer language; (3) purchasing and reading computer books for additional technical knowledge about computers hardware, software and operating systems; (4) research required, knowledge accumulated and learning needed for purchasing a computer, and (5) applying acquired computer skills to work, home and play. These stages are useful and illustrate indirectly the gradual and systematical desensitizing process necessary for reducing computer fears.

Essentially a person's attitudes, emotions and behaviors toward technology play an important role in a person becoming "Technophobic". A key question is "What can be done to help these individual handle their fear of working with computers?" Systematic desensitization is a therapy developed by Joseph Wolpe to inhibit fear and suppress phobic behavior (a phobia is an unrealistic fear of an object or situation). His method of treatment can be used to help individuals overcome their fear of technology. Wople's treatment is based on Pavlovian conditioning principles and represents an important application of classical conditioning. Wolpe's therapy uses relaxation to counter human phobias is called *systematic desensitization*. Basically, systematic desensitization involves an individual using relaxing while imagining the fear-inducing stimuli that prevent productive behavior. To help an individual overcome their fears, Wolpe used a series of muscle relaxing exercises. These exercises involve tensing and then relaxing a particular muscle. The person tenses and relaxes each major group in a specific sequence. The assumption is that tension is related to fear and so using tension reducing exercises is relaxing and helpful in overcoming a phobia. The desensitization treatment consists of four separate phases: (1) individual are instructed to construct a graded series of fear inducing scenes related to computers and ranks them in a hierarchy that produce the lowest level of fear to those that produce the highest level of fear; (2) training the individual to learn to relax; (3) actual counter conditioning involves instructing the person to relax, then to imagine as clearly as possible the lowest scene on the hierarchy of computer fears, and (4) assessment process involves testing of the effectiveness of desensitization by having the individual encounter the fear object.

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Comparing Themes of Critical Reflection from Face-to-face and On-line Discussion in a Course for Teacher Education Students

Yuejin Xu and Asghar Iran-Nejad
University of Alabama
United States
yxu@bamaed.ua.edu

Abstract: Electronic discussion is found to be better than face-to-face discussion in promoting equal participation among students and in increasing language ability. However, few studies have been conducted to examine whether the use different mode of interaction makes a difference in critical reflection among learners, especially among teacher education students. The purpose of this study is to compare and contrast students' on-line discussions recorded in WebCT Chat room and face-to-face audio taped discussions.

Introduction

Comparing and contrasting two modes of learners' interaction, that is, face-to-face and electronic, has been an evolving focus in the field of language acquisition (Kelm, 1992; Kern, 1995; Warschauer, 1996). Electronic discussion is found to increase more equal participation within students. Moreover, "students used languages which is lexically and syntactically more formal and complex in electronic discussion than they did in face-to-face discussion" (Warschauer, 1996, p. 7). However, does the use of different mode of interaction make a difference in critical reflection among learners, especially among teacher education students? This study addresses this question by analyzing students' real-time online discussions recorded in WebCT Chat room and face-to-face audio taped discussions over a period of a semester following a ground theory (Madill, Jordan & Shirley, 2000). To our knowledge, the present study represents the first attempt to explore the effect of face-to-face and on-line discussion on critical reflection.

Concept of Critical Reflection

As pointed out by Imel (1998), there has been a lack of a common definition for critical reflection, which actually led to the interchangeable use of the terms *reflection* and *critical reflection*. However, many people would agree that critical reflection "involves actively monitoring, evaluating and modifying one's thinking and comparing it to both expert models and peers" (Lin, Hmelo, Kinzer & Secules, 1999, p. 43). To engage in critical reflection, learners need "move beyond the acquisition of new knowledge and understanding, into questioning (of) existing assumptions, values, and perspectives" (Cranton 1996, p.76). Two dimensions are central to critical reflection: problem recognition (PR) and solution recognition (SR) (Iran-Nejad, 1998). Good reflective practitioners should be able to demonstrate either keen examples of cross-domain problem recognition anchored in within-domain solution recognition or keen examples of solution recognition anchored in within-domain problem recognition. In other words, learners need not only know what to know but also how to know and when to know.

Critical Reflection and Technology

Technology can play an important role in supporting learners' critical reflection. In their paper, Lin, Hmelo, Kinzer and Secules (1999) proposed four ways that technology can scaffold reflection, namely, process displays, process prompts, process models, and a forum for reflective social discourse. In the first three ways, reflection is more regarded as an individual activity, whereas in the last one, reflective social discourse, "it is clear that reflection can also be a social activity and can be influenced by a community" (p. 53). WebCT ® is a kind of software that offers real time online chat as well as other features. With its capability to trace record and display what have been input by its users, WebCT chat offers a great opportunity for learners to interact and reflect and to generate more reflective social discourses. Therefore, we hypothesize that WebCT Chat could excel or at least match the traditional face-to-face mode of interaction in group discussions for critical reflection.

The Study

Participants

The participants in this study were 8 students enrolled in an educational psychology course for teacher education students participated in this research. They were randomly assigned to one of two groups. Both control and experiment group were using the same syllabus, having the same amount of instruction, and doing the same tasks (a portfolio, a midterm, and a final). However, in the control group, students were assigned class time to conduct face-to-face discussion on group mind-changing experiences. Their discussion was audio taped and later transcribed. Whereas in the experiment group, WebCT recordable Chat rooms were created for each group to chat over the internet on their group mind-changing experiences.

Procedures

First, each participant wrote a general reflective essay. Then, they shared their reflective essays among their group members either via email or hard copy. Second, as they read their group members essays, they wrote down all the questions that came to their mind. Third, they prepared two paragraphs, proposing a group mind-changing experience for consideration during the group discussion. One paragraph discussed the prior-to-change thinking of the topic and the other paragraph the thinking after the mind-changing. Finally, each group met for a discussion (face-to-face vs. real time on-line chat) to exchange questions and decide a common shared topic for their next reflective essay.

Analysis

Transcripts in WebCT Chat and in face-to-face discussion were collected as our data. They were first compared by the amount of time, amount of discussion (words), turns. Then, they were read and re-read to identify categories, themes and the position in the aforementioned two dimensions of critical reflection.

Findings and Conclusions

Our analysis yielded few positive findings. As far as the time, amount of discussion (words), turns, are concerned, the face-to-face group generated more discussion than the on-line chat group in less time. Moreover, compared to the online chat group, the face-to-face group had more turns among its group members. The Appendix shows one recorded group discussion in WebCT Chat, in which we can see that the chat was actually dominated by one participant.

Concerning the themes, categories, and examples in critical reflection, we didn't find any major difference in two groups so far, which actually contrary to our hypothesis.

Yet, we really cannot conclude that face-to-face is better than on-line real time chat to support critical reflection because this study has some limitations. One major limitation is the small sample size. Also, it would be better if other measures of critical reflection are adopted and used.

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Appendix: One Recorded Group Discussion in WebCT Chat

```
*-*************************************************************************
New session has begun in Room1.
Time: Wed Sep 26 19:27:47 2001
*-*************************************************************************
*+**** C-3 entered Room1. Time:Wed Sep 26 19:27:47 2001
*+**** C-1 entered Room1. Time:Wed Sep 26 19:27:48 2001
*+**** C-2 entered Room1. Time:Wed Sep 26 19:27:52 2001
C-1>>hi
*+**** C-4 entered Room1. Time:Wed Sep 26 19:27:58 2001
C-2>>hey
C-3>>
C-4>>
C-3>>What is the best strategy for learning a teacher can use
C-2>>all of them
C-3>>how do we as teachers intertwine art/science in our every day teaching experience
C-1>>let's chat about what we wrote our two paragraphs on
C-3>>I feel teaching is definately a science and that the teachers who try to bring in the artsy influence are the ones
that will prosper with learning
C-2>>
C-2>>this computer stuff sucks
C-2>>I cant work it
C-2>>I don't know about all that other stuff but I think we should all write on what hope wrote
C-3>>i wrote one of my paragraphs on the topic of art versus science
C-3>>i personally like this topic the best
C-2>>what do you think about grouping?
C-4>>i think we should write on what Hope wrote too
*-**** C-2 left Room1. Time: Wed Sep 26 19:40:05 2001
*+**** C-2 entered Room1. Time:Wed Sep 26 19:40:07 2001
C-2>>this computer stuff is difficult
C-1>> i wrote my paragraphs on the importance of the way students are grouped for group work
C-3>>i feel that the personality with teaching really only concerns with the grade level you are involved with
C-3>>also if we do decide to go with this topic we should involve good vs. bad as well
C-2>>the importance of personality probably decreases some with the students' ages but I feel that it is always
somewhat important to effectiveness of the teacher
C-2>>I think that is the best way to go
C-1>>can someone with no desire to become a teacher still be a good teacher
C-2>>I think that the desire to learn influences the ability to learn and I think that someone who does not desire to
learn to become a good teacher would not learn to become a good teacher
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C-3>>that goes back to the topic of art vs. science, is that teacher capable of teaching and does he or she have an
influence or skill that can help our kids learn
C-1>>also, do all good teachers have relatively the same teaching methods, or can they still be as different as night
and day
C-4>>teaching is something you have to want to be a part of
C-2>>I think they can all be different what's good for the goose is not necessarily good for the gander
C-2>>I don't think that anyone who does not have a love for teaching is capable, if you don't want to do it, you won't
do a good job of it
C-3>>that is correct someone has to want to be a teacher and i feel you can not make them want to teach but i did
not want to tbew a teacher and here i am at 23 with a degree in business
C-1>>you are old!!!!
C-3>>old and dirty
C-4>>nobody has the same teaching skills, everybody is different
C-2>>I would say style instead of skills, we should all learn the same skills
C-2>>you're mean
*+**** C-3 entered  Room1. Time:Wed Sep 26 19:54:47 2001
*-**** C-3 left  Room1. Time: Wed Sep 26 19:54:56 2001
C-1>>so lets decide on a topic you guys
C-2>>I think we should do good v. bad
C-1>>what part of it
C-4>>???
C-2>>do we have to have a part?
C-1>>we can focus on the personality aspect of it
C-3>>this all falls under personality and art v. science
C-2>>true, but is that enough to make a paper
C-4>>sure
C-3>>those are just general assumptions under those categories
C-2>>I can see where art v. science and good v. bad contain the personality aspect but how do we tie that together?
C-1>>write a paper on how much emphasis is put on personality at different age levels and how that reflects back to
art vs science
C-3>>ok ok ok ok
C-1>>can i get a woo hoo!!!
C-2>>woo hoo
C-4>>sounds good to me
*+**** C-3 entered  Room1. Time:Wed Sep 26 19:58:23 2001
C-1>>aight, lets write those papers
*-**** C-3 left  Room1. Time: Wed Sep 26 19:58:29 2001
C-2>>sounds good to me
*-**** C-2 left  Room1. Time: Wed Sep 26 20:01:19 2001
*-**** C-4 left  Room1. Time: Wed Sep 26 20:01:20 2001
*-**** C-1 left  Room1. Time: Wed Sep 26 20:01:43 2001
*-**** C-3 left  Room1. Time: Wed Sep 26 20:03:03 2001
****************************************************************************************
Session in  Room1 ended (all participants have left).
Time: Wed Sep 26 20:03:03 2001
****************************************************************************************
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Internet in Chinese Education, Where to Go?

Robert Z. Zheng, Ed.D.
Educational Studies Division
Marian College, USA.
rzheng@mariancollege.edu

John R. Ouyang, Ed.D.
Bagwell College of Education
Kennesaw State University, USA
rouyang@ksumail.kennesaw.edu

Abstract: This paper will study (1) the various stages of Internet access in China: from censorship to limited self-autonomy, (2) instructional use of the Internet in China, (3) the digital equity issues which hinder the instructional use of Internet in China. Further suggestions will be made regarding healthy development of the instructional use of the Internet in China. They include: Internet policies, funding, digital access, and the geographical balance of technology distribution.

From Censorship to Limited Self-autonomy

The instructional use of Internet in China has come a long and hard way. Its development can be subsumed into three stages: (1) censorship, (2) half-censorship, and (3) limited self-autonomy. Starting from 1993, there were a series of changes in government policy regarding the use of technology in education, including the Internet. Realizing that technology, especially information technology, was the key to productivity and national economic growth, the Central Committee of the Communist Party of China issued *the Guideline to Educational Reform and Development* and shortly afterward, enacted the *Education Law of the People's Republic of China* in 1995. Both emphasized the need for reform in the existing education system and that the government should support the use of broadcasting, television, and other distance education avenues to create an environment for life-long learning (Chen, 1999).

A recent study shows that from 1994 to 1997, the government appropriated major funding to network infrastructure construction. Four major network systems were established: CHINANET, China Science Academy Network, Golden Bridge Network by the Ministry of Education, and the Ministry of Information Industry (He, 1998). These network systems connected more than 300 universities, colleges, and research organizations. They also provided network services that connected provinces throughout the nation. In the meantime, the Internet access became no longer a privilege that belonged only to a few research institutes and universities. More people were able to communicate via email through their Internet Service Provider and surf the Internet at home or at work, although such access was still under government control with sites filtered and censored.

As China became more and more involved with the world economy, exchange and communication with Western countries and organizations have increased exponentially in the areas of commerce, culture, and academic research. In April 1997, the government sponsored the National Conference on Information Technology in ShenZhen, a liberal and open city in southern China. Chinese Vice Premier Zhou Jiahua spoke at the conference emphasizing that (a) the central and local governments put the management of information and the construction of database for information management at the top of their agendas, and (b) schools and education organizations developed Web-based instruction and Web-based assisted materials for students in the classrooms (He, 1998). As a result, Internet business flourished. More Internet Service Providers (ISPs) became available. By the end of July 2001 there were ten major Internet Service Providers in China with UNTNET and CNCNET being the two leading Internet Service Providers in China. The government has also loosened its Internet policy allowing foreign investment in Chinese telecommunication services although the government ordained that it must own at least 51 percent of shares in any Chinese IT company.

The opening of the Internet market granted, for the first time, Chinese people self-autonomy in the use of the Internet; it not only allowed people to access the Internet but also to develop their own instructional materials on the Internet. The statistics by China Internet Network Information Center (CNNIC) indicate that the Internet users in China have increased from 620,000 in 1997 to 26.5 million by July 2001(CNNIC, 2001). In the meantime, the Internet market becomes more diversified in terms of the domains registered under the CN.

Nonetheless, the growth of Internet market and the self-autonomy granted to people are accompanied by an increased restriction and regulations imposed by the Chinese government. In April 2000 the Ministry of Education (MOE) of China published Provisional Regulations on Modern Day Distance Learning. At the same time, the Ministry of the Information Industry issued Measures for Administration of Places of Business for Internet Access Services. Both documents "regulate and guide" the Internet activities in China. The Provisional Regulations by MOE stipulate, for example, that the online school activities must be governed by laws and regulations while allowing some kind of autonomy in areas such as admissions, instruction and the issuance of certificates of completion.

Internet in Chinese Schools

The instructional use of the Internet in China has also undergone ups and downs. With no exception, it has been under strict supervision by the Ministry of Education of China. The survey studies by China Internet Network Information Center (CNNIC) from 1997 to 2001 indicate that Internet growth has been slow in education. In fact, the percentage of EDU domains under CN has been decreasing within the last few years. In spite of that, the Internet as an instructional tool has found its way in the classrooms of both higher education and elementary and secondary education.

At colleges and universities, the Internet is used in instruction in several different ways. First, it is used as an assistive tool for information search and communication. Instructors like to use email to communicate with students and encourage them to use the Internet to search information for their projects. Second, the Internet is used as an alternative avenue to traditional course delivery. In Nanjing University, for instance, the Department of Foreign Languages and Literatures developed a proprietary Web shell-ware which enables the instructors to develop their online ESL courses. Third, there is in recent a trend to form collegiate collaboration via the Internet. Eight major universities led by Nanjing University, have developed an Internet based educational network system for information sharing and collegiate collaboration.

Like higher education, elementary and secondary schools use the Internet as a tool for information search and communication. The Internet is essentially an extension of the school library. Although there is a demand from teachers who prefer to have their own instructional web page, few teachers know how to build their own instructional web.pages. Some provinces started a pilot program by establishing a centralized technology hub which provides technical support to local schools. For example, the Educational Technology Center in Fujian Province has created an Internet program that has ignited far-reaching reform throughout the country. The project includes an online expert teacher database of master lesson plans and supplemental instructional materials that teachers in local schools can access for use in their classrooms. The Center also offers online courses to high school students who, upon completion of the courses, will be awarded a high school diploma accredited by the Province (Zhang, 2001).

Nonetheless, the instructional use of the Internet in China is uneven in terms of distribution, accessibility, and digital equity. The access and equity issues have been one of the major concerns that hinder the Internet development in education in China.

Distribution. China has an uneven distribution of technology and resources. Geographically, the coastal cities and provinces are well developed with more advanced technology and infrastructure, and therefore have better access to new technologies than the inner cities and provinces. The CNNIC January 2001 report showed that the nine coastal cities and provinces accounted for 70.55 % of total 265,405 websites in China (CNNIC, 2001). Obviously, the imbalance of technology resources in distribution gives rise to the issues of accessibility and digital equity across the country.

Accessibility. The issue of accessibility is one of the major issues in Internet instruction. First of all, people in the inner land have fewer chances to access latest technology than people from coastal cities and provinces. Secondly, the universities have better access to Internet than the secondary and elementary schools. A study shows that the college students including 2-3 year technical colleges account for about 65% of Internet access, whereas secondary school students account for 23%, with only 6.44% for elementary, and 5.66% for others (CNNIC, 2001).

Digital Equity. The digital equity is another important aspect in instructional use of the Internet in China. The divide in economic status creates a divide in digital access. The economically well-offs are more likely to have computers at home, whose off-springs consequently become more computer literate than those who do not own home computers. Gender is another equity issue. The CNNIC January 2001 report showed that the male had accessed Internet more than the female with male 69.56% and female 30.44%.

Conclusions

The instructional use of the Internet in China is still in a developmental stage. Where it should go and how it should go are issues that need to be addressed immediately. We believe that a healthy development of the instructional use of the Internet in China should take following steps: (1) the government should adopt a more open, less restricted Internet policy for free information exchange and communication; (2) it should reduce the geographical differences to create an equal opportunity for people to access the information they need; (3) more funding for secondary and elementary education is needed with a focus on educational technology enhancement and the opportunity for people to access the digital technology regardless of gender, age, social and economic background.

It should be recognized that China has made great efforts to improve its education system, provide opportunities for more people to receive education, and invest in technology infrastructure in both higher, secondary and elementary education within last ten years. Such efforts could be more effective if it examines the existing issues from a global point of view, take substantial steps to loosen its control on Internet use and support the instructional use of Internet in all areas.

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CORPORATE

ThinkQuest for Tomorrow's Teachers (T3): A Collaborative Approach to Infusing Technology in 21st-Century Curricula

Susan Eskridge
University of the Pacific
Benerd School of Education
United States
eskridge@thinkquest.org

Hilary Maybaum and Robert Sibley
ThinkQuest
United States
maybaum@thinkquest.org
sibley@thinkquest.org

Abstract: ThinkQuest for Tomorrow's Teachers is a collaborative partnership among ThinkQuest®—a non-profit educational technology organization—and a consortium of teacher-preparation programs, K-12 schools, and businesses. It is supported in part by a catalyst grant from the U.S. Department of Education's Preparing Tomorrow's Teachers to Use Technology (PT3) Program. Now in its second grant year, the T3 consortium includes 14 colleges from across the country. The consortium seeks to promote the practice of learner-centered, constructivist pedagogy in which education students, their higher-education faculty, and others are colleagues in the learning process. We envision teacher educators modeling a learning environment in which inquiry, exploration, and knowledge adaptation and creation are critical modes of learning.

Introduction

ThinkQuest for Tomorrow's Teachers (T3) brings a new approach to educational technology use and integration by creating a core group of trained and committed teacher-preparation faculty who, in collaboration with academic leadership and administration, can engage their students in the ThinkQuest "Guiding Partner Approach" to constructivist learning. By combining the practice of this student-centered pedagogy with a structural approach to curriculum-based and Internet-enriched activity design, the T3 program aims to provide an ideological basis for systemic change in education practices by emphasizing exploration, collaboration, and facilitation among teacher-education faculty, pre-service teachers, in-service teachers, and elementary and secondary students.

Program Components

The T3 program is grounded in several components that, taken together, comprise a holistic approach to the integration and use of digital and Internet technologies as tools in the teaching and learning process. First and foremost is the ThinkQuest *Guiding Partner Approach (GPA)*. The GPA consists primarily of two interwoven concepts: students and teachers as junior/senior colleagues in the learning process, and the use of flexible frameworks for instructional design (Harris 1998). The approach focuses on preparing technology-proficient teachers to collaborate with students on educational activities that greatly increase the probability of long-term learning. Critical to the GPA model are techniques for establishing an environment that will encourage and facilitate "elbow-to elbow" collaboration between teachers and students.

In conjunction with the GPA, the *ThinkQuest Pre-Service* program component brings teams of pre-service teachers, in-service teachers, and college faculty together to create (1) web-based educational resources for use by K-12 educators, and (2) online learning projects for K-12 students. The program also encourages pre-service and in-service teachers to simultaneously collaborate with teams of elementary and secondary students in creating meaningful, educational Web sites.

Publishing and dissemination are important goals not only of T3, but also of the overall (Federal) PT3 program. The *T3 Web site* (http://t3.thinkquest.org) is among the primary means of addressing this programmatic goal. The purpose of the site is to disseminate project information, including methodology, partner programs, student project results, discussions, research, reflective writing, evaluation information, and resources in the areas of technology and pedagogy.

Results To Date

The program completed its first year in May 2001. Five higher-education partners participated in at least one T3 training workshop. The GPA was adopted and used by 35 faculty members at the five sites in 2000-01, and over 80 pre-service teachers created web-based learning activities that were published at the T3 Web site. Many of the faculty worked directly with their pre-service teachers to create web resources that can be used with K-12 students or by other teacher-preparation programs. Evaluation results (CER 2001) suggest that over 70% of the pre-service teachers that participated in the program felt they were prepared to integrate technology into their classrooms in the future. In addition, several participating sites forged partnerships with K-12 schools to promote the GPA in classrooms.

At the beginning of the second grant year (Summer 2001), ten additional Schools, Colleges, and Departments of Education (SCDEs) were accepted as consortium partners. These partners represent a broad geographic and demographic diversity, which will test the program in the most authentic settings and among teacher educators who are not considered technology innovators. There are currently 14 teacher-preparation partners in the T3 program. Year 1 partners are Eastern Connecticut State University, City College of New York, Western Michigan University, and University of the Pacific. Year 2 partners are Barry University, Hampton University, Haskell Indian Nations University, New Mexico State University, Oakwood College, Prairie View A&M University, Southern Oregon University, Trinity International University, Turtle Mountain Community College, and University of Washington. A four-day, hands-on workshop in Indian Wells, CA, in Fall 2001 provided an opportunity for faculty leaders from both Year 1 and 2 partner sites to meet and exchange ideas. There is great enthusiasm and commitment among these partners, which form the catalytic core of the program's success to date.

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DISTANCE EDUCATION

SECTION EDITORS:

Frank Fuller, Northwestern State University of Louisiana
Ron McBride, Northwestern State University of Louisiana

More than one hundred papers comprise the Distance Education section, this year. Selected from a significantly larger body of proposals, these reports, taken as a whole, illustrate the breadth and impact of distance education within the broad scope of educational practice. The programs for this section remind us once again that technology in education often means distance education, and that distance education means, primarily, Internet delivery. Nonetheless, the spectrum of papers illustrates a field of practice and scholarship that is emerging with great diversity and energy.

Within these presentations, there are initial reports of experience with distance education in many different disciplines and at several levels, from elementary school, through post-secondary instruction and lifelong professional development. Though the discovery of distance education remains a relatively constant theme in this section, the level of sophistication reported by the discoverers reminds us that skill levels of every practitioner, including those who have just begun, are being raised. “Reeducating the professor and the student: Lessons learned ... ” illustrates the ways that distance education plays a significant role in the overall professional development of the professorate. One suspects that the continued contributions of organizations like *ISTE* to the expectations of professionalism in distance education have helped everyone, even those just beginning, incorporate technology considerations into an overall vision of professional practice.

Not all experience is naïve, however. “Faculty use of Blackboard ... at two mid-western universities” or “An online solution to educational technology leadership certification” illustrate that the research base is broad enough to include multi-institutional and regional data sources. “A framework for senior/community college partnership ... ” and “Supporting partnerships and school improvement with collaborative learning... ” describe the ways barriers fall between kinds of institutions, as well, when distance education concerns surface.

“Preparing teachers for digital distance education” and “Facilitating online professional development” illustrate a broad shift towards distance strategies for staff development. Throughout the papers, we are reminded that learning with technology is learning about technology. Likewise, papers such as “Teaming: A catalyst for transforming distance education teacher preparation programs” and “The use of open and distance education in facilitating change in managerial development: The Mexico experience” explore professional development functions that are plainly impossible without sophisticated distance education systems - and sophisticated education technology professionals to manage them.

Reports of new offerings illustrate that the field is growing in breadth. Many of the reports here demonstrate that it is growing in depth, as well. Distance education experience is beginning to serve as a crucible of theory development. It is apparent from “Semantic knowledge factory,” “Establishing a learning community of media design and art schools,” or “Teaching through tragedy ... ” that theoretical innovation spans most, if not all, disciplines. “

This is the first year that the *Annual* has been able to feature a broad selection of papers that address the power and problems of distance education in reaching persons with disabilities. While those vital issues are addressed in other sections, “... A global infrastructure ... for the physically challenged” or “Design of student model centered Web based adaptive learning system” begin with distance education as media of learning for all students. Many papers, including “Synchronous remote Internet conferencing with deaf and hard-of-hearing students” and “Using Robolab software and Lego hardware to teach computing concepts to deaf and hard of hearing high school students” explore the power of distance education when sound is not enough.

“Different assessment methods for deaf and hearing on-line learners” reminds readers of the myriad considerations of assessment that distance settings provide. From the beginning “Assessing readiness of distance learning students" to "Considerations in evaluating network-based learning systems," experience and techniques related to gathering or using data in distance settings is considered at every level from public schools to leisure learning. Significantly, the emphasis in assessment has moved from comparing distance to face-to-face instruction or supervised examinations. Now, researchers are gathering information and constructing theory related *to the kinds of probes* that are appropriate to distance learning, in itself, and are producing "A rubric to encourage and assess student engagement in online courses," or "A strategy for analyzing online communication," among many others.

Theory, indeed, is emerging from other areas than assessment. "Creating, implementing, and sustaining community in ... distance education" or "Asynchronous online discussions: facilitating critical thinking skills ... " describe learning outcomes, unique with distance education, that bespeak a view of social learning that is fundamentally different from most face-to-face instruction. "Action research on socio-constructivist pedagogy in Web-CT" or "The transformation, reform, and prospect of distance education in Taiwan" begin a long-needed discourse about distance education as both object and tool of social reconstruction theory.

Of course, curriculum and theory all rest, to some extent, on infrastructure and budget in technology-facilitated environments. Many papers, like "Diseño, elaboración y ejecución de cursos virtuales de bajo costo," and "Distance learning: Eliminating the digital divide" or "Delivery of Web based ... courses using a freeware version of Blackboard." Funding sources make up a significant part of the treatments of "The role the New Opportunities Fund ... has played in the UK," and "Establishment and improvement of the distance learning project at Inter-American University of Puerto Rico, Bayamón campus" describe knitting together institutional resources from many different institutions.

These hundred papers, taken together, reminds readers that distance education is neither a special environment for education, nor a special application of technology. Rather, the field is rapidly acquiring a theoretical structure, policy expectations, teaching or assessment strategies, and pedagogical conventions of a complete educational system. From first encounters to distance institutions, and workshops to comprehensive student services systems, distance education establishes or reveals new ways of teaching , reinforces old values of knowledge, and establishes communities of learners in ways that thrill us all. As you will find as you read this section, among the most thrilled are those authors who share with us all their adventure of discovery.

Improved Communication Through Online Discussion

Gertrude (Trudy) Abramson
Graduate School of Computer and Information Sciences
Nova Southeastern University
United States
abramson@nova.edu

Abstract: An interactive, asynchronous forum makes an excellent alternative classroom for graduate learning. Earlier experience as a reader and writer do not suffice for maximizing the potential of the forum for higher-level learning based, in large measure, upon meaningful discussion. This paper shares the pragmatic, research-based experiences of graduate students who strived for better communication as co-moderators and participants in short, three-week online discussions.

Introduction

Technology has progressed to the point that most educated adults have access to and use the Internet. E-mail, instant messaging and chat rooms are some of the more popular tools. There is an unstated assumption that use of these tools prepares one for meaningful participation in online class discussions. Interactive online classes should not be chat rooms. Even in this hypermedia environment, online class discussion needs to be carefully structured and supervised if higher-level learning is to be attained.

Graduate Online Learning Courses

Although this paper addresses coursework at the doctoral level, the lessons learned herein can be applicable to the masters' level and even, in some cases, to undergraduate studies. Each three-credit doctoral course at the Graduate School of Computer and Information Science (GSCIS) at Nova Southeastern University (NSU) runs 22 weeks, beginning with 20 hours on campus during the first week. Because all students are gainfully employed and most have family responsibilities as well, terms are lengthened to allow for life events.

Following the proliferation of the World Wide Web, when Mosaic became Netscape, students requested courses in Internet-based learning. In summer 1998, we offered our first class in Online Learning Environments (OLE). It covered just about everything related to distance education and almost immediately, we learned that there was much more to this new phenomenon than could be addressed in a single course. Therefore, in winter 1999, Instruction Delivery Systems (IDS) was introduced. It took a while to delineate the territory of each course. At this time, OLE addresses distance learning programs and communications issues and IDS, teaching and learning online. A third course, Online Assessments and Measurements (OAM) is still in the design phase awaiting the hiring of a professor with extensive expertise in both educational technology and psychometrics.

Online Communication in the OLE Course

Asynchronous, online discussions make possible revisiting remarks that had formerly disappeared into air, reflecting on one's remarks and on those of others and, most important, thinking in a collaborative environment. It is difficult to separate the process of discussion from the process of teaching and learning. During the earlier iterations of the OLE course, discussion leaders kept morphing into classroom teachers, which caused discussion participants to assume the roles of learners in under-designed instructional processes.

Half of the summer 2001 OLE course was devoted to research and practice with online communication in round table discussions. Several readings were suggested to help participants get into the appropriate mindset. For example, Funaro and Montell (1999) present guidelines for using online discussion based upon 12 pilot iterations of a forum as a communications tool as an embellishment of traditional classes. The greatest value of their work is the specificity of items provided for reflection and experimentation. Williams (1997) offers online moderator guidelines and community-building tips based upon the WELL (www.well.com), self-described as one of the world's most influential and cherished virtual gathering places. The WELL uses the term *host a conference* as we use the term *moderate a round-table discussion*. The reading cited by the largest number of students was Beaudin (1999) who identified various techniques recommended and used by online instructors for keeping online learners on topic during asynchronous discussion. In addition to the techniques, he discussed factors that affected their selection.

As teachers, we are aware that when a learning experience requires the cooperation of the learners, the success of the experience is uncertain. However, nothing can be learned in a vacuum and in order to practice one's moderating skills, one must have participants. Each student was required to co-mentor a distant scholarly discussion and to participate as a discussant in three others. The co-moderator route was chosen in order to maximize opportunities for online communication and to ensure that discussion were not brought to an abnormal end because of life events. Forty students participated in the 20-hour on-campus meeting in July 2001, 35 of whom completed the collaborative, distance learning experience that ended on December 6, 2001. On the few occasions that co-moderators disappeared before the discussion was conducted, other teams readily included the abandoned peer.

Two online classrooms (asynchronous interactive forums) served as learning spaces for the course. The nomenclature is simple: The **forum** is the greater entity such as the classroom, a **thread** is a discussion topic, a **message** is a new statement within a thread, and a **reply** is a response to a statement. Enrollment in a class entitles one to password-protected forum entry. Anyone may initiate a thread, message or reply. Everyone has edit privileges but only the professor may delete.

The General Forum (GF), served a variety of purposes. In traditional terms, it was the classroom where new learning began, open discussion ensued and assignments were presented, elaborated upon and questioned. There was a monthly communication thread and even a café for casual conversation. It was up and running from the first day of the term and provided immediate, meaningful opportunity for new students to become comfortable in a structured online learning environment. Posting to the GF was optional. Active participation's only reward was personal and professional growth.

The second forum, Round Tables (RT), was restricted to the research-based, practical experiences (discussions) and a single thread for discussion issues. All online round-table discussions were required to be relevant to some aspect of online learning. Each round-table discussion was initiated and completed within a specified three-week period. The first week was set aside for sign-up and reading of the linked documents. During the two remaining weeks, the co-moderators were charged with presenting discussion provoking questions and encouraging increasingly deep levels of response. At the conclusion of the third week, the co-moderators had a week to collaborate upon and post a summary message on the discussion thread. A copy was posted to the GF in the Conference Summary Thread.

At the on-campus meeting that preceded the online learning experience, students were given time to circulate, meet in small groups, and come up with topics of possible interest. Following that, the class convened as a group and responded to the different ideas. This experience was not a commitment but an opportunity to get a sense of general interest and appropriateness. It was also a very significant part of building the community that would continue working together online.

Performance Assessment of One's Own Experience

There is an enormous difference between memorizing theory and turning it into useful practice. Graduate students should take ownership for their learning processes but it is very hard to convince people that the ultimate objective is other than to please the instructor. The purpose of the round-table exercises was to provide each student with multiple opportunities to balance experience and research. A four-step process was identified:

1. Literature relevant to online communication had to be reviewed.
2. Moderating and co-moderating had to be experienced.
3. Participating in different discussion with different moderators had to be experienced.
4. The three parts had to be put together into a reflective process so that the end product became professional growth.

The remainder of this paper focuses on the reflections as presented by members of the class. Initials are used to identify the students and to protect their privacy at the same time.

RS: All of the forums began with an introduction of the moderators, participants, and forum topic. One provided photos where were helpful in connecting posted opinions and ideas with a face (Boettcher & Conrad, 1999).

JL: Communication improved as a sense of community began to develop. The inclusions of first names appearing in the actual postings of a discussion are a sign that communities are beginning to emerge (Poole, 2000). As these communities emerged discussions seemed to flow more smoothly and quickly. Classes begin to negotiate substantive issues, ideas, and concerns with others who had common interests and goals (Edens, 2000). With other classmates responding, students receive much more extensive feedback than could be provided by the professor or moderator alone (Levin, 1999).

BG: The four round tables in which I participated successfully implemented Beaudin's (1999) "best practices." Each round table provided introductory information regarding the selected topic, participation criteria, and discussion questions. Discussion summaries were posted at the end of each week of the session. The discussions were highly interactive, the topics were interesting, and the resulting knowledge-base was extensive. I believe the high quality of forum contributions was a direct result of well-formulated initial discussion questions along with mentor-supplied re-focusing questions (Beaudin, 1999) when appropriate. In addition, each round table narrative included the professional background and experience of the co-mentors. At the end of the registration week of each session, the photos of round table participants and co-mentors were posted. These activities demonstrate the importance of and adherence to the principle that discussion moderating takes place in both a professional and a social context (Collison, Elbaum, Haavind & Tinker, 2000; Rossman, 1999).

NT: Through the power of asynchronous dialogue, I was able to join the discussion whenever I was best cognitively suited to do so (Abramson, 1999). I had enough time to decide how best to respond and which individual I wanted to direct my response to, in order to make the best possible contribution to the discussion (Funaro & Montell, 1999). I learned more than I thought I would from my peer's knowledge, opinions, remarks, questions, and experience. My peers were very respectful of each other, and they made an effort to understand alternative viewpoints (Poole, 2000).

JP: In retrospect, I learned tremendously from this experience. Although I have participated in a variety of online discussions, from a state-wide online conferences to daily distance education interaction with students, this exercise in mentoring illuminated more than just the admiration of best practices as mentioned above. Specifically I noted seven distinct lessons learned: Nothing takes place in a vacuum. Ask good questions. Listen actively. Involve everyone. Be flexible. Dare to venture into unknown territory. Relax.

SV: Moderators of online discussions should clearly define the topic for a discussion. Knowlton and Knowlton (2001) and Fabos and Young (2000) suggest that both the quality of communication and the interest level of participants deteriorate when moderators do not clearly solidify the scope of a discussion. In each of the round table discussions for this course, the initial postings made by moderators in week one included purpose statements about the session topics. Another successful strategy employed by the round table moderators was the use of leading questions posed by moderators in their opening postings. Discussions generally initiated with replies to these questions.

SS: Studies have shown that online forum participants want prompt feedback and specific comments posted in a timely fashion (Rossman, 1999). In preparing responses as the moderator, I was challenged to differentiate between participating and encouraging, steering and monopolizing. Rossman observed that online courses are not conducive to lecturing and that instructors who facilitate learners' mastery of course objectives by encouraging discussion of topics related to the assigned reading are typically more effective than those who post lengthy presentations. Keeping this in mind, our moderator team encouraged short three to four paragraph discussions. In responding, we limited ourselves to add-on information rather than creating mini-essays. If I felt I might be lecturing, I reviewed my posting and changed some of my statements to questions rather than giving or creating answers.

PF: I serendipitously tripped across Dehler and Possas -Hernandez (1998) who reflect the positions espoused by Dr. Abramson. They aver that computer-mediated communications (like our forums) provide a fertile medium in which to cultivate the construction of knowledge, both shared and individual. Also, that experiential learning contributes to the full mastery of a domain. They conclude that the depth and richness of the learning experience depends on collaboration, diversity, and multiple perspectives. This mirrors my experience in this exploration of online discussion via the forums in our class.

BG: As I reflect on the "round table" assignment of this course, I am impressed with the completeness and the holistic appeal of this assignment. As learners, we had the opportunity to observe and experience the "best practices" of forum moderation modeled effectively in the general forums; each of us was able to participate in four student-forums (once as a co-moderator and three times as a participant); and finally we reflected on our experiences. As a teacher in a traditional classroom, I am constantly challenged to design class activities that effectively promote learning (the assimilation, integration, and implementation) of the concepts and principles under study. I found this assignment to be an extremely effective activity. This assignment was carefully crafted and exceptionally constructed in order to promote a rich educational environment for all of us.

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Assessing the Readiness of Distance Learning Students

Dr. Mac Adkins
Distance LearningCenter
Troy State University Montgomery
United States of America
mac@tsum.edu

Abstract: Is distance learning appropriate for all learners? How does a learner know if it is an appropriate choice? To assist students in determining their level of readiness to study at a distance and to assist institutions in identifying students who might be at risk of not succeeding in an online enviroment, an online assessment device has been constructed. **READI**–Readiness for **E**ducation **A**t a **D**istance **I**ndicator is a tool to help learners and their advisors assess the student's readiness for learning at a distance. The READI tool is not intended to make an absolute decision as to whether or not a student will succeed as an online learner. However, the student's scores will give them an idea of their strengths in the four different components READI measures: reading comprehension, technical competency, individual attributes and learning styles. When the student uses the READI tool, they receive immediate feedback concerning their scores along with a guide to interpretation. In this presentation the presenter will share how this tool is being used by Troy State University as well as other institutions to assess learner readiness.

Are you ready to take a distance-learning course? Are your distance education students best prepared to learn at a distance? Is distance learning for you?

Emerging advances in instructional technology, particularly the Internet, have caused higher education institutions to re-consider how they deliver courses and use space. This paradigm shift from a classroom model to a technology-delivered model has particular significance for distance learning. There is a group of learners who, due to work, family commitments, disability, or geographical location, are unable to attend campus and therefore choose to study at a distance. This application of instructional technology has resulted in a world-wide explosion of on-line courses. **But is distance learning appropriate for all learners? How does a learner know if it is their best choice?**

Having worked in distance learning for over a decade I have observed that distance learning is congruent with the needs and talents of many students, but is not appropriate for others. As Dean of Distance Learning at Troy State University Montgomery I developed a tool I call **READI**–**R**eadiness for **E**ducation **A**t a **D**istance **I**ndicator. READI is a tool to help learners and their advisors assess the student's readiness for learning at a distance. The READI tool is not intended to make an absolute decision as to whether or not a student will succeed as an online learner. However, the student's scores will give them an idea of their strengths in the different components READI measures. When the student uses the READI tool, they receive immediate feedback concerning their scores along with a guide to interpretation.

In this presentation I will share how this tool is being used by Troy State University as well as other institutions to assess learner readiness.

READI measures four components:

- Reading Comprehension
- Technical Competency
- Individual Attributes
- Learning Styles

Geoffrey Cox (Cox, 2000) noted that Stanford has been doing forms of distance learning for more than 30 years. He observed that "Data drawn from these programs show that distance education works. We know from substantial experience that under the right conditions, not only is distance education comparable in quality to traditional education, but in some cases it is more effective. The conditions are important: students must be ***capable***, highly ***motivated***, and ***familiar*** with enough background to be ready to receive new ideas and knowledge. They must have good **coaching**, though not necessarily teaching, they must have the opportunity to interact with each other. When these conditions are met, learning takes place." Cox's comments mirror the four measurable components of READI:

Capable – Reading comprehension
Motivated – Individual attributes
Familiar – Technology competency
Coaching – Learning styles

How READI Works

The web-based tool assesses students' likelihood for succeeding in an online learning program. READI indicates the degree to which an individual student possesses attributes that contribute to success in online learning, including:

- Self-motivation
- Time-management skills
- Self-discipline
- Reading comprehension
- Persistence
- Availability of time
- Ability to use a laptop, printer, software, and the Internet.

READI does not rely on simple self-assessment questions with obvious "right" and "wrong" answers. Rather, through a sequence of activities measures the degree to which students possess the traits needed for success in studying at a distance. READI provides an immediate score and diagnostic interpretation of results to the student and to their prospective school.

Benefits to the Educational Institution

The literature shows that maintaining high retention rates in distance education programs is a significant challenge for distance learning program. One of the significant variables is student readiness and appropriateness for studying at a distance. READI serves as an early warning device to identify students that might be at-risk of dropping out of distance education programs.

Educational institutions invest heavily on attracting and recruiting students. But when students quickly drop out of the program there is little return on the investment. READI allows schools to identify the students who are likely to drop out and it then provides resources for remediation so that the student can succeed.

Benefits to the Student

Students also invest thousands of dollars in their education. Many of them are hesitant to study at a distance for fear that they might not do well. READI helps them to recognize their strengths and provides resources to strengthen their weaknesses. A student who is confident of their READIness is much more likely to enroll.

Other Features of READI

Reporting – Each participant receives an individualized report indicating their personal READI score. This report compares their results to others in their defined group. School counselors receive a summative report detailing overall usage as well as individual READI scores.

Solutions – If the instrument determines that a user is not ready to study at a distance, links to potential solutions and resources are provided. At this point the student's admissions counselor may also provide additional resources.

Ease of Interpretation – The results are not presented in confusing columns of numbers and figures, but in easy to interpret charts and graphs. Participants receive colorful charts indicating their level of READIness in reading comprehension, technical competency, individual attributes, and preferred learning styles.

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Delivery of web-based and web supported distance education courses using a freeware version of Blackboard

Wendy L. Arneson
Clinical Laboratory Sciences, University of Texas Medical Branch, Galveston, TX
wlarneso@utmb.edu

Dean L. Arneson
College of Pharmacy, Nova Southeastern University, Ft. Lauderdale, FL
deana@nova.edu

Abstract: Delivery of distance education courses can be challenging in terms of timely delivery of course materials and instruction. Another challenge is facilitating student communication within student groups and with faculty. By providing material and exercises prior to class and conducting virtual classroom/synchronous webchats, web-based distance courses can be more interactive for students and help to facilitate critical thinking and problem-solving skills. A free web-based instructional delivery method, Blackboard Version 5.0, can meet many of these needs. This electronic instructional delivery method eliminates the time and expense of mailing or sending materials by facsimile. This system can also be used for administration of quizzes within specified time frames, and immediate feedback can be delivered to the student and instructor. Virtual office hours can be conducted via the webchat/virtual classroom feature and there is also a link to external email. External links to recommended websites can be used for additional reading resources. Use of Blackboard provides many benefits that can allow for efficient delivery of distance education courses within the confines of budget guidelines, particularly when distance education is new to the educational institution.

Introduction

Post-secondary education perspectives have changed over the past few decades. Changes include shifts in enrollment patterns, changing demographics of students and faculty and greater demand for anytime/anywhere learning. Fulltime resident student enrollment is declining in many educational programs. More students are adult learners that want to advance their present positions and require advanced education and training. However, many of these students are unable to accept fulltime or daytime pedagogical roles due to the need to remain employed in the community in which they reside. Predictions of the number of students desiring post-secondary education by the year 2005 is a 20% increase from current numbers. Many students, however, will expect anytime/anywhere learning to meet their educational needs. Employment expertise will often require better communication and problem-solving skills. Meanwhile, shifting of faculty responsibilities may require more time devoted to teaching during non-traditional hours as they meet these enrollment needs. More frequently, institutions are investing in computer technology and distance education to meets these needs rather than on classrooms.

Converting courses to distance education does require some thought and re-design. One can not merely post the lecture notes and exercises, give periodic examinations and expect the majority of students to succeed in mastering the skills they need to acquire. This didactic approach is successful in developing critical thinking in only a few students who have previously acquired proficiency. Problem-solving must be taught through a variety of methods and using the computer as a delivery tool will not automatically teach these skills. In fact, using the computer as a delivery method may create more barriers than by using face-to-face demagogical practices. Professors need to become designers of learning experiences, especially when using the computer as the delivery tool. Likewise, care in instructional design must be taken so that the product is not full of "bells and whistles" that are distracting and don't add to the value of the education. Learning experiences should involve guided practice with feedback, case study or other problem-solving exercises and directions in gathering and using information.

A sense of community is missing with distance education in that students usually lack the face-to-face communication with other students and the instructor. If students also fail to receive feedback for the mastery of skills and knowledge in the course, they become discouraged and drop the course or the entire program. Likewise, if students experience difficulty using the technology and a sense that they are the only one experiencing problems, they will drop out. Students expect a seamless online environment that unifies student life and academics. Using discussion board, email, homepages, an online calendar and instant messaging can all help to create a sense of the academic community and to form networks with faculty and other students in order to resist attrition.

Features of Blackboard

Blackboard Version 5.0, can meet many of these needs to include: course creation, student enrollment, student/faculty email, bulletin board and virtual classroom usage, storage and retrieval of syllabus, lecture handouts and assignments, quizzes, grade book and use of other tools. This system is user friendly for faculty and students. Easy to use tools allow for the delivery of materials (text documents or slide shows) to distance students over the internet in many formats including but not limited to html. This electronic delivery method eliminates the time and expense of mailing or sending materials by facsimile. Case studies can be posted on the discussion board and students can collaborate to solve the problems via email or webchat. Guided practice can facilitate critical thinking with synchronized chat using the white board to illustrate points and bring in internet sites during virtual classroom time. Blackboard can also be used for administration of exams within specified time frames, and immediate feedback can be delivered to the student and instructor. Productivity tools are also provided to allow the student to have an address book and an online calendar to track their tasks. Other tools allow students to search for other courses provided on Blackboard and access resources such as online searches.

Communication Challenges

Challenges faced in the conversion of classroom-based courses to web-based involve communication. A common cause of attrition in distance education is due to students feeling isolated from the instructor and other students. Including opportunities to chat with the student at a distance and mechanisms for quick feedback via email or instantaneous feedback via instant messages can improve communication and help students to stay motivated and be successful in learning. Blackboard provides these features and the virtual classroom can be subdivided into separate rooms for small chats and private conversations between the instructor and one student even within a virtual classroom setting. Virtual office hours can be conducted via the virtual classroom feature and link to external email can provide communication when synchronous messaging is not necessary. By linking with a previously established email system rather than providing an internal email, it limits the number of communication tools that an instructor and student use.

Summary

Demands for distance education continues to rise. The delivery of distance education courses can be challenging in terms of timely delivery of course materials, didactic instruction and for facilitating student communication within student groups and with faculty. Blackboard 5.0 as a course-delivery system, is user friendly for both faculty and students with easy to use tools allowing for the delivery of materials over the internet in many formats including but not limited to html. This electronic delivery method eliminates the time and expense of delivering teaching materials and examinations via the mail or facsimile and can facilitate better communication between faculty and students in order to help decrease attrition that is typical of distance education.

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Prosocial Behavior in Online Instruction

Jason D. Baker, Ph.D.

Abstract

A significant body of literature has supported the assertion that communication in the classroom is central to the learning process. Prosocial behaviors, such as nonverbal and verbal immediacy, have been found to promote affective and cognitive learning in traditional instructional settings. The short paper presents the results of a study that examined the effects of instructor verbal immediacy on affective and cognitive learning in the online classroom. The results of this study found that students who rated their instructors as more verbally immediate expressed greater positive affect and higher perceived cognition than students taught by less immediate instructors. These results are consistent with similar studies in traditional courses and reinforce the influential role of the instructor in the online learning environment.

An understanding of the significance of prosocial behaviors in the online classroom has benefits to instructor and student alike, as practitioners could improve their course development and delivery in light of these results. Furthermore, such information goes beyond the "no significant difference" studies that continue to appear in the literature and would serve to validate an intuitive perspective held by many online instructors. Therefore, this presentation will not merely address the results of the study but will use them as a framework to suggest improvements to online pedagogy. Building upon these results, I will offer suggestions as to how to improve the effectiveness of the online learning experience through instructional design, pedagogical strategy, and social facilitation. This presentation will weave my experience, as both an online instructor and distance learner, with the results of the study to assist those who seek to effectively teach online.

Defining the Role of Student Involvement When Teaching with Technology: The Non-Traditional College Student

Martha Beasley, Lees-McRae College, US

In the process of defining the role of student involvement when teaching with technology, one must have an understanding of the student's needs. In the realm of higher education, we teach with a focus on both the traditional and non-traditional college student. The traditional college student is between the ages of 18-21, and in the midst of acquiring social and academic maturity, and a basic knowledge of the power, impact, and basic capabilities of technology on today's world. The range of technological knowledge of the traditional student varies between Internet surfing and chatting to demonstrating proficiency using highly technical processes. This proficiency will continue to increase in the traditional student, as K-12 schools continue to enhance, encourage, and advocate technology in the classroom setting. The non-traditional college student (approximately 40 years old) tends to be highly motivated and task-oriented due to the seriousness and circumstances of voluntarily enrolling in college. These circumstances entail real costs to the student such as time, employment, family, and finances. Most non-traditional students know a great deal about life, relations, and dealing with a wide range of experiences. A goal in education today is to meet the needs of all students, both traditional and non-traditional.

As we attempt to meet the needs of all students, we can find commonalities among the traditional and non-traditional student. Many times the needs of the traditional student include structure, guidance, and understanding throughout the student's college experience. Ironically, the non-traditional student possesses these same needs, but simply for different reasons. Common expectations of both kinds of students include information that is up-to-date, courses that are flexible and that accommodate different learning styles, guidance on what and how to study, opportunities for application, feedback, humor in the learning environment, and variety in course activities (Moore and Kearsley, 1996). Another common driving force for both the traditional and non-traditional student is the desire to graduate with a degree that will serve the student well in an ever changing world. Suggestions for direct student involvement that help to promote a high-quality educational program as students prepare for the real world may include such ideas as a teaching and learning center for multi-media training, a writing lab, laptops for students, and student involvement in the remodeling, networking, construction, and implementation of projects. Another method of meeting these needs, demands, and expectations is through distant learning course work.

In the process of making this transition to distant learning programs, institutions tend to grapple with various issues. The overall goal is to deliver a successful, high-quality education to students. Institutions inquire about the role of the student in the process, since the goal of a high-quality education centers around the student, both traditional and non-traditional. This includes a design or perhaps, redesign of what students bring to the "table of learning". For example, the once passive learner is required to become an active, autonomous developer of knowledge (Parker, 1997). Far more responsibility is placed on the learner and the classroom moves from a teacher-centered approach to a student-centered approach. As the approach changes, the task becomes multidimensional by a change in attitude, skills, and the ability to interact with the technology.

Kasworm (1992) suggests three stages in the continuum for implementing a student-centered approach for student success in technological course work. Stage One centers on teacher-directed interaction, which is highly structured, as students are introduced to the technology. Brief question and answer sessions are encouraged in order to assure pedagogical and social attributes as the student moves in the direction of autonomy.

Stage One allows interactivity in many formats including teleconferencing, videos, or conference calls. The goal is for the student to become self-directed through in-depth discussions that are richly sculptured by the professor.

Stage Two addresses student skills, as the learner advances from lower level thinking skills to higher order skills. The professor assists in guiding the student away from reliance on the instructor to the role of decision maker. McGiven (1994) believes that in order to promote a successful distance-learning program, one must focus on the student's ability to critically analyze and interpret information, and to interact and elaborate on concepts.

Stage Three, the final stage of a successful technological program, centers on high student autonomy and low instructor dominance. The professor's role is that of a guide and facilitator, while the role of the student is that of an active learner and participant. The professor continues to encourage and guide the student throughout the course.

All of these stages were part of the vital planning in creating an Educational Psychology course for 15 non-traditional education majors. These students displayed typical qualities of the non-traditional student, especially in the lack of confidence when faced with a distance-learning course in their program of study. In order to make this experience a successful course, initial professor-directed activities were built in to the scheduling of the progression of the course and assignments. These students were a formed cohort and had taken in-class courses together prior to the distance-learning course. They were able to associate a name with a face and personality throughout the online discussions. Three face-to-face meetings were built into the course, including an initial, introductory meeting, a mid-term exam and review time, and a final exam and assessment time of both the course work and the distance learning experience itself.

Initial attitudes about the course arrangements ranged from excitement and high motivation to learn in a new and different manner, to real doubt and lack of confidence in each individual's ability in the realm of technology. The course was purposely set up to begin as a highly teacher-centered and directed course and to gradually transform into a student-centered format. This was accomplished predominately through the use of online discussion forums and changing from professor directed questions to student directed topics and discussions based on the readings.

The course turned out to be successful in many ways. All 15 students responded in all assignments and made A's and B's in the course work. Perhaps the biggest success in the course was displayed through the confidence of the students in their final remarks such as, "I can't believe I made it through this course. I knew so little about technology, computers, and especially a distance learning course!" Others remarked about how much fun the course had become, and still others who were reluctant to speak out in class felt proud that they were able to vocalize opinions on an equal level with more assertive students! All students commented on how convenient this sort of arrangement was for their typical non-traditional student schedules. All 15 students balance such responsibilities as full-time/part-time jobs, families, and adult responsibilities. As they responded to assignments and to each other, the recorded time of student involvement was usually around 10:30 P.M. to 1:00 A.M. This proved to be a real plus for the students, as they attempted to balance everything in their busy lives.

Overall, this distance-learning course proved to be a real success, but I attribute the success to following McGiven's general guidelines for creating a course that advances from a teacher-centered atmosphere to one that is almost completely student-centered. I also feel that the preset meetings and the fact that the students already knew each other through previous course work helped to create a free environment for genuine responses and feedback regarding individual opinions and spontaneity in the online discussions. For example, one student summed up the experience by stating, " Our discussions online were much like those we have in class, and knowing the people you are participating with is a tremendous help. I liked reading everyone's ideas and feel that I came away from the class with a great deal more understanding than I would have had I only read the materials and taken the tests."

Due to the changing needs and roles of students, changing approaches in education help to foster a student-centered process of learning for both the traditional and non-traditional student. As demonstrated in this particular online distance-learning course, the role of the student focuses on technology proficiency and responsibility for acquiring new knowledge.

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Mission Impossible? Defining Roles, Developing Courses and Overcoming Myths in Distance Education

Submitted by Bob Boston

New Mexico Tech is a small (1,500 students), state sponsored research university in central New Mexico. It sits on a traditional campus offering specialized classes in science and technology in the traditional manner. But with competition increasing in recruiting qualified freshmen, transfer students and graduate students, something non-traditional was going to have to be done: distance education.

History

Distance education was not necessarily a new idea. But implementing a viable program was. Over the years distance education became the longest four letter word on campus. Distance education would take time and money, resources that were better spent on research or other projects.

There were many failed attempts at distance education over the past years. Committees were organized and disbanded. Facilities were built using surplus materials, and consortiums were organized as delivery partners. Tech was doing distance education, but was missing the drive and support needed to take the next step. There was no reason to the programming, no reason for the classes offered, and no direction. Instructors saw distance education as time prohibitive. There was a question as to who would own the program rights. And there was little incentive monetarily and professionally for developing any type of program. There was also no marketing. There were no classes to market, and therefore no market for classes. Distance education had become mission impossible.

Developing a Concept of Distance Education

As other universities became more competitive, and as enrollment dropped, the university realized it was time to look at distance education once again. But even though distance education seemed to have many of the answers, there were still many hurdles from the past to overcome. For starters, there was no administrative organization. There was no superstructure. And there was still a concern from the faculty about workload and ownership. And since Tech was so far behind other universities in delivering distance education programming, it did not make since to try and compete against already established classes such as English and other undergraduate type programs. Besides, Tech has a unique blend of classes and programs, many of which are not offered anywhere else. Therefore, the university began to take inventory and identify classes and programs that were not only unique to Tech, but would create interest beyond the campus. The concepts identified came from energetic materials, mineral engineering, and science teaching, areas of which unique classes could be developed and offered.

Next, a team of distance education visionaries was put into place to create a department for distance education. This team went to work identifying markets, researching cost-effective delivery methods, developing infrastructure, establishing policies and procedures and contemplating non-traditional calendars to meet the needs of students. A decision was made to market programs and not just classes. The team set out to do public relations work with the faculty. They had to identify and address the concerns of the faculty and convince them of the benefits of distance education. This has been done by the establishment of committees, holding facility open houses, regular reports to the faculty council, and the writing of a distance education contract with the input of faculty members that is favorable in areas of compensation and assistance in course development. As programming develops, as quality improves, and as other faculty members see what distance education is doing for other programs and the university, attitudes are changing and more and more individuals and departments are wanting to participate.

Distance Education Takes Shape

Distance education at Tech is still in its infancy. There are still many questions and concerns that need answered. Distance education at Tech is growing faster than ever. There are growing pains. Unforeseen problems arise almost daily, but with teamwork and vision they are mostly resolved. The organization is developing and team members are identifying their roles. But despite the growing pains, distance education is becoming a viable program and is beginning to meet the needs of students, community and the university. Today, New Mexico Tech is producing and delivering courses using video tape, video teleconferencing, and the internet in real time to sites all over the country. Today it is possible to earn a Master's degree at Tech through distance education. And distance education at Tech will continue to grow as more plans and programs begin to take shape. The vision of distance education at New Mexico Tech is gaining life. It has allowed the university to reach beyond its physical boundaries. Distance education is no longer Mission Impossible, it is quickly becoming Mission Possible.

Student Perceptions of Austin Peay State University Online Courses

Linda Brake, M.A. Ed
Ed. S. Graduate Student
Austin Peay State University
Clarksville, TN USA
tlca@midsouth.net

John Mark Hunter, EdD
Associate Professor, College of Education
Austin Peay State University
Clarksville, TN, USA
hunterm@apsu.edu

Abstract

Austin Peay State University began offering online courses in Fall 2000. After a year of courses evolving rapidly, instructors and administrators felt confident in their ability to present instruction using this medium. Could this confidence be supported by analysis of students' perceptions? Research questions included: (1) Has the change in service delivery from face-to-face classroom instruction to online instruction led to a satisfied student? (2) What student qualities are prominent in leading to a satisfied student who operates in our online environment? (3) What are students' attitudes toward online courses they are currently completing? A non-experimental descriptive study using an online survey determined student perceptions. Results were transferred to numerical measures to determine a perception score. Higher scores signified a more positive perception toward web-based learning. The conclusions drawn from data are that the overwhelming majority of respondents have strongly positive perceptions toward their online learning experience.

Background Information

Remaining current with technological innovation and meeting student needs has become crucial to the competitiveness of higher learning institutions. The pedagogy by which institutions of higher learning now offer instruction to students continues to evolve and change into some new and different models. The causative factor of this is twofold. There has been a dramatic increase in the nontraditional student population, and institutions of higher learning have responded to this changing student body, with it's attendant change in needs. Secondly, the broad availability of technological advances has provided an opportunity for more and more schools to take their courses into sophisticated online environments that previously were open to only a few elite institutions. The combined effect has been to fuel the phenomenon of changing the service delivery model of instruction at colleges and universities.

Statement of the Problem

Austin Peay State University (APSU) has seen a dramatic, rapid rise in the online course offerings and number of students enrolled in online classes. What are students' perceptions of these courses? Is the administration alone in believing the instruction and experience is positive for the students who choose this medium? The higher education community must gauge success based, in part, on the satisfaction and perception of the students they serve.

Review of Related Literature

Nearly fifty-five percent of all four-year public institutions of higher learning offer complete degree programs through online courses (Bataineh 2000). Current literature has much to offer us concerning student perceptions of online learning around the world. From longitudinal studies with over 15,000 participants (Rekkedel 1999) to small research projects involving just seven students (Sorg & McElhinney 2000), research has overwhelmingly found students with positive perceptions of learning over the Internet. An in-depth analysis of current research indicated some very prominent factors that are involved in determining whether students' perceptions are positive or negative. By far, the variable of interactivity on

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three different levels defined the strength of students' perceptions. Other factors include computer knowledge base (Solloway & Harris 1999), prior experience (Ewing-Taylor 1999), community-building online (Kolloff 200[illegible]), and gender (Sanders & Morrison-Shetlar 2001). The literature also is rich in attempts to identify traits among individuals who are successful in their online experiences and how those traits can be used as indicators for predicting student success

Methodology

The research sample was derived from the total population of students enrolled in online courses at APSU in the Fall semester of 2001 (approximately 450 students). The researcher developed a 25-question survey that included demographic information, computer skills and online habits, and a Likert-type response scale about perceptions toward online instruction. Completed surveys were compiled to determine perception scores for each student and each item on the survey. The instructor of record for each of the online courses (18 individuals) was asked to give their students the opportunity to participate in the online survey. Results were emailed directly to the researcher.

Results

The decision of which courses and sections would be given the opportunity to participate was left to the instructors of those courses. While several of the eighteen faculty members asked their students to participate in the online survey, most did not. One was found to have offered an incentive to his students to participate in the study. Twelve percent ($n = 56$) of the students who were enrolled in online instruction participated by filling out the online survey. It is not known how much of the online population was given the opportunity to participate.

Nineteen of the 56 respondents rated their courses in the top ten percent of the range; there were no scores in the bottom ten percent. The median score is 58 out of a possible 68. Seventy-five percent of the respondents scored above the mean (52). In depth analysis of the data is ongoing and will be completed before definitive conclusions are drawn from the study. However, a preliminary analysis makes it clear that the results are skewed strongly to the right; this is seen as an indication of positive student perceptions toward their online experiences at APSU.

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Distance Learning Program Review

Cathy Cavanaugh, Ph.D. Curriculum & Instruction, University of North Florida, USA. ccavanau@unf.edu

Abstract: Recently the college of education faculty and administration at a regional state university stated that the college needed a thorough review of its policies, procedures and plans regarding distance learning. The college's technology committee collected data to establish the college's history, current status and goals. Faculty members were surveyed to learn about their individual experience and interest in distance learning, and to learn about the issues they felt were important to resolve as the college moves ahead in distance learning. The data was used to draft a 3-year plan and a 6-year plan for distance learning at the college.

A strength of distance education is its potential to focus the learning process on the student. Courses and programs that emphasize their focus on the student's strengths and needs will succeed in attracting students. In order to build their reputations and keep students, courses and programs must reach quality goals. Instructors have concerns regarding the identity and honesty of the students doing the work in distance education courses. A survey of 850 Americans by the American Council on Education found that 43 percent think distance-learning courses do not measure up to those offered in person (Evelyn, 2001).

In its December 2000 report to Congress, the Web-Based Education Commission made high quality online educational content one of its seven critical issues. In order for a student or institution to determine whether quality has been achieved, quality must be defined. A primary goal of educators is developing independent learners who can capably apply their knowledge to new situations. To ensure that distance education offerings meet this goal, providers must identify desired learning outcomes and instructional methods. Quality indicates that instruction is effective and appropriate. The definition of quality may include quantitative elements such as completion rates, student performance, and student evaluations of the learning experience. Qualitative dimensions may include ratings of teaching-learning events, materials, learning process, pace, activities, content and options offered to students (Cavanaugh, 2001).

During the 2000-2001 academic year, college of education faculty and administration at a regional state university stated their belief that the college needs a thorough review of its policies, procedures and plans regarding distance learning in order to ensure that we continue to provide quality programs and to uphold our reputation for attention to students' needs while expanding our ability to serve the community. To begin the process of managing distance learning in the college, we gathered data to establish the college's history, current status and goals. The college Dean and department chairs designated the college's Technology Committee as the group to oversee the process. The committee selected a member with distance education experience to lead the process, with a student assistant. To learn the extent of the college's past involvement in distance learning, a history was compiled. The history listed the names of courses taught via distance technologies and information about the year and term, instructors, students registering, students completing, and student performance and satisfaction information when available.

The baseline history showed that over the four academic years during which the college offered distance learning courses, 23% of the college's full-time faculty members had taught distance learning courses. In the university, fewer than 5% of faculty taught distance education courses during that time period. In fact the college of education began offering distance learning course two years before any other college in the university. Between 1998 and 2001, the college offered 30 distance learning courses, compared to 16 offered by all of the other colleges combined. The college has served 375 students via distance learning. Throughout the 4-year period, the numbers of courses and students involved in distance learning at both the college and the university levels have steadily trended upward. The historic information indicated that distance education, while new to the college and to the university, has become more important in meeting our educational missions. Clearly, there is interest in continuing to develop our distance learning program. However, during the four years that distance learning has been available, there have been no standards or quality controls applied to courses, delivery or students, at either the college or the university levels. As interest and involvement in distance learning grows, concern over maintaining quality grows.

The college distance learning review entered a stage of assessing the current status of distance learning. Full-time faculty members were surveyed to learn about their individual experience and interest in distance learning, and to learn about the issues they felt were important to resolve as the college moves ahead in distance learning. An open-ended email survey was distributed, and follow-up interviews were conducted to ensure that each faculty member had an opportunity to participate.

Survey items pertained to past or current courses taught using distance elements, distance elements used (email, Blackboard chat or discussion, web-based projects, teaching via audio or video, other) for enhancing or replacing classroom instruction, interests in teaching a future distance learning course either fully or partly distance, college courses that would be well taught using fully or partly distance learning approaches, college courses that should not be taught using distance learning, benefits to the college and our students of expanding our distance learning offerings, concerns about the college expanding distance learning offerings, and issues that are most important to resolve as the college moves ahead in distance learning.

During the survey period, background information was collected regarding distance education policies and procedures in place or in development at the university's other colleges and at other colleges of education in the state. The colleges' Dean's office and web pages were consulted to learn how distance education was managed. Data was gathered regarding whether the college has a faculty review board, a guidebook, or policies regarding decisions about distance learning courses and instruction. Copies of any available materials were collected.

Faculty survey results and college inquiry information was compiled and summarized in a report that was submitted to the college Dean, department chairs and the technology committee. The data about past distance learning offerings and current faculty status was used by the technology committee to draft an outline for a 3-year plan and a 6-year plan for distance learning at the college. The outline is shown below. The college's comprehensive distance learning review is currently entering the action phase, in which a detailed policy and plan will be developed by a representative group of faculty members.

Plan for distance learning at the college of education

I. Policy regarding appropriate courses for distance environments, and procedures for adding distance components to courses
   Including Faculty proposals, Proposal review process, Rationale for distance component, Quality assurances, Faculty support in developing courses, Student screening

II. Infrastructure and support needs
   Including Equipment, Facilities, Faculty support, Student support

III. Plan for building student enrollment in distance learning
   Including Quality courses and instruction, Student satisfaction and success, Meeting community needs, Appropriateness of communicating distance learning opportunities to students locally, statewide, nationally and internationally

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Design of Student Model Centered Web Based Adaptive Learning System

Pinde Chen Kedong Li
Institute of Education Technology
South China Normal University
GuangZhou, China
pinde@scnu.edu.cn likd@scnu.edu.cn

Abstract: Web-based education systems are becoming increasingly popular in recent years; however, most of the systems developed so far use static hypermedia as the manner of representing contents. It's a challenge to develop advanced Web-based education applications that can offer both adaptivity and intelligence. This paper will review some related works in this area and present a design of advanced Web based learning system that support adaptive presentation, adaptive navigation and adaptive help.

1 Introduction

The first comprehensive review on adaptive hypermedia system can be found in (Brusilovsky, 1996, p. 87, in 2001 the author continued tracing research progress in this area (Brusilovsky, 2001, p. 87). Since 1996, Most of adaptive hypermedia are education hypermedia which are inferred in (Brusilovsky, 1996, 2001).

As for adaptive collaboration support, an example in this area can be found in (Greer, 1998, p. 494). This paper reported an Intelligent Helpdesk system which integrated two cognitive tools: CPR (Cooperative Peer Response) and Phelps(Peer Help System).

In this paper we will present a web based learning system which integrate adaptive content with adaptive help centered by student model.

2 Designs

Our schema is a student model centered integrated learning system feature adaptive presentation, adaptive navigation support and adaptive help. The system structure can be depicted as Fig 1.

The data part of a web based learning system is made up of course fragments, instruction strategies, domain model &course structure, student models. Student Model consists of user's knowledge level, learning goals as well as their background. User's knowledge level is an overlay model. For each domain model concept, an individual overlay model stores a value which is an estimation of the user knowledge level of this concept.

An adaptive engine will be used to generate web page dynamically based on values in the User Model and other data listed above when the curriculum is delivered via web; the pages demonstrate the features of adaptive content and adaptive navigation.

Help system is a tool that resides on a page. When a student ask for help, help information is generated according to the position of current question as well as knowledge level of the User Model. The system utilizes entries in forum & FAQ which are indexed by concepts of Domain Model and course fragments to generate personalized help information.

The help system can also consult a discussion forum; each topic of the forum is indexed by concepts in Domain Model. When user wants to submit a question, the user must select one or more concepts (from the list). The system can use the user input to make sure that all FAQ and contents of discussion forum are correspond to the (user selected) concepts.

3 Progress of the work

Our work is still in the early phase; our goal is to implement a suit of tools to help instructors to produce such an on-line course easily without writing programs. These tools include:

- Tools of define domain concepts, learning goal and background knowledge
- Tools of define class structure
- Tools of define rules of page construction
- Tools of define prerequisite concepts and output concepts
- Tools of create exercises
- Adaptive engine
- Help engine
- Discussion group on indexes for domain concepts

By this system, the teacher will be easily to develop an on line course which is an adaptive education media. In addition , there is a adaptive help tool available. Other common tools can also be linked to this course. All of these tools provide a leaning environment for the students while they learn via Internet. We believe that our work will be beneficial to web based distance education.

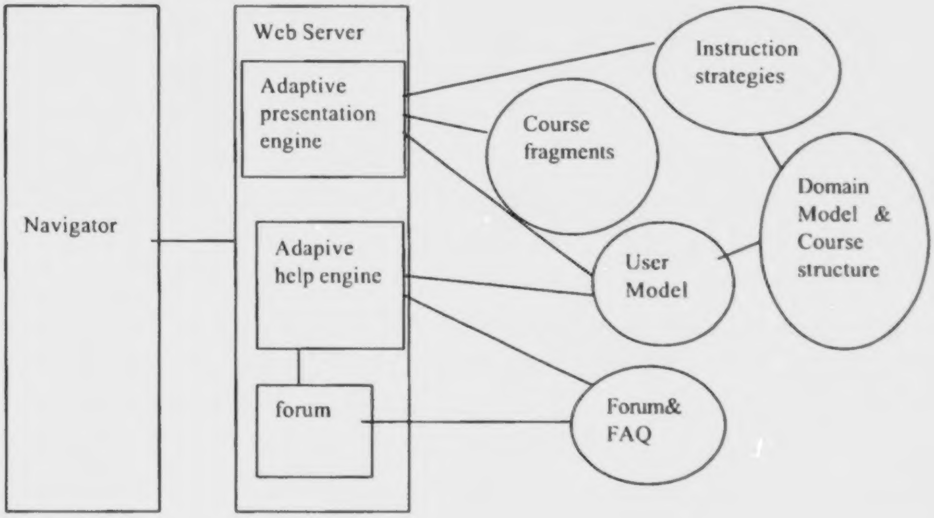
Navigator
Web Server
Adaptive presentation engine
Adapive help engine
forum
Instruction strategies
Course fragments
Domain Model & Course structure
User Model
Forum& FAQ

Fig 1 System Structure of Adaptive Learning System

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Teaching through tragedy: Use of dynamically created websites to maintain communities of learning.

Michael L. Connell, Ph.D.
University of Houston
United States
mkahnl@aol.com

Abstract: During the Summer of 2001 the University of Houston, together with the rest of the Houston community, suffered through one of the most devastating storm events in memory – Tropical Storm Allison. At the time of Allison's arrival the author's summer courses were two-thirds complete and everyone was looking forward to a smooth completion of a successful term. As a result of Allison's impact the university's main campus was shut down for a one-week period, and university servers supporting instructional tools went off-line.

This paper will describe how these courses were able to successful maintain there direction via a pair of dynamically created emergency websites. These websites successfully maintained a community of discussion within the class and enabled the completion of the remaining projects. This paper will outline the background leading to the collapse of the normal instructional infrastructure, the mechanisms and logistics of creating an alternative instructional infrastructure, and a discussion of its effectiveness.

This proposal was first thought of during August of 2001. In the chilling climate following September 11th it is comforting to know that even when normal systems are not present we can still fulfill our instructional calling.

Introduction

We often take for granted that there will be a minimum of support for our instructional efforts. At a bare minimum we would expect a classroom, some type of regularly scheduled meeting time, and a supporting technology infrastructure for web-based activities. During summer of 2001 at the University of Houston we had none of these due to the impact of Tropical Storm Allison. The university itself had been closed due to massive flooding (much of the downtown Houston area was underwater click on:

http://hometown.aol.com/mkahnl/Courses/Tech_Math_II_S2001/cathys_powerpoint.htm

to see a few pictures showing the extent of the devastation), the university technology infrastructure was off-line (talk to Jerry Price, I am sure he can tell you a few stories!), and students were in survival mode and their resulting schedules were chaotic at best.

Technology to the rescue

This paper will describe how a pair of emergency websites, literally created on the fly, together with extensive phone conversations kept the courses alive. These sites were not fine tuned creations, but serviceable constructs responding to the needs of the moment. The author during this period often found himself up at 5:00 am with a cell phone in each ear and a voice transcription unit plugged into the computer. Despite these many trials feedback from students indicated that they felt they had more one on one feedback given in the class then other courses they had taken on campus.

The paper will further describe some of the logistical challenges of maintaining contact (one student threw a 200' telephone cord across an alley to a neighbor's apartment which still had phone service!) as well as describe differences in student product when compared with more traditional offerings of the courses. I will finish by including student comments on the courses. I am planning on including the url's for the emergency websites so that others can see what was done.

PIONEER STEPS FOR NEXT EDUCATION DECADE

Mónica Costa, José Carlos Metrôlho, Arminda Guerra
Escola Superior de Tecnologia - Instituto Politécnico de Castelo Branco
Av. do Empresário - 6000 Castelo Branco,
Phone: +351 272 339 334, Fax: +351 272 339 399
aglopes@est.ipcb.pt
Portugal

Abstract: At the decade of the 90's the use of the Personal Computer – PC, became common due to the fall of its price. The spread of PC's all over the world and its connection through networks, Internet and Ethernets, made this equipment a mean of communication used by people from different parts of the world. This achievement enabled a faster and even more effective communication (e.g. chat, e-mail, net-meetings, etc) (see Barradas & Guerra 2001). Many were the areas that benefited from the spread of PC's and the new Information Technologies (IT) implicated, namely the areas of education and formation courses. With Internet and due to the growing necessities of the common citizen, nowadays is possible and it is being even more stimulated the long distance learning; this has been one of the emergent concerns of the latest scientific meetings as (Technical meeting, 2001).

Introduction

It is common to hear about long distance learning using IT (as it is the case of some virtual Universities) [1]. In the following sections of this paper we will present some projects developed in Escola Superior de Tecnologia de Castelo Branco (EST). The aim of these projects is to improve the teaching of engineering subjects. This improvement isn't only related with contents but also with the logistic support needed by students with less availability to be in campus, such as worker-students. In this paper we refer to some important items needed to approach both teachers and students from distant places.

Interface through www pages

The School has actualized online information of all subjects that integrate the curricular plan of the Computer and Computer Science Engineering courses as we can see in (Fig. 1a) [2]. For each subject the students have access to the teacher's contact (email, etc), to the subject's program, evaluation regulations, technical and didactic information, bibliography, etc. It is without doubt an extremely positive mean of communication between teachers and students; it allows the direct contact between them once the student has finished his graduation. Therefore the page allows former students to get knowledge actualization; it's also useful for those trying to get a higher education, as they know previously the contents of the subjects they will study.

Supporting teaching tools

A didactic Compact Disc (CD) is being developed whose contents are related to the control area subjects (Digital Control, Dynamic Control and Computer Control), as showed in (Fig. 1b). The CD will serve as a teaching support in EST and in other Engineering Schools where these subjects are part of the curricular contents.
There is also a logistic component, www page, whose gold is to improve the CD ROM's effectiveness. Through this page the support is guaranteed to the components in need of actualization; it also allows taking doubts

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[1] http://www.accrediting.com/vuaa.htm
[2] http://www.est.ipcb.pt

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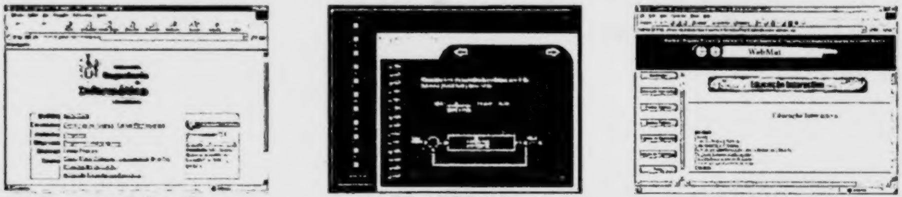
related with the referred subject. Users' suggestions are collected to improve both CD and www page. Control Teaching Multimedia Tools – FEMECO (Marques et al. 2001) is the name given to these tools.

The referred page serves as a student support; it has additional information, which allows communication with the teachers of the subjects, whom can also elucidate doubts. Therefore it contributes to a better learning and enables communication amongst instructor and student. The page is frequently actualized in order to enable effective support.



a) Course web interface b) FEMECO CD c) WebMat

Figure 1: Supporting teaching tools

Other www sites are being developed to improve teaching of different subjects such as the case of Mathematics (Fig. 1c). Other software is being developed to allow remote control of practical experiments and used in long distance laboratory experiments, this is particularly important for engineering courses (Chasqueira et al. 2001).

Special teaching

Information Technologies are a paradigm of society. However, there are some neglected groups as it is the case of handicapped people with greater access problems. In order to offer knowledge to a group of those ill-favoured people, it was developed in EST a support teaching integrated system for people with hearing deficiencies (Valente & Guerra 2001). The greater advantage of this application is the integration of both spoken and written languages with sign language. Although it was developed for students it also enables parents and teachers to use it to transmit knowledge. This is another of the new information technologies applications developed in EST.

Conclusion

In this paper we present a summary of the new information technologies techniques, used in long distance learning, developed in EST. We also include tested strategies to motivate students to the technological courses, Computer Science and Computer Engineering, lectured in Castelo Branco-Portugal.

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Teaching Research Methods Online: Course Development and Comparison to Traditional Delivery

Reagan Curtis, Ph.D.
Educational Psychology
College of Education
Northwestern State University of Louisiana
United States of America
Email: reaganc@nsula.edu

Abstract: The development and evaluation of an online Educational Research and Evaluation course for Master's level students in a College of Education is described. Rationale for the course's highly structured design and the inclusion of a synchronous group discussion component in an otherwise asynchronous course is discussed. Students' performance in the 2 sections of the online course is compared to a traditional section of the same course. Results indicate that students performed equally well when applying their knowledge in written papers, but that the traditional testing situation put those students at a disadvantage compared to their online counterparts.

I have three goals in mind as I write this paper. The first is to describe the development of an online version of an Educational Research and Evaluation course for Master's level students in a College of Education. Both the number of courses offered and the number of entire degree programs offered online doubled between 1995 and 1998 (Phillips, 1999). Research methods courses are required in most Master's of Education degree programs across the country. As many universities strive to offer online degrees, research methods courses will increasingly be nominated for conversion to online delivery formats. A description of the process of designing and implementing such a course will provide insights for those who are or will be involved with online delivery of similar courses. My second goal for this paper is to go beyond a description of the course development process to provide insight into how online delivery compares to traditional formats for research methods courses in education. I will describe data from three groups of students: those enrolled during the first semester online delivery was offered, students enrolled during the second semester online delivery was offered, and those enrolled in a traditional section during the second semester online delivery was offered. The third goal for this paper is to describe how teaching the course online one semester informed how I taught it during the second semester. While many forces push for increased online delivery of courses, it is important to ask how these courses compare to traditional methods of instruction. I believe there is a trade-off between online and traditional delivery formats so that the benefits and drawbacks of each must be weighed.

Online Course Development

Consistent with the first of my goals for this paper, I will describe my particular experiences in the process of online course development. Let me first relate my reasons for moving into online delivery for Educational Research Methods. This is a course that all students who receive a Master's degree in education from Northwestern State University, and many other universities, must complete. It is traditionally a very demanding course for students and one that most students leave for the end of their program. It is also one of my passions and along with statistics is a course that I think students can really learn to love if it is delivered properly. Finally, at Northwestern State University, Educational Research Methods was a course that had not been taught online before. I knew that several complete degree programs would become available for distance education students if this course was offered. I realized that under these circumstances someone would be developing this course for online delivery and I decided that my background and love for the course made me the ideal candidate. I started my journey through the online adventure by signing up for 33 hours of training funded by the Learning Without Travel initiative on distance delivery methods available at Northwestern State University.

These methods included using compressed video to present instruction where students could see and hear their instructor and receive feedback in real time. This system has some definite advantages, but also has the drawback of forcing students into a particular timeslot and physical location for instruction. Frankly, I was not convinced that dialog with a 1-2 second delay was really enough of an advantage over asynchronous delivery methods to warrant restricting students to a particular time and physical location for instruction. In my mind, they might as well make the trip to a university for a traditional course if that was the best we could do.

I decided that truly asynchronous Internet delivery was my delivery method of choice. This meant using the Blackboard delivery system. I received training on how to develop, design, and manage a course using the Blackboard delivery system. The training went a long way to preparing me for the course, but there was much more that could only be learned by doing. One of the many truths I learned in those training session was that preparation is everything. In traditional delivery formats, the professor has much more room for on-the-fly adaptation as they assess their students' progress. That type of assessment and adaptation is not possible without face-to-face interaction. Preparation becomes your only substitute. Preparation in the structure of the course; preparation for every contingency you can conceive of because others you haven't thought of will arise.

I spent several months preparing and designing my course before it opened for student enrollment. As I began, there were several ideas I knew I wanted to incorporate into this course. Those ideas had origins in my graduate training in educational psychology and found substance through the training sessions I was able to attend. I am greatly indebted to Darlene Williams for her expert training and willingness to help me in bringing these ideas and goals into reality through the Blackboard delivery system.

First, I knew that I wanted the course to have a clear structure that led students through the material. I knew that other instructors in other courses preferred to post most of the assignments at the beginning of the semester and allow students to work at their own pace. I don't think Educational Research Methods is the kind of course that this is appropriate for. The material is difficult and complex for students. I think that a guided tour with a more analytical or piecemeal approach is warranted. Of course, students have to be able to bring it all together in the end, but I think they need to perfect the components first. I had in mind the cognitive apprenticeship kind of model discussed by Barbara Rogoff and Jean Lave (Rogoff, 1990) and the idea of a more knowledgeable guide through the Zone of Proximal Development that Lev Vygotsky (1978) described. This model is sometimes described using the metaphor of an apprentice tailor learning to complete a garment. I would allow students to work on small pieces of the garment and guide them as they perfected each piece before they would tackle a complete garment on their own. For Educational Research Methods, that complete garment was an empirical research proposal complete with an in-depth literature review, specific methods, and detailed measures. A research proposal that would allow students to go out and collect data for a thesis the very next day if need be.

A second idea that I knew I wanted to incorporate into this course was the use of small group discussion. This was at first nothing more than a vague goal. I thought that group discussion among peers in an asynchronous course had the potential to replace much of what was lost by not having face-to-face class meetings. Threaded discussions are a common way of trying to facilitate group discussion in asynchronous courses, but I didn't think they would be enough. For one thing, threaded discussion lists have a reputation for being difficult to sustain. I knew that I would be using threaded discussions, but wanted to supplement them with more real time types of interactions. With this goal in mind, and Darlene's expertise reassuring me that it was possible, I decided to require students to form into small groups with designated times to meet in the Virtual Classroom section of Blackboard. This introduced a synchronous component to the course and I was unsure how students would react to the requirement.

With these ideas in mind, I put together a course where just about every week involved reading a chapter from the textbook, reading my lecture notes on that chapter, meeting in the Virtual Classroom to discuss issues with classmates, and posting questions or comments on a threaded discussion board. The final research proposal was broken down into 5 sections and a draft of each section was due about every other week. I then read these drafts and provided detailed feedback on how to improve them for the final version due at the end of the course. Weeks that did not have drafts due usually involved taking a quiz on the reading assignment for that week. These were open-book, open-note quizzes, but were also timed so students had to be well organized. Finally, I included a midterm and final exam that students downloaded and had 3-4 days to complete before emailing me their responses.

Online Course Delivery

Delivering this course turned out to be quite labor-intensive. I thought that the amount of up-front work that went into designing the course would make the actual delivery less intensive compared to a traditional delivery format. This did not turn out to be the case, but if I had not put that effort in at the beginning, then delivering the course would have been completely overwhelming. As it was, I averaged at least an hour every day just answering emails and questions from the threaded discussions. Each week, I also graded quizzes and sent feedback on the correct answers or reviewed proposal drafts and sent detailed feedback on how to improve the final version. The amount of work that I put into delivering this course was about the same as that I put into delivering traditional sections. The difference was that much more planning had gone into it before instruction ever began.

You may be wondering what could take up an hour a day answering emails and discussion lists. For the first few weeks of the course, students had three overriding concerns. Firstly, some had difficulties with email and Internet technology. I learned quickly that some students were well suited to taking a course online, while others needed a great deal of "basic training" in skills such as sending emails with attachments, saving word processor files in different formats, and navigating a web site. I believe strongly that there are some students who belong in online courses, while others simply do not have the prerequisite skills. I don't mean that this latter group cannot perform in an online course, but simply that they would be better served in the traditional classroom. Even for those with a strong technology background, online courses can be challenging as evidenced by this email excerpt:

> I have been unable to email you all day. I faxed my final exam, since our server at school has been non-functioning, and when I got home and tried to email from my regular browser, that also had problems. I am trying this route. I hope this is acceptable (anonymous student).

Both the professor and the students must be flexible and able to problem solve with technology in order to make an online course work. For me, this flexibility included accepting assignments by several routes, being able to read files in several different formats, and being able to respond to emails and phone calls promptly.

A second early concern involved questions about how to navigate the course site. Navigation difficulties were generally fairly easy to resolve. It was just a matter of clearly explaining how I had organized the course site. Students entered the site on an Announcements page. All assignments were on a separate page and listed according to their due date. The assignments for each week were posted at the end of the previous week. This page explained where they needed to go to find links to lecture notes, threaded discussion boards, the virtual classroom quizzes, explanations of proposal drafts, or whatever was needed to complete that weeks assignments. The course syllabus and other general course documents were posted on a course content page.

Students third concern in the first few weeks involved the Virtual Classroom discussion group assignments. Many emails and threaded discussion postings from students indicated that they had signed up for an Internet course precisely to avoid that sort of time constraint. Still, I maintained that they could find 2-5 other students and meet at anytime during the day or night. The groups were finally formed, albeit with a good deal of grumbling. I asked students to send me transcripts of their synchronous discussion sessions in the Virtual Classroom and responded to any unresolved questions from those. It turned out that, by the end of the course, most students indicated that the discussion groups were their favorite part of the course. It allowed them to get to know their peers, to discuss the content in a way that they had not done in any other online courses, and to get feedback from me for anything that their peers couldn't help them figure out.

Once these concerns were resolved, the course delivery ran fairly smoothly. I still had emails to answer, threaded discussions to respond to, and Virtual Classroom transcripts to read, but student questions became mostly content oriented as they became familiar with the technology and structure of the course.

Comparison to Traditional Course

The third goal for this paper is addressed by focusing on students' work and feedback relative to the Educational Research and Evaluation course as presented in each delivery format and across two semesters. The data include all and only regular course assignments: quizzes, tests, journal article critiques, drafts of a research proposal, e-mails, group discussion logs, etc. Students were asked to provide consent for their course performance to be used in this comparison. The online course was first delivered in Spring 2000, which is a 16 week semester. Forty-nine originally enrolled. Of those, 12 withdrew and 14 of those that completed the course agreed to participate in this study. The online course was modified and delivered again during a 9 week session in Summer 2001. Thirty-six students enrolled, of which 3 later withdrew. Of those that completed the summer course, 16 agreed to participate in this study. I also taught the course in the traditional classroom format during the summer. Twenty-three students enrolled for this section and 1 later withdrew. Nineteen of the 22 that completed the course agreed that their performance could be reported in this paper.

A comparison was done of the proportion of total points earned in the course across the three sections. Students in the first semester online course averaged .93 (SD=.03) of the total points available. During the summer session, students in the online section averaged .91 (SD=.05), while students in the traditional section averaged .88 (SD=.07).An ANOVA showed a significant effect of section [F(2, 46)=3.74, p=.03]. Scheffé post hoc analyses (p<.05) revealed that this significance was driven by the difference between the first semester online course and the traditional summer section while other comparisons were insignificant (See Table 1). This difference between the summer traditional section and the spring online section may be due either to the online versus traditional delivery format or to the 9 week versus 16 week session. In trying to better understand this difference, students' performance on their major assignments was examined.

Table 1: Total proportion of points, proportion on critique and proposal writing assignments, and proportion on midterm and final exams for each section.

Section	Critique	Proposal	Midterm*	Final*	Total Points*
9 Week Online	.90(.11)	.89(.05)	.89 (.05)	.90(.06)	.93 (.03)
15 Week Online	.91(.12)	.87(.12)	.90(.05)	.86(.06)	.91 (.05)
15 Week Traditional	.94(.04)	.86(.13)	.71 (.15)	.63(.15)	.88 (.07)

* Significant (p<.05) difference across course sections.

The proportion of points earned on a critique of an empirical research paper ranged from .90 (SD=.11) for the first semester online to .94 (SD=.04) for the traditional section in the summer session. For the final research proposal assignment, this range ran from .86 (SD=.13) for the traditional section to .89 (SD=.05) for the first semester online. ANOVA's examining the effect of section on the proportion of points earned for these writing assignments showed no significant differences between sections (See Table 1). This is very interesting. Students in both sections were able to write equally solid journal article critiques and research proposals. The ability to critique published research and to write a research proposal were primary goals for this course. They involve students applying their content knowledge of research methods to the real world contexts of both evaluating existing research and designing new research studies. The online course appeared equally facile at allowing students to attain these goals.

The case was different for the exam scores. The first and second online sections earned .89 (SD=.05) and .90 (SD=.05), respectively, on the midterm and .90 (SD=.06) and .86 (SD=.06) on the final exam. The traditional section earned .71 (SD=.15) and .63 (SD=.15) on the midterm and final exam, respectively. ANOVA's examining the effect of section on students' midterm [F(2, 46)=20.24, p<.000] and final exam [F(2, 46)=34.08, p<.000] scores revealed significant differences. Scheffé post hoc analyses (p<.05) showed an advantage favoring both online sections when compared to the traditional section.

There is an obvious reason for this difference. Students in the online sections had several days to complete the exam in which their textbooks and notes were ready at hand. Students in the traditional section had to take the exam in class without using their text or any notes. While this clearly explains why the traditional students did not score as well, it also raises an important question. If both online and traditional students critiqued journal articles and designed empirical research studies with equal facility, then how do we interpret the difference in their exam scores? It seems from their papers that both groups had equal mastery of the material, but the testing situation precluded traditional students from displaying their knowledge. This may be seen as an argument for open book/note testing or as an inherent advantage for online instruction where instructors are all but forced to create open book/note exams. Even though the traditional students were at some disadvantage regarding their tests, the differences in overall course grades were slight. This difference was only significant when compared to the first online section and not to the second. This seems to argue against it being driven by test scores, because both online sections had the advantage there, and for it being driven more by the length of the session, 9 versus 16 weeks.

Insights

Besides the argument for open book/note testing and the conclusion that the online course seemed to allow students to apply research knowledge just as well as the traditional course, there are other insights to be gleaned from the development and delivery of this online course. First, and perhaps foremost, is that online courses are wonderful for some students, but inappropriate for others. Along with this I believe that students (and perhaps instructors) do not always realize what qualities make someone suitable for online courses. These qualities include an ability to work independently and to motivate themselves; an ability to learn complex material from text, written explanations, and graphic representations; and a certain baseline technological savvy. Those who need external motivators, learn better through face-to-face interaction, and/or are frustrated using computer, email, and Internet technologies would be better served in a traditional classroom. They will find that the online course is simply more challenging than its flexible time schedule is worth.

These considerations should also be turned to evaluating courses as to whether they are appropriate for online delivery. I believe that at least three questions should be asked before an online course is developed:

1) Are the goals or content of the course such that student motivation is likely to be low?
2) Is face-to-face interaction crucial to meeting the goals of this course?
3) Is the student population for the course likely to be technologically unprepared?

If the answer is yes to any of these, then the course should not be developed for online delivery.

A second insight is related to the workload involved in teaching online. As I talked with colleagues who don't teach online, I sometimes got the impression that they thought it was easier than traditional sections. That not having to show up to lecture each week meant that there was less work and less preparation time. What I found instead was that the lecture time was more than replaced with answering emails, responding to discussion threads, and reading Virtual Classroom chat logs; and that the preparation time was moved back so that it primarily occurred before the semester ever began. I found that teaching online required me to do much more technological problem solving, to be more flexible in responding, and more available to my students than when I taught a traditional section. That said, I found that teaching online was an extremely stimulating experience that made the extra, or at least different, workload well worth it. At the end of it all, this comment from one of my students sums up both my experience and what I hoped to impart to those in my courses:

> This semester has been a true learning experience for me. I have learned much both about research practices and about myself as a result of participating in this course. I have a better grasp of the components of an effective research study, the process involved, and the time required (anonymous student).

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Virtual Learning? Enhancing teaching and learning through ICT

John Cuthell, MirandaNet, UK

Information and Communication Technologies present students with a constantly developing toolbox. Students use the tools to construct artefacts from a range of sources and inputs. The end product - a frozen point in a shifting panorama of possibilities - asserts their identity. These post-modern magpies use skills and concepts to combine source materials that meet the needs imposed by their teachers and tutors. The surface gloss confuses and dazzles: what is original? Where are the sources? Which (if any) is attributed? The question of whether the learning and skills embodied in the artifacts are transferred to conventional learning raises other questions.

The conventions and assumptions of institutional learning have become increasingly at variance with the praxis of the learners, whose style is that of bricolage, based on the hardware and the software to which they have access. The content and form of students' learning is inscribed within the artefacts which they produce. Knowledge and outcome are synonymous for them: they have become cyber bricoleurs.

Students with computers have become owners of the means of their knowledge production, and hence of their cultural capital. The symbolic capital which issues from this is virtual: the simulations transient: constantly updated. The standards and expectations of the education system sit uneasily with the values of the digital auteurs who form the vanguard of the postmodern economy.

At a time when e-learning is seen as a solution to the needs of both industry and the education system, the work and words of these students may shed some light on the ways in which it takes place.

The work of these autonomous learners in the classroom and at home is examined and related to the curricular framework in which it takes place. Can their teachers assess the originality of the work, or are they dazzled by a surface gloss which they can never achieve. Do the ways in which these students learn complement or clash with the assumptions of their teachers?

The use of a number of online services to support teachers is examined. These range from services which simply provide the equivalent of online worksheets, through those that support the teacher in the delivery of the curriculum by offering a highly diverse set of resources and student activities, to those that provide 'one-off' curriculum enrichment activities.

The research basis of this paper is a six-year longitudinal study at an 11-18 school of one thousand eight hundred students. The research investigated the impact of ownership of computers on work, learning styles and concepts of Mind on students and teachers.

Facilitating On-line Professional Development

Suzanne de Castell, Simon Fraser University
Jennifer Jenson, York University

In today's "knowledge economy," institutions of higher education struggle to keep up with the demands of lifelong learners, driven as these are by shifting economic and political conditions both nationally and globally. Significant among these new demands is the insistence that practicing teachers upgrade their technology skills in order better to implement and integrate computers in the classroom. This project seeks to articulate in greater depth and detail than any list of "best practices" can provide, a well-established professional development program for practicing teachers which makes use of both traditional and on-line delivery methods. Through a rich, fully elaborated study of a range of instructional forms (including on-line, classroom-based, workplace-based and peer mentorship methods) we seek to understand and specify what hinders and, most importantly, what enables learning and instruction in web-based environments.

In all the ways we have, in the past, understood alphabetic literacy as the keystone for affording in practice the rights affirmed in principle to education for all, it is necessary now to understand contemporary technological changes as these continue significantly to alter the terms and conditions of access to public educational goods. Although we know a good deal about the role, functions and uses, and forms of pedagogical support for traditional text-based literacy in the provision of educationally valued knowledge, we urgently require an up-dated conceptualization of functional literacies and their optimal development – one which is capable of taking seriously into account the impacts and implications of new learning technologies for information, communication and expression.

Despite the eagerness with which new media, computer technology and on-line delivery systems have been widely embraced across Canada, educational institutions have failed adequately to study the pedagogical conditions for attaining in practice what are too often merely presumed in principle to be actual educational efficacies and outcomes of e-learning technologies and resources. In the rush by postsecondary institutions to put courses on-line, we are only just now, post hoc, beginning to be critically attentive to research which examines educational outcomes of online learning and teaching (see, for example, Bonk, 1998; Bonk, Kirkley, Hara & Dennen, 2000; Owsten, 1997). Moreover, in light of increasing recognition of the actual inaccessibility of on-line instructional content to a range of "targeted" users (in this case, in service public-school teachers in university-based courses), forgotten have been familiar – and essential – educational questions. Primary among these is the question central to our own research: when it comes to on-line learning, what *kind* of help helps?

As a result of the omission of critical questions about curriculum and instruction in online learning research, what works to facilitate learning with web-based tools and resources is largely not known or when it is purportedly known, "best practices" (Jenson & Lewis, 2001) are unproblematically generalized from case studies which are in fact small-scale, subject/context specific, and of short duration. This means that much of the research currently available on web-based learning is little more than a "snap shot" of a single course which has been placed on-line.

The purpose of the research described in this paper is to improve the teaching of fundamental technology skills and knowledge by advancing our understanding of optimal uses of technology in education, in both curricular and pedagogical terms, in online, face-to-face, and mixed mode environments. The issues which drive this work, accordingly, are those which have largely been ignored in the competitive rush by universities to offer courses online: (1) the design of research-based, custom-built yet scalable, user/community-specific and context-specific curriculum (and not merely the "adaptation" of existing generic course content to web-based, most typically template-driven forms) (2) identification and evaluation of the full range of potential pedagogical supports for in-line learners, especially users new to learning in this medium, and (3) a persisting obstacle to sustainability of technology implementation in education: identifying conditions which facilitate the effective practical application and transfer of knowledge by and among teachers, both within and across the school as a workplace.

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A Review of Impediments to Distance Education on the Learner Part

Muhammet Demirbilek
Ph.D. Student
Educational Technology Program
University of Florida
United States
mdbilek@grove.ufl.edu

Sebnem Cilesiz
Ph.D. Student
Educational Technology Program
University of Florida
United States
cilesiz@grove.ufl.edu

Abstract: This paper is a review of literature on the impediments to distance education on the learners' part. The authors believe that an understanding of the impediments to distance education on the learners' part will help teachers from at all levels (preservice, inservice, higher education) not only to set more realistic expectations from students but also to design their distance courses in a way that meets the learners' needs. Distance education is identified as "student centered" by many researchers and thus much of the research in distance education is from students' perspective. The distance education literature presents various barriers to distance learning from the students' perspective. The authors review these barriers and present them under six categories: the learner's comfort level with technology, technical shortage, level of interaction, the level of learner's psychological readiness, cultural/individual characteristics, and environmental factors.

Introduction

This paper is a review of literature on the impediments to distance education on the learners' part. The primitive form of distance education was correspondence. Since then, the form of distance learning has become more sophisticated with the use of communication technologies, including satellites, telephones, cable-television systems, computers and the Internet. The definition of distance learning in the US Department of Education glossary is " the use of telecommunications technologies, including satellites, telephones, The Internet and cable-television systems, to broadcast instruction from one central site to one or more remote locations."[1]

Although learning at a distance has existed for several decades, both the characteristics and the medium of distance education have dramatically changed due to technological advances. Educators encounter new teaching methods and forms to serve a diverse student population. In distance education teachers have different roles than they do in traditional education. In addition, there are numerous obstacles to successful distance education. Some of them are new, but many of them have existed since distance education was born (Berge, Muilenburg, 2000).

We believe that an understanding of the impediments to distance education on the learners' part will help teachers at all levels (preservice, inservice, higher education) not only to set more realistic expectations for students but also to design their distance courses in a way that meets the learners' needs. Wood (1996) and Galusha (1997) imply that knowing student characteristics and demographics helps distance teachers understand potential barriers to success and allow them to plan distance education in order to optimize student performance, retention, success, and potential barriers to learning.

Distance education is identified as "student centered" by many researchers. Therefore, much of the research in distance education is from students' perspective. Many researchers present various barriers to distance learning from the students' perspective. The author of this paper reviews these barriers and presents them under six categories: the learner's comfort level with technology, technical shortage, level of interaction, the level of learner's psychological readiness, cultural/individual characteristics, and environmental factors.

The first category, comfort level, refers to the learner's lack of technical literacy to be able to use the course media, negative attitudes toward technology, and lack of training or support from the educators.

The second category, technical shortage, includes the requirement of course materials that are cost-prohibitive for the learner, poor online connections, shortage of software, platform dependent media, and inaccessibility of materials such as extensive graphics.

The level of interaction refers to the learner-teacher and learner-learner interactions. Feeling isolated and "faceless teaching" (minimal feedback from the teacher) are the barriers in this category.

The level of the learner's psychological readiness includes barriers such as lack of motivation, resistance to change, lack of time management skills and discipline, weak goal commitment, lack of orientation, and fear of failure.

Cultural/individual characteristics refer to cultural differences, e.g. the learner's awareness of teacher expectations, the learner's disabilities that keep him/her from meeting the course requirements, language barriers across cultures, time zone differences, and learner's lack of prerequisite knowledge on course content.

Environmental factors include lack of family support, lack of peer support, lack of time, noisy study environment, changes at work, unexpected responsibilities at work, and family problems.

Literature Review

Removing the barriers created by institutions is crucial especially in reaching adult learners, learners in rural areas, and learners with employment restrictions or physical limitations (Machtmes, Asher, 2000).

Galusha (1997) classifies barriers as student, faculty, and organizational barriers in distance learning. Garland (1993) classifies obstacles to distance learning as situational, institutional, epistemological dispositional obstacles to distance learning. Garland (1993) suggests that situational and dispositional barriers are related to learners' life situation, psychological and sociological personality such as attitudes, confidence, learning style, and motivation.

In the reviewed literature barriers to distance learning on the learner's part were identified as follows: Lack of learner training, "faceless" teaching, lack of learner motivation, poor online connection, extensive graphics, cultural differences, lack of interaction, feeling isolation, lack of technical literacy, resistance to change, lack of time management skills and discipline, lack of family support, lack of peer support, lack of time, stress, poor grades, weak goal commitment, fear of failure, lack of prerequisite knowledge about course content, noisy study environment, lack of orientation, environmental conditions, illness, family problems, changes at work, unexpected responsibilities at work, information overload, language barriers across cultures, fear of technology, fear of foreseeable replacement of faculty, high cost materials, lack of support service, and resistance to change (Brown, 1996; Wood, 1996; Galusha,1997; Truman, 1995; Berge, 1998; Lehman, 1998; O'Toole, 1999; Whitworth, 1999; Berge, Muilenburg, 2000; Palloff, Pratt 2001; Muilenburg, Berge, 2001).

Learners' Comfort Level

"A feeling of alienation and isolation" was an obstacle reported by distance learners (Galusha, 1997). Whitworth (1999) states that in a learning situation in which the instructor is not physically present, both the students and instructors feel isolated from each other. Lack of motivation is one of the obstacles for distance learner. Obsborn's (2001) and Garland's (1993) studies show that learners who have lower motivation are at risk students in distance education. Truman (1995) states that lack of time management skills and discipline are obvious barriers for distance learners. The learner's "resistance to innovation" is also an obstacle in distance education (Berge, 1998).

Technical and Support Service Shortage

Inappropriate tutorial assistance and having difficulty in reaching tutors are obstacles for a distance learner (Garland, 1993). These barriers can be a psychological problem for some students who are hesitant to initiate contact with others. Galusha (1997), Berge&Muilenburg (2000) state that the lack of support, services such as providing tutors, academic planners and schedulers, and lack of technical assistance are obstacles for distance learner.

Another obstacle observed often with distance learners is a lack of suitable study materials for distance students. Wood (1996) notes that study materials must take into account the significant portion of students who enroll with little or no experience of in distance learning. These students are at risk of dropping out unless they develop study survival skills as rapidly as possible (Wood, 1996). Lack of training is another obstacle for the distance learner. Galusha (1997) and Palloff&Pratt (2001) note that if clear guidelines are not presented, the distance learner can be confused and disorganized and the learning process will suffer. Berge (1998) concludes that the most critical obstacles reported in the survey that he conducted were resistance to and fear of changes, and lack of access to resources and people.

Level of Interaction

O'Toole (1999) explains that studies emphasize that student-teacher contact is critical to the success of the distance learning process. Galusha (1997) and Garland (1993) state that perception of poor or timeless feedback and lack of communication with the teacher are main obstacles for the distance learner. Rumbe (2000) summarizes that learners without support are likely to delay completion of a program or dropout. A lack of frequent feedback was defined an often encountered obstacle by O'Toole (1999).

Level of Learner's Psychological Readiness

Distance learners often feel lack of confidence in terms of learning. Galusha (1997) defines that lack of confidence is founded in individual and institution-related issues such as financial cost of study, disruption of family life, perceived irrelevance of their studies, lack of support from employers, insufficient support from tutors, course too time consuming, difficult in contacting tutors, change of employment, fees being too high, and feeling isolated. Insecurities often result in higher discontinuation rates among distance learners (Brown, 1996). In addition, lack of clear goals, the stress of multiple roles, learning style problems, adult pride, lack of prerequisite knowledge, lack of content knowledge are shown as barriers for distance learner in Garland's (1993) study.

Cultural, Geographical and Individual Characteristics

Geographical isolation has been identified as one of the major barriers for the distance learner. Galusha (1997) notes that contacting academic and administrative staff, obtaining study materials, and borrowing library books are major geographical problems for distance learner). A study from Wood (1996) shows that this may lead to feelings of inadequacy and insecurity, and a lack of confidence in distance learners' own abilities. O'Toole states that the learner's cultural background is an obstacle often encountered.

Environmental Factors

A poor learning environment, such as lack of family and peer support, is one of the obstacles for the distance learner as well as the traditional learner (Garland, 1993). The learning environment is critical for adults who have a lack of self-confidence. Garland (1993) classifies situational barriers as poor learning environment, lack of support from family or peers, and uncomfortable study environment.

Discussion

The dramatic growth of distance education courses and the size of the adult learner population bring problems that require great attention by both distance educators and administrators.

We believe that the discussed barriers have various sources, yet some of them interact with each other. Some barriers create others, or some barriers strengthen each others' effects. Thus, a distance teacher should be aware of all existent and potential barriers a student may have in order to design the course accordingly. We suggest that each distance course should begin with barrier inventories. Understanding real and perceived barriers on the learner's part to effective distance learning and teaching may help to find the best ways to overcome obstacles. Without knowing the barriers, it is not possible for distance learners to effectively learn. There is no doubt that the fewer barriers there are to distance learning, the more learning and learner satisfaction there will be.

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Reaching Teachers through Distance Education

Mary C. Enderson
Department of Mathematical Sciences
Middle Tennessee State University, USA
mcenders@mtsu.edu

Abstract: This paper addresses how one institution makes use of distance education to offer mathematics and mathematics education courses in its Master of Science in Teaching Program. The courses are offered through a compressed video format where there is two-way communication and interaction with students and faculty. Providing courses in this manner has proven to be quite successful for students on campus as well as those off campus (at the remote sites). It has also been found that students who are at the remote sites perform just as well, if not better, than those on site.

Brief overview of Distance Education

Distance education, a term that may be interpreted in a number of ways, basically means offering courses/classes via an electronic medium. The method of delivery – audio, video, email, tele-conferencing, video conferencing, web-based – is often what varies from one situation to the next. While such learning environments may appear different than the traditional classroom, the interactions and learning that occur are just as powerful.

The United States Distance Learning Association (USDLA) has reported on studies that have been quite consistent in finding that distance learning classrooms show similar effectiveness results as those reported under traditional instruction methods. Additionally, studies often point out that student attitudes about distance learning are generally positive (USDLA, 2001). With such factors at the forefront, one program, the Master of Science in Teaching (MST) Mathematics, has been quite successful in offering courses through a compressed video (video conferencing) format for mathematics teachers or teachers who have an interest in mathematics. In what follows, I present some of the factors that influence how courses are offered in this program, how faculty support has provided such courses for students, and how students have operated successfully in such learning environments.

A Master's Program in Mathematics Education by Way of Distance Education

The USDLA has reported that distance learning must be an important aspect of higher education due to its timely and cost-effective means of continuing education and lifelong learning. It also elucidates that it is imperative in today's society to bring together learners from widespread locations for live interactions and relationships. With the aid of a video classroom designed with two-way communication, the MST mathematics program at Middle Tennessee State University (MTSU) has been able to accomplish this. The program has allowed a number of teachers in the rural middle Tennessee area to complete graduate studies in the area of mathematics by providing courses through a video conferencing format. The "on-sight" classroom is the central location for courses where the instructor delivers the course. There may be students on sight who are able to come to the campus to take courses, where other students are off campus. There may be anywhere from one to five remote broadcast sites that have off campus classrooms for students to meet at for specific course times throughout the semester.

Preparing courses offered by distance education is a major undertaking that many faculty or instructors are not well aware of until the process begins. One study, conducted by the NEA (2000), found the following:

- Over half (53%) of distance learning faculty spend more hours per week preparing and delivering their distance education course than they do for a comparable traditional course.
- Those faculty who have taught the distance education course eight or more times, spend more hours (48%) rather than fewer hours (21%) on their course.
- Most faculty (84%) do not receive course reduction or compensation for teaching a distance education course.

These points bring out that fact that while offering courses through this manner are important in reaching a greater number of students, faculty who prepare such courses are often having to commit a great deal more of their time to present such courses. The Higher Education Program and Policy Council of AFT (2001) found that some faculty

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spend anywhere from 66% to 500% more time in their course preparation. This often is a major point for "newcomers" not joining the ranks that teach via distance education.

An important part of preparing a course is making decisions on how to involve students in the course – particularly those at the remote or off campus sites. *Best Practices for Electronically Offered Degree and Certificate Programs* (2001) addresses the importance of developing a rich interaction between instructor and students and among students in the design of a program and its courses. Several points mentioned in this document have been confronted by instructors and individuals involved in the MST program at MTSU. Such issues include: (1) assurance of appropriate interaction, (2) instructor response to assignments and other coursework, (3) technologies used for interactions (e.g.: email, telephone office hours, voicemail, fax, classroom discussions by video), and (4) measurement of the success of course interactions. MST mathematics faculty have been able to meet such demands due to the method of delivery adopted for the courses. The video conferencing method allows two-way communication with visual images of individuals who have spoken. Thus, all classrooms are equipped with television monitors and microphones for this to occur. Prior to class meeting times, faculty have materials (in-class assignments, returned homework or graded assignments) delivered to the respective sites for students as well as setting up other means for them to receive needed materials (e.g., email, readings/documents obtained from the web). Once a course begins, students are prepared to be involved in the course in much the same way they would a traditional course. Each site is equipped with an overhead projection device for sharing or presenting materials as well as select sites having a computer station for using software such as PowerPoint and a connection to the Internet. Students are to ask questions or to share points of discussion – both of which are vital to the success of the remote sites. Even though all students are not physically in the same classroom, they can operate like they are in the same place with the video and audio features. While most courses meet regularly throughout the semester at the various sites, mathematics faculty teaching the courses often make a point of scheduling one to two Saturday class sessions where all students come on campus for class.

One might think that students "learning" how to exist in a distance education situation would be difficult. Instead, we have found the transition for students to be rather easy. Once students get over the "shyness" of talking by use of a microphone and seeing themselves on the television monitors, the rest almost falls into place. The learning environment becomes one rather than many. This is crucial to students feeling like they are a part of a class as well as vital to the success of our courses in the master's program.

Hand-in-hand with student learning is student assessment. Since the student population described here is at the graduate level, they are expected to prepare and present work for the class – regardless of their location. All students are evaluated in the same manner and measure of course success is as challenging as that in a traditional classroom setting. Faculty involved in the distance education course offerings have found that this is an area that constantly needs to be revisited – especially in cases where testing occurs. Some agencies and organizations have documented that testing with qualified proctors at remote sites is often not available, and thus causes problems in obtaining accurate results.

Data collected from students involved in the MST distance education courses paints a success story, but also one much in line with the research on distance education. Findings indicate that students who are off campus perform just as well, if not better, than the students who are on campus. This is an important factor for continuing to offer such courses in this manner, as well as revising the presentation and delivery of such courses.

Offering courses through distance education is not just a "fad" in higher education. With the technological revolution upon us, we are faced with a means to make advanced studies available for more individuals. For one institution, MTSU, this avenue has helped support a number of teachers in improving their teaching and learning of mathematics, as well as maintaining a strong graduate program that continues to grow.

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Use of Asynchronous and Synchronous Conferencing Tools: Implications for Teacher Practice

Dr. Teresa Franklin
Instructional Technology-College of Education
Ohio University
USA
franklit@ohio.edu

Selma Vonderwell
Instructional Technology-College of Education
Ohio University
USA
koc@ohio.edu

Abstract: A comprehensive understanding of online learning, tools and instructor practices can contribute to a much-needed knowledge base for effective planning and implementation of successful learning. This paper presents the implications of facilitating asynchronous and synchronous tools on teacher practice. The instructors have taught and applied these tools in a *Technology Applications in Education* course in which one instructor used asynchronous discussion tools and a weekly student online journal in her undergraduate classes and the other instructor used asynchronous and synchronous tools in her online classes with undergraduate and graduate students.

Introduction

Developments in computer technologies have opened ways for the redesign of teaching and learning. Online education is a new area promising active, self-regulated and reflective learning. When properly designed, the online learning environment can promote collaborative learning; improve interaction and participation supporting learner-centered rather than teacher-centered learning. The use of asynchronous and synchronous discussion tools has gained attention due to their potential to provide rich learning experiences and interaction among students and instructors. These tools have commonly been used to enhance collaboration, critical thinking, knowledge building, to create learning communities and to provide a means for the online instructor to develop active learning environments.

Research and literature on asynchronous and synchronous discussion focus on discourse analysis, type and quantity of interaction among the participants, instructional strategies used when implementing these tools as well as the roles of the instructor and students (Ashton, Roberts & Teles, 1999). The question remains as to how does the use of asynchronous and synchronous tools change teacher practice in the online environment? Teacher practice in planning and implementing instructional strategies plays a significant role in online learning success. This paper presents the implications of facilitating asynchronous and synchronous tools on teacher practice.

The Study

The instructors applied asynchronous and synchronous tools in their *Technology Applications in Education* courses. Sections of *EDCI 203 Technology Applications in Education* or *EDCI 532 Technology Applications in Education* (graduate equivalent) are required of all students pursuing a degree in the College of Education at a Midwestern University. In the past, the courses have been offered in a traditional setting. In 1999, 2000, and 2001 a section of each was offered each quarter online due to increased enrollment demands. In hopes of developing a learning community, the instructors decided to use the asynchronous and synchronous tools provided by the University. The instructors felt that this might help to simulate the same discussion practices, collaboration, interaction and feedback often found in the traditional classroom and alleviate the concerns about building a classroom community. The discussion tools included as part of the course were synchronous chat (1999, 2000), discussion board (1999, 2000, 2001), listserv (1999, 2000, 2001), email (1999, 2000, 2001), and electronic journals (2001).

The participants from the courses were divided into three groups in which a qualitative case study method was used to examine each course as a complete data source. All asynchronous and synchronous tools were provided to all faculty at the university in the development of online courses. The software used by this university was CourseInfo 3.0'and Blackboard 5.0 (www.blackboard.com). The instructors continued to use Blackboard set of software tools provided by the university in order to maintain continuity of tools/software throughout the study. The participants were grouped in the following manner to create a coherent understanding of the differences among the groups:

- Group 1 participants were graduate inservice teachers and used the chat, email, listserv and discussion board as their asynchronous and synchronous.
- Group 2 participants were undergraduate preservice teachers and graduate inservice teachers. These participants used email, listserv and discussion board as asynchronous tools.
- Group 3 participants were undergraduate preservice teachers and used a virtual café, email, discussion board and electronic journals as their asynchronous and synchronous tools.

Data was collected from the following course sources: email between student and instructor, email between student and student when possible, chat archives, listserv archives, discussion board entries, and electronic journals. Data collection was ongoing and continued throughout the study. Instructors maintained a reflective journal of their concerns and changes during the courses as well. An examination of the chat, email, listserv, discussion board conversations and students' weekly online journals offered opportunities for the instructors to evaluate and reflect on their own practice. All sources were evaluated and coded for common themes.

In an examination of instructor practice the following activities were noted. With Group 1, the instructor used both asynchronous and synchronous tools in her class that included a discussion board, email, listserv and synchronous chat. Each week online office hours were held in which students could chat with the instructor and ask questions concerning course work and other concerns. Part of the online office hours were set aside for individual conferences and other times were for open discussion in the class or team discussions. Questions were posted to the asynchronous discussion board were used to check understanding and to encourage reflection and discussion of technology topics common to preservice and inservice teachers. Email attachments were used to turn in assignments or to ask for a critique of work in progress. A listserv was used to ask questions between the online chats or to distribute information that the whole class should see.

With Group 2, the instructor decided to not include the online chat in the development of the course due to access problems with the university software and technical server problems. The instructor continued with the use of the discussion board to check understanding and to discuss technology topics common to preservice and inservice teachers. The listserv took on a much greater role as it was used to discuss weekly concerns and team discussions. All communications were asynchronous in this term of the course.

With Group 3, the second instructor used the asynchronous discussion board and student online journals. The instructor created learning teams composed of three to five students. The discussion team size was kept small and students were put into similar or same specialization areas. The instructor had intended to create small learning communities in which students discuss and analyze issues and concerns that deal with their specialization areas in regards to technology integration. This instructor implemented an online journal to collect feedback and student reactions. *Minute Paper* format is an assessment technique to provide rapid feedback to the instructor (Cross & Angelo, 1988). Individual online journal areas were created for the students to give weekly feedback to the instructor's questions about the class and give suggestions in regards to what they are learning and the structure of the class.

Findings

The use asynchronous and synchronous tools in online learning have implications on teacher practice. These implications are pedagogical, social, managerial and technological. There were also differences found between graduate and undergraduate level concerning the implications of how they influenced teacher practice. When used appropriately, these tools can help the instructor to foster a learner-centered climate and allow the instructor to use a constructivist philosophy when interacting with students. Additionally, the teacher can facilitate these tools to check student progress and learning while continuous assessment and development of the course. However, as well as appropriate use of instructional strategies, online teaching requires a great deal of commitment on the part of the instructor.

Pedagogical Implications: Teaching online requires design decisions that are appropriate to online learning. The instructors intended to enrich their students' learning experiences through asynchronous and synchronous communication tools and to build a learning community model. Utilization of these tools were determined by the instructor's pedagogical values and goals as well as the technical and technological capacity of these tools provided within the CourseInfo and Blackboard and other technology services at the University. The instructors made deliberate decisions on how to use these tools, how to provide feedback to the student(s) and how to obtain feedback from student(s).

When discussing the development of the courses and the use of the discussion thread the instructor of Group 1 and Group 2 had the following comments:

> *While the undergraduates prefer to work in groups and correspond with those in their majors, the graduate students want to hear and read everyone's answers it seems. I had originally thought that I would have everyone in small groups but the graduates complained that they wanted to know what the whole class thought about different discussion questions. While the undergraduates seemed content to be isolated, the graduates want to read everythihng.*

The Group 3 instructor put in her reflective journal when deciding upon the use of threaded discussions these statements:

> *I could have just created discussion questions for the whole class, but I thought by creating small groups that specialize in the same area, students are going to write issues that deal directly with their majors and they can learn from each other. I also would like to create a small learning community which they will share information with each other and ask questions to each other. The other reason I created small group areas is that when the data is too much to read as in the case the whole class posting info, this will create information overload and students will not tend to read each other's responses. In my previous [face-to-face] dass, I observed that students simply answered the questions. However, this could be just an assumption. The amount of interaction that might happen may depend on the type of the questions asked, the amount of moderation provided by the instructor.*

Discussion questions and weekly online journals provided ways for the instructors to get feedback from the students' and check student learning and progress. Instructors incorporated activities that emerged from student discussions and journal writings. For example, Group 3 instructor created a Frequently Asked Questions Area to answer student questions that emerged from student online journals and a Virtual Café where students can ask questions to each other and collaborated. Students offered suggestions and instructional tips in their journal writings.

Another implication of the online journal was that the format of the questions changed after the fifth week due to the feedback from the students. The students were initially asked to write what they have learned, what is remaining that they haven't learned and if they have any suggestions for the instructor. The students told the instructor that they were tired of answering the same questions. The instructor changed the questions to questions that dealt more directly with integration of technology. This allowed students to reflect on the issue of how they could integrate technology into their teaching rather than focusing on technical skills.

Implications for Management: The Group 3 instructor aimed to create collaboration among students in each undergraduate learning team. Three of the discussion questions required each undergraduate team member to be either an editor or a judge. Each time one of the team members gathered the information other team members posted and edited those and create a technology poster or list the issues pertaining to the matter in hand. This created quite a confusion among the students. They were confused about how to handle collaboration online. One student wrote in her online journal:

> *The only difficulty that I have had this week is about the discussion board question. It seems rather hard to talk with the group. We are all pretty busy and it is difficult to actually write this paper over the Internet without physically seeing one another.*

The instructor received several emails or phone calls in regards to how the students were to do their editorial tasks. After the first initiative, the instructor had to revise the questions and redesign to simplify the tasks of the students. Another challenge for the instructor was to have the students respond to the discussion questions and to remember to write their online journals. The instructor initially had planned to use eight discussion questions spread to ten weeks during the quarter; however, it was decided to keep it at six since the students were getting overload by the discussion questions.

Social Implications: The instructors tried to create a friendly social environment in which students could ask questions to the instructor and to each other. Teacher presence, concern and acknowledgement of students are important aspects for creating a learner-centered environment. One of the strategies used was to email students for progress check in a friendly manner. They asked students how they are doing and how the class is going for them even if the students did not ask any questions. Bonk, et. al. (2000) suggests that social actions such as instructor empathy, interpersonal outreach (e.g., welcoming statements, invitations, and apologies), discussion of one's own online experiences, and humor can help foster a learner-centered climate.

Group 3 instructor used the online student journals to interact with the students as well as checking student progress and learning. It was observed that the students used the online journal as a way to connect with the instructor. Instead of emailing the instructor they asked their questions or made comments to the instructor within their online journal areas. The Group 1 and 2 instructor used the chat, email, and listserv to make student inquiry about student concerns and class issues. Students indicated on the course evaluations that the chat was the most interesting and had helped students connect to the instructor in a personal way.

Technological Implications: *The technology available, specifically the course management software had enormous implications on teacher practice. For example, the instructors had to post each discussion question to each learning team one by one. Also, the online journals had to be created individually one by one. This required the instructor to spend a great deal of time. The variety of levels within the software created the need to take more time in moving among the various parts of the software.*

Implications of Educational Level Dfferences: In examining the use of the different synchronous and asynchronous tools the instructors found the some interesting differences concerning not only the tools, but whether the participants were graduate or undergraduate students. Concerning the educational levels of the students, the instructors found that undergraduate preservice teachers approached the use of technology and coursework in very different ways. By in large the graduate inservice teacher asked more questions of the instructor in fact almost 2.5 more inquiries were made on assignments and critiques of work. The graduate inservice teachers were more likely to return to the synchronous discussion board and respond to each other's responses to the questions than the undergraduate preservice teachers. The graduate inservice teachers would ask each other for help by use of the listserv often posting questions of the following nature,

> *[Graduate inservice teacher to the listserv] Does anyone have an idea why my printer is not working? It keeps printing only the bottom half of the words. I have replaced the print cartridges and paper....and reset everything, HELP!*
>
> *[Graduate inservice teacher to the listserv] What software is everyone using to complete assignment #7? Can someone tell me what she really wants us to do?*

Not a single listserv question from the undergraduate inservice teacher ever asked a question of the whole class although they were encouraged many times to do so. The undergraduate preservice teachers would ask the instructor for individual help through personal emails.

The listserv was often used by the instructor of Group 1 and Group 2 to remind the students of upcoming deadlines. This often sparked a flurry of questions from the graduate inservice teachers and a sudden rush of assignments being sent. At times, it seemed that the reminders were the main prompts for questions and comments to the instructor by the graduate inservice teachers. They were very interested in asking fellow teachers about how they would handle an assignment.

This same attitude was also used in the asynchronous chat by the graduate inservice teachers. While the instructor would often begin the discussion or questions on the asynchronous chat, after about 10 minutes, the instructor found that the teachers would begin to ask each other questions and make comments about their teaching methods, schools, students and technology and only looked to the instructor for confirmation or another point of view. The chat was extremely lively with teachers [they did not know each other] discussing classroom issues as though they had known each other for years. Teachers would come in and out of the chat often leaving to take children to events and returning. The instructor began to have less and less of a role in the chat during office hours as the graduate inservice teachers took the lead in questioning and discussion.

With Group 2, the use of the listserv with the undergraduates had a very different outcome than was seen with the graduate inservice teachers. Seven of the sixteen undergraduate preservice teachers sent a message similar to the one below,

> *Dr. [Instructor], I have a syllabus and the assignment list with the dates things are due. Please do not send me anymore emails about when things are due. I can read the assignment list.*
>
> *I have a list of when the papers are due. Don't email me about this.*

Quite surprised by these statements, the instructor promptly made a note that the seven students did not want to be reminded of when assignments should be completed and removed them from the distribution list.

Conclusions

Graduates and undergraduate behave differently in the online environment. This behavior affects the way the instructor presents and distributes information. While the course content remains the same, the methods used to encourage students to participate and develop an online community must be carefully crafted to meet the characteristics of the online student. While the instructors had expected that the undergraduates would be very used to the online environment and chat or participate in discussions easily, that was not always the case. The undergraduates were more interested in finishing the course to meet a graduation requirement than participating in meaningful discussion for the most part.

In this paper, we attempted to describe the implications of asynchronous and synchronous conferencing tools in online learning on teacher practice. Online teachers need to be committed to be available to respond to students' questions and concerns and make the means for them to engage in meaningful learning. The teachers need to continuously check student progress as well as how they are doing while teaching online. Teacher presence is an importance issue for the students to feel they are not alone and everybody is a part of the learning process.

Online teaching is not simply posting assignments and discussion questions. It requires extensive planning and structuring and time. Online instructors need to be aware of the strategies and activities they can use with asynchronous and synchronous conferencing tools to engage students in active learning and to provide and receive constructive feedback.

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Title: Critical Issues in Distance Education
Type: Panel
Panel Members: Thomas Frizelle- graduate student, Jesse Drew – graduate school, Sara Rinkleff – graduate student

The purpose of this panel is to discuss relevant critical issues in Distance Education. Critical issues reach far beyond personal experiences and educational systems. For this reason, the panel will be composed of visiting scholars and Iowa State University graduate students. We hope to provide a diverse and international perspective on critical issues related to distance education.

What are some of the advantages and disadvantages associated with the increased offering of Distance Education classes? During our time we plan to focus on several salient issues related distance education: student learning outcomes, motivational issues, pedagogical considerations and instructors intellectual rights. Our panel will present qualitative and quantitative research and offer questions for reflection.

We hope to increase understanding and awareness with other IT professionals concerning the above critical issues in distance education. As instructional technologists, we are faced with a daunting task, which has an awesome responsibility associated with it: how to create educationally meaningful learning experiences for students using technology responsibly. As with any new technology, it is long after a technology has been introduced that it either reaches its full potential or falls to the wayside. We firmly believe that distance education, and other technologies, have not been fully explored and refined. It is difficult to speculate when and how this epiphany will come about. One thing is certain, instructional technologists must be cognizant of both the changes in practice and more importantly the changes in values which distance education and other technologies bring to a culture.

Faculty Attitudes Towards Distance Education: Enhancing the Support and Rewards System for Innovative Integration of Technology Within Coursework

Ruth Gannon-Cook
University of Houston
United States of America
gannoncook@cl.uh.edu

Caroline M. Crawford
University of Houston-Clear Lake
United States of America
crawford@cl.uh.edu

Abstract: Distance education is an area of rapid growth at the university level, especially within the colleges, schools and departments of education (National Center for Education Statistics, 1999; United States Distance Learning Association, 2000). However, there are some faculty who are not jumping on the bandwagon and are taking a more conservative route towards considering the impact of distance education within their courses attitudes towards distance education: early innovators; hangers-on (late adopters); and, negative withholders (resistors) (Robinson, 1996). Each of these groups have concern not only for their students and the appropriate learning environment for their subject matter expertise, but also a concern towards the university rewards system.

Introduction

Since faculty members are key ingredients to both creating and teaching distance education courses, there is a need for research concerning faculty perceptions about distance education, and which factors could influence faculty participation. As postsecondary institutions expand distance education courses, it will become even more important to determine what motivates and inhibits faculty to participate in distance education.

The survey in this study originally consisted of several studies combined into the original survey and validated by Dr. Kristin Betts at George Washington University (Betts, 1998; Hunt & Crawford, 1999). This survey differed, however, in the dissemination of the surveys by sending the surveys to faculty electronically, using email listservs, and by establishing an Internet website to collect and gather data from respondents. Through the adaptation of the surveys to an electronic format, the study had the opportunity to provide the participants with electronic surveys, tools that reflected the technology of the study.

Rewards System

The rewards system, both written and unwritten, are of primary importance to faculty and their attitudes towards distance education. Types of rewards may also play an important part in how faculty responds to using and integrating technology into their courses. So, while part of the concerns of faculty may be due to the time and energy required to focus upon the instructional design process (analysis, design, development, implementation, and evaluation), other concerns that may have stronger effects upon faculty members' efforts may be going overlooked, reasons like tenure consideration and the efforts expended incorporating technology that are often overlooked in designation of tenure.

As is well known, each of the three aspects leading to tenure are of utmost importance, teaching, research and service, with the research, publication and grant writing elements being highly prized. The instructional design process that must be focused upon distance education takes valuable time and energy away from the traditional rewards system and, therefore, is of concern to both tenured and untenured faculty. A thoughtful revamping of the university rewards system concerning innovations and instructional design concerning distance education elements integrated into university coursework must be considered. A focus upon faculty attitudes towards distance education, the traditional rewards systems concerning tenure-focused faculty, considerations towards revising university rewards systems concerning tenure-focused faculty, and how innovative technological integration within university coursework may be rewarded within the university rewards system are addressed. Mixed research methods were used, incorporating both quantitative and qualitative data obtained from a dissertation survey conducted at a large urban southwestern university by one of the researchers in this study.

Faculty Motivation and Distance Education

The dissertation data used in this study divided the data into two categories of faculty motivation: internal and external, to see which motivators encouraged or inhibited faculty member's use of distance education. Internal motivators included encouragement, team spirit, and collaboration. External motivators included tenure consideration, merit raises, compensatory time, and other types of external rewards.

This research study surveyed faculty to determine if factors such as academic division (school or college), age, gender, tenure-track and non-tenure-track status influence faculty participation in distance education. The study also examined whether other factors might motivate faculty members to participate in distance education or inhibit/deter faculty members from participating in distance education.

Research on motivation indicated that currently many universities uphold a "public relations" approach to participation by administration and faculty, or a top-down management style of information dissemination to faculty (Paul, 2000; Stribiak & Paul, 1998). This type of management style attempts to appeal to the intrinsic motivators to faculty members, but can create hygiene (negative) factors that can inhibit authentic participation (Herzberg, 1986). The "public relations" approach maintains: one-way communications; the status quo for existing arrangements; defining the citizen/employee as dependent consumer; and defining the educator as an autonomous professional (Anderson, p.576). Administrative interest in the needs of faculty and efforts to assist faculty and meet those needs could be helpful in establishing a precedent of administrative collaboration with faculty (Gannon Cook, 2000). Authentic participation consisting of positive rewards, collaboration and team building could then build upon the foundation of collaboration and trust established with administration and faculty.

Distance Education

Distance education operationally defined for the purpose of this paper is "a planned teaching/learning experience that can incorporate a wide spectrum of technologies to reach learners at a distance and encourage learner interaction (GannonCook, 2001)." Distance education can be taught: in face-to-face (f2f) formats at remote sites; in instructional telecommunication formats; using computer-based technology, like the Internet, listserv(s), e-mail, cable TV, interactive CD-ROM programs; using other technology like telephones, faxes, videotapes, audiotapes; or using little or no technology at remote sites (Gannon Cook, 2000)."

Authentic Participation

Authentic participation can go a long way towards engaging and retaining faculty because if they know the commitment is there and is evidenced by multiple examples of what the administration is willing to do, the faculty members will be more willing to meet them somewhere between the extremes of each side. By demonstrating the support of the administration, by nurturing activities, and by providing a venue for faculty voice, the faculty knows that authentic participation is really taking place and is not mere rhetoric. But extrinsic motivators have a growing influence on faculty members, particularly with respect to the use of distance education. Tenure consideration had a top priority to those faculty members still in contention for tenure status. Other motivators like increased salaries, monetary stipends, and compensatory time, all contributed to the increased motivation of faculty members participating in the survey (Gannon Cook, 2001).

Future Trends

The trend of institutions offering DE courses will continue to expand due to increased consumer demand and cost-efficiencies offered by this type of course delivery. The review of literature revealed that factors that most influenced faculty to participate in the creation and instruction of distance education hinged on motivation, both external and internal. Many faculty already carry full or overload teaching and administrative workloads, so it is difficult to persuade them to carry additional work for distance education courses without some type of external compensation (Gannon Cook, 2000). External compensation for faculty could include additional money stipends, royalties, course releases, tenure consideration and faculty voice in decision making-policies. Recent studies suggest that, while internal motivation can be inspired, particularly by department chairpersons and deans who have taught distance education courses, and can be inspired by participating in design teams, the pride of accomplishment often does not sustain continued distance education instruction without the reinforcement of some type of external motivation.

Conclusion

While there are still many challenges and issues to designing and offering distance education courses, it seems unlikely that the trend for distance education will abate at any time in the foreseeable future. The research on faculty motivation and which factors can influence participation in distance education will become increasingly more important as the demand for these courses continues to burgeon. Future research is recommended in order to track trends and to gather new data pertaining to faculty motivation and which factors influence participation or non-participation in distance education.

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Motivating Students with Interactive Web-based Learning

Tianguang Gao
Teachers College
Ball State University
United States
tgao@bsu.edu

Judy Lewandowski
CERIAS
Purdue University
United States
judyL@cerias.purdue.edu

Abstract: As a fastest growing branch of distance education, Web-based learning is attracting more and more people. Interaction is an important factor that affects the learning process. It not only affects the learning effectiveness, but also the learner's motivation. To investigate the learner's motivational perspective of web-based learning materials, a posttest-only experiment was performed. The results from the experiment showed that college students who went through web-based learning materials implemented with elaborated immediate feedback outperformed those who learned the material through the regular website in the IMMS test. The interview data also supported the above conclusion.

Introduction

The World Wide Web is attracting more and more people and increasingly used as a medium to deliver instructional materials. Web-based learning is becoming a fastest growing branch of distance education. Many courses have been developed and distributed through the web. However, a significant number of web-based courses are predominately designed to transmit information to the learner and lack interaction (Alessi & Trollip, 2001).

As an important factor that affects the learning process, interaction not only influences the learning effectiveness, but also affects the learner's motivation. In web-based learning environments, there are three types of interaction: students interact with instructors; students interact with other students; and students interact with the learning content (Moore, 1989). In the learning process, interaction can be used to confirm if the desired learning happens; provide inquiries asking for additional materials; navigate through the learning materials; and combine existing knowledge with new instructional content. Many means have been used for the first two types of interaction: email, listservs, chatrooms, bulletin boards, and audio and/or video conferencing. However, studies focusing on student-content interaction in web-base learning environments have not been found in the literature. Many strategies can be implemented into the learning materials to increase the interaction between the learner and the learning content and to motivate the student learning. One of them is to use immediate feedback. By integrating immediate feedback to the learning process, the web-based learning material becomes more interactive and motivates students' learning. This study investigated the motivational effects of elaborated immediate feedback in a web-based learning environment.

Study

In this posttest only experiment research, student's motivational perspective of web-based instructional materials was examined through an Instructional Material Motivation Survey (IMMS) (Keller, 1999). To have a deep understanding of learners' attitudes toward the learning materials, an interview was also conducted after the learner finished the experiment. The subjects in the study were college students in various majors. The learning content is about copyright rules and principles, which is a very important topic for pre-service teachers. The control group went through the learning material presented in a regular website, which provided limited interaction between the learner and the learning content. The experimental group went through the learning material presented in a website which integrated elaborated immediate feedback strategy. In this group, the learner could interact more with the learning content by following the provided feedback information.

Findings

The data collected through the IMMS and interview were analyzed with statistical procedures. The results showed that students in the experimental group outperformed those in the control group in the overall IMMS test. The ANOVA test indicated that the difference between the two groups was statistically significant. The analysis of the four subcategories of IMMS also indicated that the learning material embedded with elaborated immediate feedback was more attractive, and the students in the experiment group felt more satisfied with their learning. The data from the interview also supported the above conclusion. All the interviewed students expressed very positive attitudes toward the embedded immediate feedback strategy. They thought that strategy motivated their learning, provided helpful information to lead them to review their learning, and reinforced what they learned. Therefore, it can be concluded that immediate feedback can motivate students' learning in the web-based learning environment.

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Semantic Knowledge Factory: A New Way of Cognition Improvement for the Knowledge Management Process

Victor Manuel García Barrios
Institute for Information Processing and Computer supported new Media (IICM)
Graz University of Technology, Austria
vgarcia@iicm.edu

Christian Gütl
Institute for Information Processing and Computer supported new Media (IICM)
Infodelio Information Systems, Graz, Austria
GÜTL IT Research & Consulting, Graz, Austria
cguetl@infodelio.com

Maja Pivec
Information Design
University of Applied Sciences Graz, Austria
maja.pivec@fh-joanneum.at

Abstract: The goal of the novel tool HERMA (enHanced E-learning Repository MAnager) is to improve the efficiency of the knowledge transfer process in web-based learning environments. The mechanism enables users to improve adaptive courseware enlargement and it supports the dynamic retrieval of the content, its presentation and navigation. Based on self-defined semantic parameters, which describe course and user specific factors, it generates dynamically context dependent, user relevant and always automatically updated background knowledge that relies outside the static repository by applying a smart search framework. HERMA places this dynamically generated background knowledge at the disposal of learners across distinct viewing modes while navigating through the courseware. In addition, HERMA may improve the process of course generation and maintenance. In our first application, HERMA is integrated in the Hyperwave eLearning Suite and interacts with the smart search framework xFIND.

Motivation

At the IICM we had long-term experiences in the fields of web based learning systems, for example (Dietinger et al. 1998b), hypermedia management systems like (Hyperwave 2001), dynamic background libraries, as stated in (Dietinger et al. 1998a), and knowledge discovery, as with (xFIND 2001). The praxis showed that within the learning process the sole application of a static course repository is not sufficient. This led us to propose that one of the key issues of modern web based learning systems is to reach a dynamically enhanced knowledge transfer.

The knowledge transfer process could be interpreted as a holistic phenomenon composed of two, mostly overlapping but essentially different, main streams: a) the teaching process, which concerns knowledge generation and delivery, and b) the learning process, which concerns knowledge acquisition. A wide range of problems caused by a huge and an increasing amount of information as well as by rapid changing knowledge are faced within both processes. A selection of those problems is discussed as follows.

Knowledge in virtually any subject is a dynamic entity itself. According to (Lymann et al. 2001) each year a dramatic amount of 1.5 EByte of unique information is produced worldwide. Course authors and learners have to keep up with permanently increasing and changing knowledge. Thus, a mechanism should be given to support trainers in gathering new knowledge and tracking the modifications. Learners should get informed dynamically of this up-to-date background knowledge during their learning process.

Another problem is that nested hyperlinks in static documents often lead to no longer reachable resources. A survey of hyperlink sources in research papers has shown, that some 20-30% become invalid links within one year (Lawrence et al. 2001). Thus, the delivery of content with embedded linkages should happen in a semantic and adaptive way. The system should provide an adaptive extension of the static repository for example by defining an itemized semantic-based background library. Furthermore, the system should ensure relevance, actuality and reliability of this background knowledge. This can be achieved by collaborating with a smart search framework, like xFIND.

The learning process is a not always predictable user dependent entity. Current systems provide distinct "adaptive" features to deliver user-tailored content. We propose that adaptive and goal-oriented knowledge generation and delivery should be supported in web based training systems in order to define semantic topic maps and to assign user expertise levels. This enhances the responsiveness of the system in order to reach a wider target audience. Our former experiences in user behavior within the learning process, as stated in (Pivec 2000), have endorsed that learners hold distinct learning methods. Some prefer to get informed of background knowledge directly within the content of the course, for example through embedded hyperlinks. Others prefer information at the end of each chapter, and so on. Thus, a mechanism to provide adaptive presentation alternatives for the dynamic background library should be enabled.

Furthermore, trainers should have the possibility to specify grouped topics that describe different background knowledge resources in accordance to the skills of learners. In addition, learners should get the freedom to define their own expertise level, to personalize their view of the dynamic background library and add their own sources of information.

Based on the motivations, facts and problems stated above we have set up a prototype implementation called 'HERMA'. The enHanced E-learning Repository MAnager HERMA may be seen as a smart dynamic background library that transparently monitors all the features to solve the problems described above. Thus, it improves most of the needs of trainers and learners within web based training systems. An optimized adaptability is reached due to its gradable features and its permanent presence through the entire knowledge transfer process.

State of the art

As Peter Brusilovsky stated in (Brusilovsky 1998), we advocate the criteria of assessing adaptability within web based training systems on dependence of the provided or absent adaptation technologies. A survey in the field of pre-existing learning environments as well as present research work led us to emphasize that current systems do not meet the needs of trainers and learners for adaptive technologies. Annotations, chat rooms, asynchronous messaging, dynamic navigation, personalized study spaces, courseware delivery platforms, curricula sequencing, progress tracking, static library and glossary, internal search functionality, virtual references, adaptive collaboration, meta descriptors, topic maps, metadata servers as well as self-assessment features represent only some of the existing modules interacting in current on-line learning environments. Nevertheless, problems arise after trainers have already published their courseware. At this point they have determined their strategy to reach a specific didactical goal. In order to reach different target audiences with various levels of expertise, they should have to enlarge the courseware physically on the system storage.

A similar problem could emerge during the course attendance, for example if enrolled learners are not able to manage the delivered knowledge in the expected time or manner. Because of that, we propose that courseware as well as additional background information (background library) have to be provided according to learners' needs. HERMA solves these problems by exploiting novel features that allow constant reconfiguration and personalization of courseware and dynamic background library.

The static knowledge repository is the basic element of on-line learning systems. Apart of representing a static collection of ready-to-use digital materials, it should integrate an adaptive complement for assisting trainers and courseware authors while developing, presenting and maintaining the courseware according to the needs of learners and to the dynamically changing knowledge. This should happen all the time, during the whole teaching and learning process.

HERMA enhances the goal-oriented knowledge transfer process by enabling the development of a dynamically indexed background library of subject-relevant resources relying outside the static repository. Trainers may determine, after creating its static courseware, a set of topics referring to accurately described resources on the Internet. Relevance, actuality and access of this background knowledge are maintained with the collaboration of the smart search framework xFIND.

The Basic Idea

The basic functionality schema of HERMA, as shown in (Fig. 1), depicts the different interaction layers and its dependencies through the knowledge transfer process. Background knowledge relying on the Web is dynamically accessed via the smart search service xFIND (exploiting Quality Metadata) according to the predefined items in the Semantic Knowledge Factory 'HERMA'. These items are essentially defined within expertise level groups and assigned to one or more course chapters. Thus, depending on the selected viewing, the requested page is dynamically generated and contains a list of valid items. Clicking on a delivered item, in (Fig.1) symbolized by the arrow 'Activation', will lead to a search call of xFIND using the pre-stored item specific query term. The final result is a set of accurate, relevant, up-to-date documents.

From the point of view of the trainers, HERMA essentially provides an option for determining a set of topic specific items, which refer to a dynamically generated set of resources provided by xFIND. Each item belongs to a specific level of expertise, may be grouped with other items to a specific 'subject' collection, may have synonyms - which should be referenced in the same way as the topic itself -, and has a scope of validity within the courseware. From the point of view of the learners, HERMA provides the possibility of choosing its own level of expertise and one of four different viewing modes for displaying the currently valid elements while navigating through the courseware.

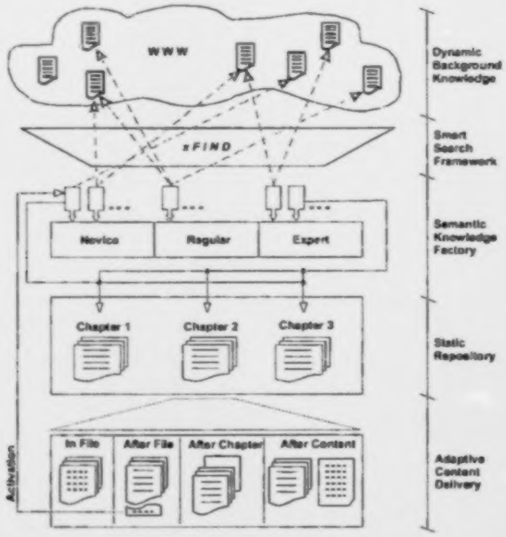

Figure 1. Basic Functionality Schema of HERMA

Prototype Implementation

The implementation of HERMA runs fully integrated in the Hyperwave eLearning Suite system, works hand-in-hand with its data base objects (courseware and users stored on the Hyperwave Information Server), and accesses background knowledge from the Internet intercommunicating with xFIND. When learners demand a page of the static repository, HERMA dynamically parses it applying a smart pattern matching mechanism. It remembers each valid occurrence of the predefined items and delivers the content according to the personalized learner settings. An item within HERMA is defined as a combination of: a) descriptive information about a topic, which is stored as an xFIND specific query term, and b) metadata about the meaning and validity scope of the topic definition within the training system.

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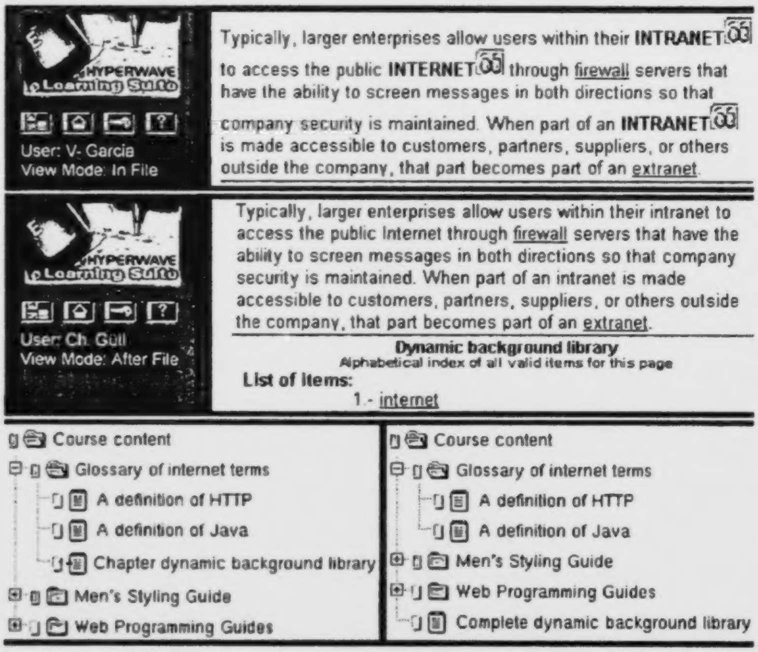
Trainers assign each item a user-specific expertise level. The name of the item is simultaneously the name of the Topic, for example 'Internet'. Some Topics may also be collected in self-defined superordinate sets called Subjects, for example 'Information Technologies'. After determining via (xFIND 2001) a satisfying list of accurate information from the Web, the xFIND specific query terms are stored within HERMA. These terms represent the semantic retrieval of background knowledge and ensure always up-to-date information from the Internet. Trainers define also the scope of validity for each Topic (one or a set of course chapters for which the topic is valid). A set of Synonyms corresponding to the Topic may also be defined, for example "Intranet". Thus, the presentation of the semantically itemized background knowledge depends on the intention of the trainers and on the personalized learner configuration.

Learners may not only choose an expertise level but also one of the four provided Viewing Modes that are shown in (Fig. 2) and explained as follows: a) Embedded hyperlinks: the content of the demanded page is parsed and modified dynamically depending on the current settings. Each match is highlighted and hyperlinked to a proper xFIND-specific search request. This is shown in (Fig. 2) by the word INTERNET and its Synonym INTRANET (identical hyperlink information stands behind the icons beside those terms). b) End of page: A list of the matching items is appended 'at the end' of the page. In the example of (Fig. 2) both, the topic Internet and its Synonym Intranet, were found. Therefore, the corresponding Topic name is contained in the List of items immediately after the content. c) End of chapter: single pages are not modified. At the end of each chapter a dynamically generated HTML page that contains an alphabetical list of the chapter and level-specific items is provided. d) End of course content: a dynamically generated HTML page with a list of all level specific items is attached at the end of the course.



User: V- Garcia
View Mode: In File

Typically, larger enterprises allow users within their **INTRANET** to access the public **INTERNET** through firewall servers that have the ability to screen messages in both directions so that company security is maintained. When part of an **INTRANET** is made accessible to customers, partners, suppliers, or others outside the company, that part becomes part of an extranet.

User: Ch. Güll
View Mode: After File

Typically, larger enterprises allow users within their intranet to access the public Internet through firewall servers that have the ability to screen messages in both directions so that company security is maintained. When part of an intranet is made accessible to customers, partners, suppliers, or others outside the company, that part becomes part of an extranet.

Dynamic background library
Alphabetical index of all valid items for this page
List of Items:
1.- internet

- Course content
  - Glossary of internet terms
    - A definition of HTTP
    - A definition of Java
    - Chapter dynamic background library
  - Men's Styling Guide
  - Web Programming Guides

- Course content
  - Glossary of internet terms
    - A definition of HTTP
    - A definition of Java
  - Men's Styling Guide
  - Web Programming Guides
  - Complete dynamic background library

Figure 2. Adaptive Presentation and Content Delivery with HERMA [Top: Embedded hyperlinks - Middle: End of page - Bottom Left: End of Chapter - Bottom Right: End of Course Content]

Conclusion

As shown through the paper, HERMA enhances dynamically the functionality of static repositories by providing smart features that improve accuracy, actuality and goal orientation of static courseware. The prototype implementation of HERMA has been successfully tested for the course

'Knowledge Management' at IICM, Graz University of Technology. Further research and development work will update HERMA's functionality. Thus, a learner may not only use one global Semantic Knowledge Factory, but develop a personal one or share a self-defined one within a group of course participants. It is also planned to integrate HERMA in large distributed systems, where users of different environments, like universities, may mutually manage a multi-server Semantic Knowledge Factory.

A semantic-based dynamic mechanism with various interactions, as implemented with HERMA, assists trainers, publishers and learners along the whole knowledge transfer process: it assists actors during knowledge creation, structuring, delivery, maintenance, personalization, reconfiguration and acquisition. Knowledge delivery is adaptable to users' needs without overloading system capacities. The separate treatment of delivery and storage of knowledge makes the system flexible, reusable and cost effective.

The smart reconfiguration feature of HERMA makes it possible to gradable conduct the activities of learners during the whole knowledge transfer process. This enhances the teaching process by means of an improved guided learning.

As stated in this paper, HERMA applies a smart pattern matching mechanism to each topic definition - and to its corresponding synonyms - during the content delivery process. This simple idea enables a single HERMA environment to manage also systems that support multilingual content delivery, by associating topic definitions with synonyms in different languages.

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Rhetorical Approach to Assessing Online Discussion

Duane B. Graddy
Middle Tennessee State University
United States
dgraddy@mtsu.edu

Abstract The purpose of this paper is to assess the fruition of online course discussions by analyzing the transcripts of these interactions for a graduate survey course in economics. The method used to conduct the study is unlike other works in that it is lexical in nature. Dictionaries are used to develop quantitative measures of the linguistic characteristics of the online conversations. These rhetorical facts are used to assess the linguistics of general course discussions and a specific team discussion.

Introduction

A key element in successful online learning is full and fruitful participation of learners in group discussions. These collaborative forums provide the basis for devising shared goals, encouraging comments, using the semantics of the subject area, developing critical thinking skills, providing personal examples, asking questions, lending support to others, sharing responsibility for completion of assignments, and promoting feedback. Online discussions provide a means of enhancing cognitive skills as well as a method for assessing learning outcomes.

In these respects, online discussions are dynamic processes that develop over the life of a course. Knowledge is constructed in these collaborative forums through the process of social negotiations among the discussions' participants. Therefore, recognizable advancements in social and cognitive skills should be evident in the degree of content sophistication and the level of perspective taking by the learners. Various authors have characterized this collaborative learning process in different ways.

For instance, Jarvela & Hakkinen (2000) describe web-based discussion as an ontogenetic process. They use the five stages of Selman's model of social cognitive development to portray the evolution of online course discussion.(Selman, 1980) Palloff and Pratt see online involvement as ideally evolving from initial dissonance to content mastery and then to transformative learning (Palloff, 1999). The cognitive analysis model of Henri (Henri, 1992) is built around four dimensions of interaction ranging from social interchange to revealing metacognitive skills. Gunawardena, Lowe, and Anderson (Gunawardena, 1997) theorize that the active construction of knowledge in online discussions moves through five phases. Rourke, et al (2001) considers the issue from a model of community of inquiry. In this model, deep and meaningful learning occurs through the interaction of cognitive presence, teaching presence, and social presence. Others (Bonk, 1998) approach the development of online course discussion in the context of Bloom's cognitive taxonomy. With the sophistication of learner questioning evolving from the lower stages of cognition to the synthesis and evaluation levels.

The aim of this study is to use this rhetorical information to shed light on several important questions.

1.Does the character of the discussion change over the life of the course? Does the linguistic nature and tone of the conversation change as discussions develop? Is there linguistic evidence of moving from low-level discussion to deeper collaborative synthesis?

2.Can generalization be made about communality, accomplishment, optimism, and understanding from the rhetorics of the discourse? Are there key indicators of conversational sophistication?

3.Do the linguistics of the messages reveal anything about the learners and the learning process? Can linguistic indicators suggest anything about conversational sophistication of individual learners and about the entire class?

Methodology

This paper uses Diction 5.0 ([Hart, 1999) to analyze the content of the online discussions. This lexically based program searches the content of online discussions for five semantic features as well as thirty-five sub-features. Each semantic feature is scored on the basis of thirty-five sub-features (dictionaries) according to a series formulas incorporated into the software. The online discussions are compared to forty standard dictionaries and word lists in segments of 500 word. For discussions exceeding 500 words, the overall scores are the average of the individual 500 word segments. Custom dictionaries on microeconomics, macroeconomics, noted economists, and mathematical terms were also included in the database. No terms are duplicated between these dictionaries. The noted economists dictionary is a list of surnames of famous individuals in the evolution of economic thought. The mathematics dictionary includes basic mathematical terms used in the construction and discussion of economic models. The custom dictionaries focus on word usage in contrast to calculating a specific score.

Sample

The sample for this study includes thirteen graduate students in an MBA prerequisite course focusing on the fundamental principles of economics. None of the students had taken the principles of economics as undergraduates so this was their first formal exposure to the material. Three discussion forums are analyzes in this paper. The combined scores on participation in the forums counted twenty percentage of the students overall grade. The forums dealt with assigned topics. The first one center on an article by James Fallows entitled "What's an Economy For?" which compared the economic structures of Western and Asian economies. The California energy crisis was the theme of the second forum. The third forum, which was somewhat shorter than the other two, focused the use of the Federal government surplus for tax cuts versus additions to the Social Security trust fund.

Results

The results of the study provide evidence of the usefulness of rhetorical assessment. The ambivalence, hesitation and oversimplification of the early discussion was proceeded by communality and optimism in the later group interactions.

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Reeducating the Professor and the Student: Lessons Learned from Distance Education Classrooms

Melanie W. Greene
Department of Curriculum and Instruction
Appalachian State University
United States
greenemw@appstate.edu

Sara Olin Zimmerman
Department of Curriculum and Instruction
Appalachian State University
United States
zimmermnsj@appstate.edu

John H. Tashner
Department of Leadership and Educational Studies
Appalachian State University
tashnerjh@appstate.edu

Abstract: This paper is a report on the findings of a study conducted with graduate level students enrolled in courses delivered through the medium of real-time audio-video teleconferencing via the North Carolina Information Highway. The purpose of the study was to investigate the quality of distance education courses, to determine the effectiveness of the delivery medium, and to examine the respondents' perceptions of the instructional strategies implemented in these synchronous learning environments. Input from experienced teachers who were pursuing a graduate degree regarding the learning environment and pedagogical strategies offered valuable information to the researchers. Findings reveal much insight into how distance learning courses can best be delivered in synchronous learning environments.

Introduction

One of the questions in distance education that we continually attempt to answer is: what constitutes effective teaching in synchronous and asynchronous environments? In search of the answer, the fields of education and technology have studied student perceptions comparing online to traditional lecture class quality (Ryan, 2000), the achievement of students in distance education and traditional classrooms (Schulman & Sims, 1999; Dominguez & Ridley, 1999), demographics of students taking online courses (Guernsey, 1998), staff training needs (Connell, 1998), support for faculty teaching (Bremner, 1998), and community and team formation in distance education classrooms (Berg, 1999) and numerous other subjects. We have also examined traditional versus nontraditional roles for the teacher and new paradigms for on-line learning (Bourne, McMaster, Rieger, & Campbell, 1997; Shneiderman, Borkowski, Alavi, & Norman, 1998). The need still exists to examine the role of the teacher and effective strategies for effective teaching. As Shneiderman (1998) wrote, "technology can be wonderfully empowering for teachers and students, (but) the relationship between human beings is still the heart of the educational process."

Purpose

This study attempted to examine the relationship between teachers and students in distance education classes taught by university faculty from the college of education. Graduate students who were practitioners in various fields of education were the participants in these synchronous classes. It was anticipated that this pool of students would give insight into appropriate and inappropriate uses of various teaching strategies and techniques due to their expertise in education. A website with a discussion board was created to allow for interactions among students about: 1) the quality of learning, 2) effective teaching strategies, and 3) the effectiveness of the media of course delivery.

The Study

Conceptual Framework

The conceptual framework that serves as a philosophical basis for our institution posits that faculty and students come together as a community of inquirers to examine the aims of education and the nature of teaching and learning for achieving worthwhile educational goals. Teaching is viewed as a dynamic, goal-oriented, social activity, and learning is perceived as an active process of acquiring, assessing, and producing knowledge. We collectively embrace the exploration of new forms of teaching and learning through experimenting with emerging technologies. To this effort, we work as a community of practitioners who embrace the social constructivist perspective and encourage discourse from various levels of participants in solving educational problems.

The Participants

When the researchers in this study determined a need to engage graduate students in a collaborative effort to evaluate the quality of their learning experiences from courses offered through distance learning, two groups of students were selected. These two groups of students consisted of majors from the field of instructional technology and elementary and middle grades education who were currently employed in their field of expertise. The technology majors were enrolled in the course *Planning for Technology in Education*. It is one of the advanced courses students must complete for a graduate degree and K-12 licensure in instructional technology in North Carolina. The course emphasizes the development of technology plans at local, school, and district levels. In addition, the issues and processes of successful grant writing are explored. This course was taught simultaneously to two groups of students at remote sites and one group on the campus. The remote sites had computers for each student, while the main campus site required students to use a computer lab located in another building. Each site had a technician to assist with the overall operational details of the teleconference. A web-based supplement was also developed for the course that included an orientation, daily outline and assignments, resources and a threaded discussion forum. The instructor for this course had previously taught with this delivery medium. The elementary and middle grades education majors were enrolled in the course *Connecting Learners and Subject Matter*. It is one of the required courses for all education majors for the graduate level degree. The course emphasizes effective strategies for ensuring student mastery of content. This course was taught simultaneously to two groups of students with one group on the main campus and the other section at a site approximately 90 miles away. Each site had a technician who assisted with cameras, sound, equipment, and trouble-shooting when the technology difficulties occurred.

The North Carolina Information Highway (NCIH) program used in this distance learning study provided video teleconferencing capability to universities and public schools across the state. The "Highway" originally established for video communication today serves as the centerpiece of the states high-speed data network, supporting the data, voice, and video needs of all government at the state and local levels as well as school systems and other public entities. Using the high-speed backbone of the North Carolina Integrated Information Network (NCIN), our NCIH services provide broadband connectivity and setup of on-site video conference rooms to support a host of point-to-point and multi-point conferencing applications, including the distance learning medium used in this study.

Altogether 73 students were enrolled in these two classes. The instructional technology majors were aware of the synchronous learning environment in advance. However, the students enrolled in *Connecting Learners and Subject Matter* were not informed in advance of the delivery system to be used. These students met for a sixteen-week semester and when the courses were complete, they were asked to provide feedback on their pedagogical and technological experiences. These students volunteered to participate in an open-item questionnaire that was designed to collect demographic data and feedback regarding the quality of their learning experiences in these distance education courses versus courses that did not involve this delivery system. Students also analyzed the effectiveness of teaching strategies used in these courses and the effectiveness of the NCIH. The survey was posted on a password protected website and required students to give permission for their comments to be used in a research study. Results were summarized and presented below.

Research Questions

Each graduate student enrolled in these two courses was invited to participate in a research project designed to assess the quality of the delivery system used in their class and to examine their perceptions of the instructional strategies used. The following questions were posted on a password protected website.

1. Contrast the quality of the learning experience in distance education courses versus on campus courses (interaction, instruction, assessment, etc.).
2. What teaching strategies have you found to be effective in distance education courses?
3. How effective was the medium for delivery of the class (ie. NC-REN, NCIH, web-based)?

Altogether 46 students logged onto this website and participated in this research project.

Findings

In the following narrative, the responses to the research questions are summarized. Specific quotes are used to highlight student perceptions.

Question 1

When students were asked to evaluate the courses delivered in synchronous environments using NCIH, the quality of instruction was perceived as high and being "as good or better than courses taken on campus." However, students reported a strong preference for the professor to be at their site and felt that "instructors should be required to spend equal time at the various sites. Students miss a lot by not having direct contact with the instructor." One student wrote, "…the quality of instruction is not diminished by the remoteness of the instructor and learner" and further stated, "We tend to work more cooperatively as a group because of the distance, therefore, depending on one another mo re." Another student commented, "Distance education is a good tool if all people included work together to make it successful. I don't believe it can be successful when the groups are looked upon as separate entities. We must be a whole."

Several respondents commented on the limitations of distance education courses. "The frustrations of the technological problems… made this class difficult and often non-productive," wrote one student. Statements such as the following were posted. "A few glitches occurred with the delivery because of the equipment." "Time was wasted due to technical difficulties." "As technology bugs are worked out, distance learning should improve." These comments appear in the final research question as well.

In summation, while students prefer direct instruction with the professor, many would not have been able to obtain a graduate degree due to living a distance from the university campus. The convenience of this delivery medium has "truly benefited" the majority of students.

Question 2

Graduate students were asked to reflect on the effectiveness of the strategies used in distance education courses. The majority of students commented that small group discussions and cooperative learning activities were the most "effective strategies used by the professor." One student stated, "I believe that small groups discussing the topics and then coming together as a whole is the best strategy I have used." This use of instructional time allows students to "get things accomplished without the hassle if technological problems." Another stated, "Small group discussions kept the program personal and relevant." "The instructors were adept at encouraging students to pursue areas of interest."

One student commented, "Just like in a regular classroom, variety is key: Cooperative Learning, Videos, Power Point, Direct Instruction (providing that the technology is working). For two sites, it is effective to bounce questions back and forth so that you can get everyone involved and sharing." "Power point and the overhead were good to supplement direct instruction" because visual learners need additional support. Literature circles used in the *Connecting Learners and Subject Matter* class was cited as a "very effective strategy" also.

Least preferred by students were lectures and large group discussions. For example, "whole group discussion was limited to the technological difficulties" of having cameras and sound focused on the speakers.

Question 3

Determining the effectiveness of the NCIH delivery system was the purpose of the third question in this survey. Students enrolled in *Connecting Learners and Subject Matter* reported more frustrations with the delivery medium than their counterparts in the *Planning for Technology in Education* course. Technical difficulties such as "...voice delays, freeze frames, and just being down were common to our classes this term." Most students made comments such as the "...the NCIH was not successful in truly making the class a good learning atmosphere." "I know that the technical folks here worked really hard; however, we have experienced technical problems," and "NCIH has a lot of room for improvement."

To the contrary, students enrolled in the technology course said, "NCIH has worked well. We've only had a few instances when connections did not work. The biggest problem was that voices broke down often and at times the volume from campus was very low." One student reported that this delivery system had been used frequently and they had learned the value of flexibility." However, one of thee students questioned the amount of money the state invested in this technology saying, "It would be better to just have web-based courses." Another concluded that though there were technical problems, they far outweighed the safety concerns of having to drive 60 miles at night through winter weather, and the fee was affordable."

In summary, both groups of students see NCIH as a good idea that will continue to be a part of graduate level education.

Summary

Given the results of this research, it is clear that there are still barriers impeding the success of distance education such as technical assistance and failures of equipment. It is also clear, however, that educators can create an effective learning environment, one that is influenced, but not driven by the technological media.

Students who were knowledgeable about teaching strategies reported that two major approaches were most successful in the distance education classroom. First, a cooperative group approach was reported as highly effective, allowing full participation by all students regardless of their distance from the instructor. A more constructivist approach to distance education classes, where students actively take part as peer leaders and instructors, may improve student learning. Instructors need to take on the role of facilitator, to an even greater extent, making sure all students have a voice in the class.

Second, students reported learning best when small group discussions and direct instruction were employed as long as the instructors used active, interesting audio visual aids and were well prepared for questions and follow up interactions. Distance education affords an instructor the ability to influence a greater audience, sometimes as many as three to four classes simultaneously. This advantage may require the instructor additional time in preparation and perhaps even a full rehearsal of lectures.

Finally, students still want face-to-face interactions with instructors. Faculty may need to creatively address this concern with two-way video office hours, make visits to off campus sites, or change student expectations of a traditional classroom.

Discussion

Teaching is a complicated task even in the most favorable of conditions. Teaching and learning in a nontraditional environment requires both the teacher and learner to modify how they interact. The instructional strategies employed in distance programs must be examined from the perspective of the learner and the instructor. Instructors must be apprised of specific guidance based on research. By studying the perceptions of classroom teachers in their roles as students, we can delineate good from poor practice.

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Using a Centralized Web Site to Support Distance Learners

David Halpin
Instructional Technology Master's Program (ITMA)
Virginia Tech
United States
dhalpin@vt.edu

Stephanie Scheer
Institute for Distance and Distributed Learning
Virginia Tech
United States
sscheer@vt.edu

Barbara Lockee
Instructional Technology
Virginia Tech
United States
lockeebb@vt.edu

Abstract: Supporting students at a distance can be quite a challenge, especially for programs that are completely web-based. Many times instructors must be responsible for providing not only instructional information, but also direction for students regarding administrative, technical, and logistical matters, all of which must be communicated in a clear and comprehensive manner. This paper overviews general support needs of distance learners and demonstrates how the Instructional Technology Program at Virginia Tech created a centralized web site to support learners in its online program.

Support Needs of Distance Learners

An essential aspect of any distance education project is the support services available to the students (Abate, 1999; Gibson & Gibson, 1997; Peters, 1998). Krauth (1999) asserts that students enrolled in distance education programs need the same types of student support services that are available to on-campus students, but that distance learners expect the delivery of these support services to meet their needs for flexibility and convenience. She also notes that special needs arise based distance learners' isolation and the fact that they depend heavily on technology for learning and accessing resources. Abate (1999) states, "think of all the offices on campus, all of the services provided for traditional students. All of these should be considered and made available in some fashion for students studying at a distance".

An Online IT Program for Teachers

The Instructional Technology Program at Virginia Tech currently offers an online Master's degree for professional educators. Termed ITMA (Instructional Technology Master's Program), the initiative originates from the Center for Instructional Technology Solutions in Industry and Education. ITMA provides practicing teachers the opportunity to earn a Master's degree without the need to enroll in our on-campus program. In addition, the program is structured around a set of outcomes that are specifically geared to these nontraditional students; these outcomes are based on technology standards developed by the International Society for Technology in Education (ISTE), as well as by technology standards recently implemented by the state of Virginia for instructional personnel. In order for faculty to assess whether or not students have acquired the knowledge and skills outlined in these standards, the students are required to create an electronic portfolio that showcases their work throughout the program. Every course that our online students take relates in some way to the development of this portfolio, and the development process itself provides a meaningful learning context for the acquisition of these skills.

Studio Support Services

The portfolio idea also provided the context for the development of the ITMA Studio as the centralized support system for our online students. The "Studio" name stems from a desire to create a metaphor for an art studio as a location where many resources are available for creative development. The home page features a graphical palette of links leading students to various support resources designed to help them through the program. The resources available in the Studio can be grouped into several categories: portfolio support, program support, and peer support. Portfolio support is the main focus of the ITMA Studio. The Portfolio link provides access to a wide range of information about the electronic portfolio, including a complete list of requirements, links to related standards, and examples of previous student portfolios. Other portfolio support options provided by the Studio are links to tools and tutorials that are specifically chosen to help ITMA students acquire and learn the technology that will assist them in the creation of their portfolios. The Tools section includes annotated links to a variety of software programs that can equip students for the development process, while the Tutorials section provides assistance for students who are learning to use these tools.

Program support in the Studio consists of a help area that provides contact information for all of the faculty and staff involved in the ITMA program, including instructors, administrative staff, and technical support staff. This provides the simplest of benefits for students by allowing them to access important program information in one place. If they misplace a phone number or email address they know to consult the Studio for the information. The Help section of the Studio also contains links leading to important sections of the Virginia Tech web site, such as the library, the email pipeline, and students' personal accounts. Virginia Tech allows students to perform a wide range of tasks without ever setting foot on the campus.

Peer support is the third category of support addressed by the Studio. The first way this is accomplished is by providing a gateway for students to share work amongst themselves. This gateway provides a link to every student's portfolio, which allows both students and faculty to easily access everyone's work. We have also provided a chat room in the Studio to allow for synchronous communication between ITMA participants, without the delays associated with email or discussion groups.

Through a combination of resources, the ITMA Studio is designed to meet our students' needs for flexibility and convenience. By providing portfolio, program, and peer support, the ITMA Studio endeavors to be a place where students can resolve problems, develop their skills, and find social support at any time of the day. It is hoped that with the benefit of these resources each student will be able to create his or her own electronic "masterpiece."

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The Professional Development Series: Web-based Staff Development for K-12 Teachers

Lisa A. Heaton, hcaton@marshall.edu
Assistant Professor, Elementary and Secondary Education
Marshall University Graduate College, USA

Lisa A. Washington, lisa@rockman.com
ROCKMAN *ET AL*

Rudy Pauley, rpauley@marshall.edu
Assistant Professor, Elementary and Secondary Education
Marshall University Graduate College, USA

Abstract: Marshall University's Graduate School of Education and Professional Development has successfully offered a series of staff development courses for K12 teachers using the Internet for course delivery. Teachers may apply, enroll, and complete the courses in an online format. The courses are structured around a series of informative and timely topics pertinent to today's teachers. Participant response to this program has been highly positive as exhibited by the exit surveys.

Introduction

The Professional Development Series was initiated during the Spring 2001 semester for the purpose of providing staff development courses to in-service teachers across the state. Courses are web-based (using WebCT as the delivery platform) with no face-to-face class meetings. One course was offered during the first semester as a pilot for the course development, marketing, registration, delivery, and evaluation procedures. The program was expanded to include three courses during the Summer 2001 semester and four courses during Fall 2001.

All courses offer three professional development credits that teachers can use for recertification or "plus hours" for advanced salary classification. Courses are graded as Satisfactory/Unsatisfactory. Content is geared toward providing teachers with practical applications that can be integrated into their classroom instruction. The current selection of topics includes: Using the WWW, Web Design, Literacy, Character Education, and Multicultural Education. Approximately 350 teachers from 49 out of 55 counties and three other states have participated in courses during the first three semesters.

Getting Started

Course offerings are advertised using a variety of formats, including: direct mailing to school superintendents and principals, faculty senate personnel, newspaper and newsletter advertisements, and the Series website, developed for the Fall 2001 semester.

Initial inquiry by students is completed by phone, e-mail, or online. Registration is completed by mail or online. Once registration is processed each student is mailed a Welcome Packet that includes a letter from the instructor, an assigned username and password, course login directions, and a tip sheet with suggestions for increasing success in an online course. The eight-point tip sheet was added after the first semester pilot was completed. These tips will be shared during the presentation.

Course Setup

All courses in the Professional Development Series begin with an orientation module designed to familiarize students with the course setup and navigation and to introduce the use of the course communication tools that are essential for discussion and assignment submission. Some of the most popular course tools include mail, discussions, student grades, quizzes, presentation area, and content module—all built-in to the WebCT interface. As part of the orientation module, students complete practice assignments that require using mail to announce that they have started the course and using Discussions (the Bulletin Board component) to post a brief bio.

Since the registration period for each course lasts four to five weeks during the beginning of each semester, students begin and end the course at different times throughout a semester. To facilitate this open enrollment period, all assignments are self-paced. This self-paced approach is also intended to accommodate the busy schedule of the typical classroom teacher.

Course materials and assignments include readings, interactive practice exercises (quizzes), online discussions, and independent projects. The focus of each course is on practical applications of content within the K-12 instructional setting. Examples of the Orientation Module and the organization of course content and assignment pages will be demonstrated during the presentation.

One or more instructors, depending on student enrollment, are available to facilitate each course. The course instructors are available to answer questions, facilitate online discussions, and evaluate assignment submissions. The target policy is to respond to inquiries and assignments within 48 hours of submission. Instructors for each course provide students with ample feedback and opportunity to make corrections to any assignment submission that does not meet the Satisfactory requirement.

The final component of each course is the Exit Survey.

Exit Surveys

Nearly 280 teachers participated in four courses during the first two semesters. Of this number, 260 participants completed the Exit Survey. The Exit Survey is intended to serve two major purposes: 1) evaluating course quality and 2) gathering information for future program planning. Items include:

- The course content was applicable to my professional development needs. (Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree)
- The assignments were relevant to the course objectives. (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree)
- The directions provided throughout the course were clear and helpful. (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree)
- The instructor(s) for this course were responsive to my questions and assignment submissions. (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree)
- Approximately, how many hours did it take for you to complete the course? (5-10 hours, 11-15 hours, 16-20 hours, 21-25 hours, 26-30 hours, >30 hours)
- Would you recommend this course to other educators? (Yes, No)
- Prior to this experience, have you ever taken a web-based course? (Yes, No)
- How did you hear about this course?
- If you are interested in taking other Internet-based courses, what topics would appeal to you?
- Please make any additional comments.

Results from the first two semesters (260 participants) are available and will be shared during the presentation. Ninety-eight percent of participants indicate Agree or Strongly Agree to the applicability of course content to their professional development needs. The remaining 2% were neutral. Ninety-four percent of participants indicate Agree or Strongly Agree with the responsiveness of course instructors to questions and assignments submissions, with the remaining 6% indicating Neutral or Disagree. One hundred percent of participants completing the survey indicate that they would recommend the course they completed to other educators. Additional feedback provided by students in the "additional comments" and future course topics has been equally positive and informative for course revisions and development of future course topics.

Conclusions

The need for quality professional development programs for in-service teachers is tremendous, especially for teachers who live and work in rural, isolated regions. Teachers who live beyond the standard service areas of colleges and universities deserve an equitable opportunity to participate in professional development programs. With the increasing access to Internet-connected computers in all public schools and with the expansion of Internet Service Providers into rural communities, online programs like the Professional Development Series can help bring the educational opportunities to teachers in all areas of the state.

CONSTRUCTING THE ONLINE LEARNING COMMUNITY: AN EXAMINATION OF READER RESPONSE AS A MECHANISM FOR SCAFFOLDING

Jeannine Hirtle Ed.D., Curriculum & Instruction, University of Texas at Arlington, USA, jhirtle@uta.edu

Kelly Frankum M.Ed., Mansfield High school, Mansfield, Texas, USA, kbfrankum@yahoo.com

S.Janelle Quintans B.A., North Dallas High School, Dallas, Texas, USA, sjquintans@earthlink.net

Abstract:

Studies on the pedagogical implications for integration of technology within teacher preparation courses are emerging in a time when national surveys (Milliken 2000, ISTE 1999) decry the lack of adequate teacher preparation in this area. This study examines the pedagogical implications for the use of Reader Response in an online post graduate methods course. The resulting benefits of technological, social, and cognitive scaffolding are the anticipated results and the specific methodology examines closely how these are achieved. The significance of this work is that it could be potentially used as a model for processing expository text in online learning communities thus increasing the learning experience.

Introduction

One of the criticisms of distance education is that it limits the students' education experience because of the anxiety and frustration due to the isolation inherent in the process. (Hara and Kling, 1999) Distress may occur while working on the Internet because of the complexities of working in isolation in regard to technological issues as well as course content issues. (Hara and Kling, 1999) This is indeed problematic as Brown and Duguid caution (1996) that learning does not occur independent of communities . . . Learning, at all levels, relies ultimately on personal interactions.

As a professor in a web-based distance education program, I work with students who have degrees and are seeking certification in teacher education through distance education. These nontraditional students are teaching on emergency certification or working in other jobs preparing to transition into teaching. Within these same classes, I also worked with students who have varying degrees of experience as teachers and are pursuing graduate degrees in education. Many of these students already are coping with the isolation of teaching and I want to alleviate frustrations and anxieties that potentially could affect their learning experience by designing courses I taught online with built in mechanisms for scaffolding student learning.

Framework and Review of Literature

Scaffolding in the learning environment is defined as the process of supporting students so they can accomplish tasks towards the higher end of the Zone of Proximal Development. This is "the distance between a learner's 'actual developmental level as determined by independent problem solving' and the higher level of 'potential development as determined through problem solving under adult guidance or in collaboration with more capable peers.'" (Wertsch, 1985, p.67-68). Vygotsky described this as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978). This support can be provided through collaborative group work with more capable peers or through adult guidance. A great deal of scaffolding is provided initially, but is then slowly removed until the student is able to accomplish the same task on their own. An important aspect of scaffolding is that the task the student is asked to perform does not change to accommodate the learner. Rather, the learner is supported and guided until their schema have accumulated enough new information to enable them to perform the task on their own (Hodson & Hodson,1998).

The mechanism for scaffolding I chose to build into this course design was the use of reader response with expository text as the framework for online discussion communities. Based on the work of Louise Rosenblatt (1994), reader response is generally thought of as a literary practice, generally utilized within a language arts course. Rosenblatt theorizes that readers transact with text incorporating their personal linguistic experiential reservoir (1994) and their cognitive, affective residue of past experiences (1985) to construct meaning in text over time. Rosenblatt believes that the reader responds by means of the meanings he or she brings to the text, as well as by means of the meanings which emerge in the process of reading (Bertoff 1988). While my courses contained expository text, as opposed to the literature that reader response is more traditionally used with, I believed this method of processing the reading, when shared in community, might provide an opportunity for students to scaffold their learning.

Using Rosenblatt's theory of reader response with the expository text used in two teacher certification courses, coupled with opportunities for social interaction which connected students' thought and language in an online environment, I wanted to see:

1. If scaffolding of learning would occur as a natural outgrowth of this process
2. And if it did, what forms of learning support would it provide.

Methodology

The research design for this study is an action research project, which pursues action (or change) and research (or understanding) simultaneously through a cyclic process. This process alternates between action and critical reflection and the continuous refinement of methods, data and interpretation in the light of the understanding developed in the earlier cycles (Dick, 1997). The methodology chosen was a case study involving two post-baccalaureate and/or graduate level online classes. The department where this study was conducted offered a Masters in Education with an emphasis in Reading online and offered a series of five curriculum and instruction courses, which could be used towards a Masters in Education and/or in preparation for teacher

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certification. The first author of this paper is the instructor for this course and the two co-authors, are teaching assistants. One of the coauthors, Frankum, has a Masters in Education and the other, Quintans, is pursuing a masters. Both coauthors are teaching in K-12 public education at the time of this study.

The data collected for this case study comes from four sources: documents related to the course, threaded message boards, e-mail, and student interviews. The course documents include the syllabus and online lessons. The online lessons contain directions for reader response discussions. They will be analyzed for statements that would encourage or discourage scaffolding. The last three sources will be analyzed initially for the elements of scaffolding as well as negative expressions and expressions of frustration.

Three sets of threaded message boards for each class are being analyzed. They were chosen from the threaded message boards from weeks three, seven, and eleven in the course. At this writing weeks three and seven were the only weeks available for analysis. So, this paper is an intermediate look at the data. After initial analysis of weeks three and seven by the three researchers, the following codes for analysis were generated:

1. Questions asked
    a. for clarification
    b. for support
    c. for a solution
2. Statements made
    a. supposing or imagining
    b. agreeing
    c. affirming
    d. suggesting
    e. offering a solution
    f. commiserating
    g. presenting a problem
    h. providing additional information (explaining)
        i. in the form of a story
        ii. in the form of metaphor or analogy
    i. correcting
    j. expressing an aha or a breakthrough
    k. expressing empathy
    l. expressing value or appreciation
    m. expressing resistance
    n. expressing a negative reaction
3. Exclamations
    a. of excitement
    b. of pleasure
    c. of value or appreciation
    d. expressing resistance
    e. expressing strongly negative reaction
    f. of encouragement

In addition, e-mail to the instructors in the form of student self-assessments for weeks three, seven and eleven are being analyzed for references of the elements of scaffolding or expressions of negativity or frustration which may connote non-scaffolding.

One month following the semester, each author will conduct three online interviews to ascertain the elements of scaffolding or examples of non-scaffolding perceived by the students within the reader response discussions in the course.

1. Has my experience with online reader response discussions influenced the way I think about learning? If so, how?

2. Does my experience with this online course contain any examples of scaffolding in reader response discussion? How did I scaffold my peers' learning? How did my peers scaffold my learning?

3. Has my experience with using reader response in an online environment influenced how I think about education and learning in general?

Data Analysis and Discussion

Four different kinds of data will be analyzed (document review, threaded message boards, e-mails, and interviews). The analysis will be triangulated in terms of methodologies, people, and time (Silverman, 1996; Stake, 1995). Furthermore, the informants will validate each interview transcript and interpretation. The three author/researchers will analyze data independently and debrief to analyze their results and draw implications and conclusions.

Document Review is the first kind of data analyzed. To invite students into the text in week three, I at first used guided questioning to help them tap into their existing schema and relate personal experiences to the concepts in the text. The following is an example of those instructions:

Questions to reflect on and respond to while reading.

Please note that this is challenging reading in that the language is complex and many times specific to the field of research. Try not to let this dampen your spirit, but read for general understanding and reflect on the main ideas. It is important that you read some of the discussion of the primary research in our field of literacy instruction and that you are familiar with the major researchers, their claims, and the research upon which they base their claims. Think of this as Popeye did his "spinach." It makes you strong in the field of literacy education. The discussion questions are designed to help guide you through this labyrinth of conceptually dense text. Please answer them in complete sentences in well-constructed paragraphs that have a topic sentence, supporting

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points and a closing sentence. As a reminder, each WebBoard™ response plus follow-ups to two of your colleagues' postings and responses acknowledgements to all who respond to you are worth 5 pts per WebBoard™ session.

While the instructions did not open much space for reader response, but rather supported the reader through the text, the follow-up responses to colleague's postings did open that space and students began to question each other's experiences and ask for opinions.

The second kind of data analyzed was student responses to each other's postings. In Week Three, there were 16 original posts from 16 different students for a total of 58 student responses. There were 3.6 average responses per original posting.

The responses showed that the students were involved in the reading and communicated with their peers. Some students, 17%, asked questions such as, "How is it that the writing of the actual researchers has not called attention to policy makers that phonemic instruction is not proven to be the best reading instructor?" They synthesized the information gained from the articles and communicated their concerns with other students. For example, these were some responses to Chall, J., "Some Thoughts on Reading Research: Revisiting the First-Grade Studies" (1999).

Hi AG, Do you think that phonics is the great and wonderful phenomena that the First Grade Studies depicted it as being? ER

Do you think we are likely to see the same correlation of phonics to reading achievement as students move into later grades?

And students began to form opinions and take a stance.

I think they attacked the design to discredit the results as you stated in your question. If the design is flawed how can we believe in the results. I think people did not like the results of the research because it did suggest change. Change is always hard to do and some are not willing to do it. It differently takes effort and commitment. KP

This showed trust was being formed, and respect was beginning to develop. Approximately 50% of the questions requested clarification. For example LW writes:

P, Chall points out the decrease in reading achievement due to whole language but doesn't examine it anymore than saying it was because of the lack of phonemic awareness. She also leaves out some elements about her own research as you mention. Why do you think that is? LW

An additional 32% requested support. PW asks:

ER, I thought they really ignored the "other factors" that played a role in students' success, did you get that feeling too? PW
The rest, 18%, solicited a solution from their peers. For example KP asks:
I am a product of the 80's group that resulted in lower reading scores. I did not have formal phonic instruction in the classroom and I did learn to read and comprehend. But, I must say I still have a difficult time with phonics. I can not blame this all on the lack of teaching because I did have to attended speech as a child as a result of many ear infections and not picking up our language as an infant/ toddler. Do you think phonic instruction is vital to teaching a child to read? KP

Online statements made were analyzed. Of the statements, 23% were statements agreeing with their peers, and 14% affirmed what their peers had to share. In some students' responses, 13% proposed suggestions to their classmates.

In all honesty, I don't know why there has been this great debate raging for so many years. After all, if we want to achieve balance in our lives, why would we not want anything other than balance when it comes to educating our children? The balanced approach, as indicated by Berniger, is the goal. ER

An additional 5% of the responses offered solutions.

I think part of the problem with all of this research is that we are researching readers. Readers are human, specifically, children, it is impossible to have a true control group. Furthermore, as we have all stated again and again, readers are individuals and in order for them to get the best instruction it must be individualized to meet their particular needs. LA

The same percentage of responses, 5%, commiserated with their peers online. Four percent of the responses presented additional problems in their posting. Twenty-six percent of the responses provided additional information by explaining or clarifying their position. An additional 5% told this in the form of a story, while 1% gave information in the form of a metaphor or analogy.

Corrections were offered in 3% of the postings, and 3% expressed an "aha" or a breakthrough.

While most of the postings were positive, 3% expressed resistance either to the reading or to the procedures they find in their schools.

Some exclamations, 8% of all responses, were made. Of those exclamations, half expressed excitement, 25% showed value or appreciation. For example KP writes:
That does make a lot of sense and I do agree with what you said about every student being a factor. This does help me understand Chall better. Thank you. KP

12% expressed resistance, and 12% expressed a strongly negative reaction. For example:
In retrospect (after reading the articles by Graves and Dykstra and Pearson) it is quite clear to me that Chall is just another example of someone misusing research. These studies never came up with any direct correlation between phonics instruction and improved reading. These studies do not really take into account any changes in demographics or populations. Even at the time the researchers were unable to completely, scientifically control all of the variables.

Data from Week Seven

During the seventh week of class, document review revealed that the instructions for reader response became more open to student interpretation. For example:

Please use "reader response" to process this article. These questions will help focus your response process.

A. What do I want to remember from this chapter that may be helpful to my present or future teaching?

B. How do these readings connect to my present or prior experience in education? What stories or examples can I recall that relate to the information in these chapters?

C. What questions or comments do I wish to discuss with my colleagues about the reading?

D. What would I like to have clarified, explained, and/or extended?

For the seventh week of online class, there were 12 original postings of the assignments and 12 different discussions occurring after reading two articles. There were a total of 134 responses from peers (this data does not include responses from the course instructor and class TA). There was an average of 11.2 responses for each original post of the articles read. While some of these were one-line questions, most involved participation and contributed additional information.

The responses showed that the students were involved in the reading and communicated with their peers. There were more responses the 7th week; this shows that more "conversation" is occurring online. Twenty two percent of the responses involved the students asking each other questions. Of these, 42% inquired into clarification, 21% asked for support, and 37% sought a solution. Students were asking more questions, but less were asking clarifying questions. Students seemed to get to know each other better, so less clarification was required. Students were beginning to need less technical or interpretive textual support from their peers, and started to ask for their help in solving their classroom dilemmas. In other words, they were beginning to apply some of the theory they were studying to the context of their classroom experiences. They were assimilating or accommodating (Piaget) this expository information into their existing schema. As a result, the scaffolding, which occurred from reader response in week seven, was scaffolding of a practical application nature.

Most of the comments, 77%, were statements. Most of these statements, 58%, were either agreeing or affirming statements made toward their fellow peers. This is an increase from Week 3 when 37% of the statements either agreed or affirmed. It appeared that students were appreciating their students more as they got to know them better. Also, 39% of the students provided suggestions or offered a solution.

For example LP wrote:

E: You asked how we respond to children who have the ability to read, but have no interest in doing so. I firmly believe that you should never FORCE a child to read for pleasure because then you are actually punishing a child with books. What I do is read aloud every day. Some days I read from a chapter book that we read throughout the year, some days I choose a trade book about something my kids like, like trains or birds, some days I read some funny poems and some days I read something by Jon Sciezka (sp?), who can motivate any boy in the world to pick up a book because of his funny almost inappropriate humor. What I have found is that even though the book has already been read to my students there is always a run on whatever book I have read aloud . . . they all want to read it again! Through the course of the year everybody finds some kind of book that they do like reading. I try to keep a large variety of books on my bookshelf, some easy, some difficult so that all students have something that holds their interest. Luckily Barnes and Noble gives teachers a 20% discount on books they buy for their classroom! LP

It appears that students feel more comfortable in offering their services and sharing information.

Discussions were enhanced by 45% of the responses, in which additional information or explanations were supplied to peers through the WebBoard. This is an increase from Week 3 of 19%. Thirteen percent of the students shared information in the form of a story, up from 5% in Week 3. Students seemed to feel more at ease and more able to share personal and relevant information. Students were beginning to open up and honestly share with their online peers. Also the stories were often of the students' actual experiences as a learner, or from her experiences in the classroom. This fits with the need to scaffold with practical application. The more open format of reader response gave students the opportunity to bring forward their personal experiences in response to the readings.

No corrections were made in Week 7, down from 3% in Week 3. It appeared that students appreciated and respected their peers more and felt they did not need correcting; students understood each other better.

While no students expressed empathy in Week 3, 2% of the responses did so in Week 7. Since students were beginning to know each other, they appeared to feel closer and express that relationship. No students expressed resistance or a negative reaction, compared to 3% in Week 3.

Fewer exclamations were found in Week 7 when compared to Week 3; 5% of all responses made in Week 7 were exclamations. All of these responses were positive, though. Forty two percent of all exclamations shared value or appreciation, 29% expressed excitement, and 29% expressed pleasure. Negative responses were absent from postings.

The following table 1.0 summarizes and compares the responses by category.

Number of postings		58	134
Number of students responding		16	24
Average Response per posting		3.6	11.2
		Week 3 % Response	Week 7 % Response
1.	Questions asked	17	22
a.	for clarification	50	42
b.	for support	32	21
c.	for a solution	18	37
2.	Statements made		77
a.	supposing or imagining		
b.	agreeing	23	58
c.	affirming	14	
d.	suggesting	13	39
e.	offering a solution	5	

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f.	commiserating	5	
g.	presenting a problem	4	
h.	providing additional information (explaining)	26	45
i.	in the form of a story	5	13
i.	in the form of metaphor or analogy	1	
i.	correcting	3	0
j.	expressing an aha or a breakthrough	3	
k.	expressing empathy		2
l.	expressing value or appreciation		
m.	expressing resistance	3	0
n.	expressing a negative reaction		0
3.	Exclamations	8	5
a.	of excitement	50	29
b.	of pleasure		29
c.	of value or appreciation	25	42
d	expressing resistance	12	0
e.	expressing strongly negative reaction	12	0
f.	of encouragement	12	

Table 1.0 Responses by Category.

Intermediate Conclusions and Implications

Using Rosenblatt's theory of reader response with the expository text used in two teacher certification courses, coupled with opportunities for social interaction which connected students thought and language in an online environment, I wanted to see:

1. If scaffolding of learning would occur as a natural outgrowth of this process
2. And if it did, what forms of learning support would it provide.

The work of Piaget and related theorists is based on the premise that when individuals cooperate on the environment, socio-cognitive conflict occurs that creates cognitive disequilibrium, which in turn stimulates perspective-taking ability and cognitive development. When students respond to text incorporating their own unique schema, through their statements, questions, and explanations and share this response in online discussion then knowledge can be social, constructed from cooperative efforts to learn, understand, and solve problems. Current cooperative learning theorists and practitioners David Johnson and Roger Johnson create cooperative learning environments based, in part, on positive interdependence. In this environment:

Positive interdependence exists when students perceive that they are linked with group mates in such a way that they cannot succeed unless their group mates do (and vice versa) and/or that they must coordinate their efforts with the efforts of their group mates to complete a task.

This environment does exist in this online learning community. At first, it was imposed by the guidelines of the assignment that required that students respond to each other's posting. This led to positive interdependence (Johnson and Johnson). Positive interdependence promotes a situation in which students can achieve promotive interaction. Promotive interaction occurs as individuals encourage and facilitate each other's efforts to reach the group's goals (such as maximizing each member's learning). Group members promote each other's success in part by (Johnson & Johnson, 1989):

1. Giving and receiving help and assistance (both task-related and personal).

2. Exchanging resources and information. Group members seek information and other resources from each other, comprehend information accurately and without bias, and make optimal use of the information provided. There are a number of beneficial results from (a) orally explaining, elaborating, and summarizing information and (b) teaching one's knowledge to others. Explaining and teaching increase the degree to which group members cognitively process and organize information, engage in higher-level reasoning, attain insights, and become personally committed to achieving. Listening critically to the explanations of groupmates provides the opportunity to utilize other's resources.

The authors believe that the positive interdependence that exists within the framework of cooperative learning is, in actuality, an explanation of the scaffolding which occurs within this online learning community as a result of students' reader response to expository text.

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Bridging Craft and Academic: A Demonstration of Web-Based, Problem Based Learning Training Materials

Sarah Hough, Universtiy of California, Santa Barbara, CA 93101, US
Stacey Kyle, University of California, Santa Barbara, CA, 931010, US
Michael Gerber, University of California, Santa Barbara,CA 93101, US
Jill Leafstedt, Univeristy of California, Santa Barbara, US

Come and learn about a multi-media web based learning tool -- built on a constructivist (problem based learning) approach--designed for use in teacher development.

Objectives and Overview

The purpose of this proposed poster /technology session is to present and discuss interactive, web-based learning tools that are the end-product of CASELINK. During this session participants will (1) become familiar with problem-based learning and its uses in teacher development; (2) have the opportunity to explore one of the PBL web-based modules in action; and (3) gain an understanding of the power of using online environments to facilitate PBL.

CASELINK and its successor School Link are development projects whose impetus was a question: How can traditional academic knowledge and the highly specific and contextualized "knowledge-in-practice" be integrated in a meaningful context for use in professional training? Utilizing a problem-based learning pedagogy, the CASELINK team designed, developed and field-tested four interactive multimedia web modules for use in existing courses for the development of prospective teachers' understanding of special education. When "knowledge of practice" and "knowledge in practice" are linked together in professional development programs, due to the way in which traditional learning is structured, the gap between the two can ordinarily be wide. Traditional "knowledge-*of*-practice" is packaged and typically resides in textbooks and lectures in central locations because these formats permit a satisfactory balance of per trainee cost and overall instructional benefit (i.e., the knowledge obtained by each learner). On the other hand, supervised teaching in the field is distributed over a geographical area defined by cooperating institutions and without much control of the nature or content of experiences. Creative solutions to this problem are important in order to improve the overall quality of professional preparation. The CASELINK modules attempt to address this issue using problem-based learning pedagogy along with multi-media web technologies.

CASELINK has developed a new pedagogical strategy for allowing access to professional knowledge by using a case/problem based learning program supported by interactive, multi-media, website case studies and associated data and documents. The CASE materials that have been developed bring together information from school professionals (including regular and special educators, administrators, counselors and psychologists) in school site-oriented, co-operative teams as these professionals collaborate on real-life messy problems, in an attempt to capture knowledge-in-practice.

The use of hypertext and QuickTime video was chosen as the appropriate forum for presenting the CASELINK materials to student users subsequently all of the CASELINK materials are mounted in a systematic way on CDs and the web. These multimedia materials include photos and video segments of different children, their parents, peers, teachers and other school professionals, along with IEP's, and professional publications such as journal articles and book chapters.

Outline of the Session

During the session participants will have the opportunity to:

1. Interact with the a full PBL "CASE" that is designed for training teachers how to work with EL students.

Each Module can be viewed as having three main components: The problem framing component; the solution development component; and the reflective component.

A.. Frame the problem The process begins with a description of a core problem. Core problems will center around real school situations involving one or two disabled students. From the core problem, users will have several optional hypertext links to choose from, including links to role-specific individuals involved in the core problem. Examples of roles-specific individuals include parents, special education teacher, school psychologist, pupil, school administrator, general education teacher, etc.

Meeting. Groups of students then meet (either in real time of on line), in order to develop comfortable as well as efficient operating procedures (e.g., roles, responsibilities, notetaking/keeping). Student users then submit their understanding of the problem as a group, online through an interactive form on the module.

Stakeholders' perspectives. The submission of the interactive form then opens a gateway to a video presentation of the stakeholders' view of how they see the problem. Often these views are in conflict from each other as in a real life situation.

Reframing/reflection. Student users now are allowed an opportunity to reflect on differences between how they saw the problem and how the stakeholders saw it--with an opportunity to resubmit their problem statement if they so choose.

B. Constructing a solution to the problem

Role Strands. At this stage student users either choose or are assigned a *role.* Roles in most cases include parent, general education teacher, special education teacher, school psychologist, administrator, principal, and when appropriate the child with a disability. After determining which role they will adopt, the student researches all information within that stakeholders strand. This information can be obtained through video clips, reading assessments given, and accessing outside links on related topics on the world wide web.

Team Meeting. After obtaining all information they deem relevant to represent their role, student users bring their new knowledge to their team meeting at which point an agreement on a plan for the student in question must be reached.

C. Reflect on and discuss solutions. The final stage in the PBL module is the reflection and discussion regarding the submitted solution. In this stage student users are given a chance to compare their problem solution to that which was developed by the professional team in the case. As a team, the students sift, weigh, and integrate what information has been gathered. They discuss what differences exist between the professionals' solution and their own. They also reflect on the possibilities for these differences and the knowledge that they have gained from this unique process.

II: Explore some of the tools that are currently being developed to enhace the users experience with the CASE modules.

A. Chat rooms for team meeting and discussion
B. Video interviews with "experts" from the field.
C. Stand alone "information" modules that allow users to explore relevant topics in depth. (Such as IDEA, the Individuals with Disabilities Education Act).
D. Interactive pages that allow users to share (upload) resources and view and search through digital archives of previous solutions.
E.

Closing the gap between "knowledge in practice" and "knowledge of practice" requires education professionals-in-training to be brought as close to the reality of authentic school practice as possible. Knowledge-in-use is messy and is based upon the interactions of teams of school professionals; it exists in on-the-fly decisions in classrooms -- decisions that are grounded in years of experience; and it is always shaped by the context in which the specific problem-to-be-solved is situated. CASELINK attempts not to bring these aspects of knowledge to the traditional learning environment, but to use technology to recreate the learning space to more closely resemble an authentic school decision-making environment.

New Internet Tools for Facilitating Scientific Inquiry

Richard A. Huber, Curricular Studies Dept., UNCW, USA huberr@uncwil.edu
Louis Lanunziata, Curricular Studies Dept., UNCW, USA lanunziatal@uncwil.edu

Abstract

This paper presents a case for using interactive Internet resources as tools for facilitating inquiry-based science instruction, as called for in the National Science Education Standards, with a focus on grades 4-14 application. Two categories of interactive inquiry sites will be demonstrated: (1) sites that provide simulation of scientific equipment and resources and (2) sites that allow students to interact with large educationally relevant databases.

Contrary to a common misconception, effective use of the Internet in science education has little or nothing to do with surfing the web. This is not to imply, however, that the Internet does not contain outstanding resources for supporting inquiry science. Experts are urging teachers to move away from activities that invite students to surf the web in favor of Internet activities that direct students to access and utilize pre-selected sites in order to accomplish pre-determined objectives (Huber & Harriett, 1998; Huber & Moore, 2001, Moore & Huber, 2001, Watson, 1999). For high school and middle school science teachers, interactive sites that use Java applets designed to facilitate students in accessing and interacting with large authentic data sets represent one of the currently most promising of Internet applications. This paper examines two such sites; one site permits active inquiry about principles of physics the other site supports inquiry learning about river ecology. In addition this paper will examine the use of these Internet resources for special needs students.

In evaluating the suitability of Internet resources for supporting inquiry-based instruction, it is necessary to first define what is meant by the term, "inquiry-based instruction." While no single universally agreed upon definition of inquiry-based learning exists, it is generally accepted that inquiry based classrooms are student centered and emphasize cooperative "hands-on and minds-on" learning activities in which problem solving and creative thinking are strongly emphasized. Through these experiences, curriculum goals are met as students construct meaningful, broadly applicable, well-structured, information-rich knowledge, skills, and affective domain attributes. The nature of inquiry-based instruction is perhaps most clearly described in the "vision" of the National Science Education Standards. As envisioned in the *Standards*, inquiry-based teachers function as facilitators and supporters of student learning rather than as disseminators of knowledge. The vision of the *Standards* is one of dynamic learning communities working within enriched learning environments supported by an educational system that has been overhauled to provide the support those communities will need. Within this setting, the *Standards* recognized the central and interactive roles of mathematics and technology in both scientific work and science instruction. According to the National Science Education Standards, in the inquiry-based classroom, students are actively engaged in cooperative, "hands-on and minds-on" learning activities that emphasize problem solving and creative thinking. Teaching problem solving and thinking skills to students with special needs, such as students with learning disabilities, mental disabilities, behavioral disorders and attention deficits, is also considered critical by many educators. Mildly handicapped students often are unsuccessful with tasks requiring inquiry and problem solving approaches (Mastropieri, Scruggs, & Butcher, 1997). However, when appropriately prompted to reason through new information, studies have indicated that students with special needs can understand better and comprehend more than when directly taught the same information (Scruggs, Mastropieri, & Sullivan, 1994; Sullivan, Mastropieri, & Scruggs, 1995). Scruggs & Mastropieri (1995) also reported that inquiry-oriented instructional practices could effectively promote the understanding of science concepts for students with mental disabilities. In their text, *the inclusive classroom; Strategies for effective instruction* (2000), Mastropieri and Scruggs note that;

> "Inquiry-oriented approaches to science and social studies, found in both textbook
> and activity approaches can also be adapted for students with special needs.
> These adaptations include use of hands-on materials, carefully structured questioning,
> redirecting attention, and reinforcing divergent, independent thinking." (p.545).

With instructional technology, in particular, multimedia applications, students with special needs can actively engage in scientific experiments requiring inquiry and problem solving and through appropriate prompting, more successfully reason through new information. "In addition to providing an opportunity to obtain and observe unique aspects of the content, these instructional delivery systems can motivate students and stimulate their curiosity" (Salend, 2001). Through these experiences, curriculum goals are met as students construct meaningful, broadly applicable, well-structured, information-rich knowledge, skills, and affective domain attributes.

While there is an abundance of Internet sites that disseminate useful content information, sites that support productive exploration of interesting academically valid questions, as discussed above, are more rare. However, some sites do make use of very effective computerized displays of quantitative information that do make data analysis more productive and intuitive. Among the most effective of these displays are animated interactive line and color gradient graphs, such as those incorporating within the River Run (http://www.uncwil.edu/riverrun/) and the physics activates found in explorescience.com. Importantly, students can, with a few points and clicks, change parameters defining the dynamic graphic displays. Thus, the utilities provide simple and engaging mediums for open exploration and powerful effective tools for hypothesis testing. As an example of a graph sequence that invites hypothesis testing, consider the graph shown in Figure 1.

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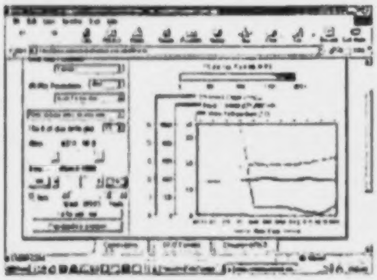

Figure 1. Data visualization from River Run Indicating highly turbid water with a high fecal coliform bacteria count at the upper sampling sites on March 9, 1998.

After developing a basic understanding of the cause-and-effect relationships underlying the displayed information, students could form hypotheses of how other variables might behave within this scenario and change system settings, and "run" animations to test their hypotheses. One of the strengths of the River Run Data Visualization Tool is that it provides numerous opportunities for students to discover and explore extremely interesting ecological events, which tend to stand out when the data is graphically displayed (Huber & Moore, 2001). These provocative anomalies are abundant because the river systems from which the data are drawn have experienced numerous highly noteworthy events during the years over which the data are collected. Specifically, the River Run resource provides data and utilities for exploring data on the water quality of the Cape Fear River and the Northeast Cape Fear River from 1995 to 2000. During these years these river systems experienced a major poultry farm spill, several ruptures of hog waste lagoons, five hurricanes, and a 500-year flood. Consequently, when water quality data on the rivers are explored using the data visualization tool, conspicuous spikes in line graphs and

flashes of color on the color mapper pop up frequently. These anomalies invite students to stop the animations, form hypotheses, reset parameters, and rerun the animations to test their hypotheses.

The explorescience.com web site facilitates inquiry by allowing a student to repeatedly conduct an experiment designed to illustrate important physical science concepts. For example in the density lab students can repeatedly conduct density experiments to reinforce the concept that density is the mass per unit of volume. This is a difficult concept for students to comprehend unless they can conduct the experiment repeatedly.

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Differential Characteristics of Students in On-Line vs. Traditional Courses

Stephen J. Jenkins, Georgia Southern University, US
Elizabeth Downs, Georgia Southern University, US

On-line offerings of courses have increased exponentially (Hall, Watkins, & Ercal, 2000). Efforts to meet the needs of diverse, non-traditional students have created a market for instruction that can be delivered in flexible formats. While the movement to increase the use of on-line instruction is rapidly moving forward, there is a lack of empirical data to identify the effects of this technology (Maki, Maki, Patterson, & Whittaker, 2000; Shelton, 2000).

There is also a corresponding scarcity of research to identify the characteristics that might influence a student to enroll in on-line instruction over traditional instruction (Robyler, 1999; Wang & Newlin, 2000). Previous research on student characteristics has focused primarily on demographics of students participating in on-line courses. Robyler (1999) found no differences in age, gender, GPA, or experience with technology when comparing students who chose distance learning over traditional courses. Wany and Newlin (2000) found students' geographical location from campus, hours at work, and number of children at home were not related to course format choice. Gender, age, and employment status had no relation to students' perception of on-line courses (Jiang & Ting, 1998).

The highly unique features of on-line instruction (e.g., lack of physical presence of instructor, flexible timing, dependence on technology) suggest corresponding personality and attitude differences between students who elect to take on-line courses and student who choose traditional courses. Few studies have examined this possibility. Robyler (1999) found that community college students who enrolled in on-line courses valued control over pace and timing of learning in the course. Wang and Newlin (2000) found that students in a distance-learning course had a higher external locus of control than students participating in a conventional course. Field-dependent students are just as successful as field-independent students in taking an on-line course (Shih, Ingebritsen, Pleasants, Flickinger, & Brown, 1998.)

Research on the personal characteristics of students who enroll in on-line courses compared to students who enroll in live format courses is highly limited and far from definitive. This inquiry addresses this informational void by examining the personality, attitude, and demographic characteristics of students who enroll in on-line classes and students who enroll in live, traditional courses.

Method and Instruments

Participants were Master's degree students enrolled Summer and Fall semesters, 2001 at a medium-sized Southern university. Students registered for one or more of three core courses required for the M.Ed. degree. Each of the three courses had both an on-line and live section. On-line courses were completely on-line as the student and instructor never met physically. Course objectives and content were identical for on-line and live sections. Of the 76 students who registered for on-line courses, 51 (67%) agreed to participate in the study. Of the 80 students who registered for live sections, 69 (86%) agreed to participate in the study. Only two students who elected to take more than one course chose to take one course on-line and the other live. These students were classified as on-line students. Data were solicited the first week of each course. The sample (N= 120) was 78% female and the average age was 31.45.

Students voluntarily completed the Sixteen Personality Factor Questionnaire (16PF) Fifth Edition (Cattell, Cattell, & Cattell, 1993) and a brief demographic and attitude questionnaire constructed by the authors. The 16PF is a 185-item, widely used instrument designed to measure personality characteristics of normal functioning adults. The instrument has 16 primary scales (e.g., Warmth, Perfectionism, Privateness, Self-Reliance) and five global scales (i.e., Extraversion, Anxiety, Tough-Mindedness, Independence, and Self-Control). Favorable validity and reliability evaluations are reported by McLellan (1995) and Watt (2000).

The author-designed questionnaire assessed student demographics and attitudes about on-line and traditional courses. Student demographics consisted of gender, age, number of graduate courses completed, employment, and number of miles residence was from campus. Students were also asked an open-ended question as to their reasons for enrolling in either an on-line course or a live course. Ten attitude items were measured on a 1-5 Likert-type scale, where 1 = strongly disagree, 3 = unsure, and 5 = strongly agree. Two-week test-retest reliability of the items averaged .65 and ranged from .51 to .79. Item numbers three ("I am very interested in learning the content of this course") and eight ("I think that the content of this course will be difficult") were excluded from the reliability analysis, as these items were not expected to remain stable, especially within the context of a five-week Summer course schedule.

Results

A multivariate analysis of variance (MANOVA) was conducted to test for 16PF scale score differences between student enrolled in on-line courses and students enrolled in live sections of courses. An overall, multivariate F (21,98)=

1.02, p = .45 was obtained, indicating no between-group 16PF differences. Thus, personality differences were not found between the two groups of students.

Means, standard deviations, and t-test results for the attitude items by group are reported in Table 1. It is apparent from Table 1 that several attitude items differed significantly by group. Students enrolled in on-line courses indicate a higher level of agreement (M = 3.50, SD = 1.01) than live format students (M = 2.39, SD = .84) on the equivalency of on-line instruction compared to traditional instruction. On-line students have a more positive view of on-line courses (M= 4.25, SD = .74) than live section students (M = 3.16, SD = .88. Students in on-line sections indicate that face-to-face interaction is not as necessary for them (M = 3.90, SD = .82) compared to students in live sections (M = 2.34, SD = .92). Finally, the meaningfulness of traditional, live instruction was rated considerably higher by students in live courses (M = 4.16, SD = .85) compared to on-line students (M = 2.70, SD = 1.02). No other attitude items differed significantly by group.

Between-group analysis of demographic items did not reveal any statistically significant differences. That is, students in on-line courses did not differ from students in live courses on gender, age, number of prior graduate courses completed, employment, or number of miles residence was from campus. Analysis of the open-ended question assessing reasons for selecting either an on-line course or a live course revealed that convenience was the reason cited most by on-line students and personal interaction was the reason cited most often by the live section students.

Discussion and Educational Importance of the Study

A result of this study is that the personality characteristics of students enrolling in on-line courses do not differ from students enrolling in live, traditional courses. The two groups of students did not differ on such 16PF scales as Independence, Openness to Change, Self-Control, Extraversion, and Self-Reliance. Higher scores on these particular scales would be congruent with the unique demands of the on-line instructional format. In mirroring the acceleration of on-line courses observed nationally (Hall, Watkins, & Ercal, 2000), this university has been offering on-line courses for three years. Thus, we may be at a point in time where on-line students are personally and demographically heterogeneous.

There were however, significant attitude differences between the two groups of students. Students in on-line courses perceived that format as more equivalent to traditional instruction and had more positive views of on-line instruction than students enrolled in live sections of courses. Also, the latter group indicated that traditional instruction is more meaningful to them and that personal interactions are important in their learning as compared to on-line students.

Essentially, on-line students' perceptions of on-line instruction were more positive than the perceptions of traditional students who viewed on-line instruction with ambivalence. This was true even though traditional students did not differ from on-line students in computer savvy and course expectations. It would seem prudent for institutions to be responsive to the ambivalent views of many students and not adopt a "one size fits all" mentality in planning instructional formats. This seems particularly advisable in postsecondary institutions in which a business model atmosphere could inappropriately define technology as a goal, not a means to an end (Katz, 2001).

A relevant observation in this study was that on-line students did not reside significantly farther away from campus than traditional students. Equally important was the finding that the majority of on-line students reported that the major reason for selecting the on-line format was convenience, not driving distance. These two findings refute the popular notion that on-line courses are a form of distance education and suggest that vigilance be used to avoid over-commitment to students' desire for convenience.

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The Learning to Teach with Technology Studio: Demonstration of a state-of-the-art Web-based Professional Development system for teaching K-12 technology integration

Jamie Kirkley, LTTS, Indiana University, US
Carolyn Scholten, LTTS, Indiana University, US

Abstract

In this demonstration and follow-up discussion, participants will examine an existing online professional development system for preK-12 technology integration and explore key issues related to designing this type of a system. One such Web-based system, the Learning to Teach with Technology Studio, will be presented. Following a demonstration of the toollearning environment, presenters and participants will examine the following key issues: (1) designing learner guidance and assessment systems; (2) balancing educational theory and practice; (3) building long-term partnerships with teachers; and (4) supporting online peer collaboration and community.

Background

In recent years, Web based professional development has expanded rapidly throughout higher education, corporate training, and the preK-12 arena. Organizations and institutions are increasingly offering Web based professional development opportunities to preK-12 educators. "Increasingly, the Internet makes it possible for educators to choose from a tantalizing array of professional development offerings – at a time and location of their own choosing" (Mather, 2000).

In the past several years, there has been an increasing body of research that highlights how technology can help to improve teaching and learning. (Barab, Hay, & Duffy, 1998; find other references). This has caused increasing demands for technology integration in schools. Recent reports have indicated that eighty percent of teachers report they do not feel prepared to integrate technology with their teaching (National Center for Education Statistics, 1999). Since finding time and resources for professional development in technology integration can be challenging, web based instruction offers a convenient, accessible, and often inexpensive method for updating technological and pedagogical expertise. It also provides opportunities to build a long-term plan for development of technology integration skills in an educational environment that, unlike short-term workshops, provides ongoing learning, mentoring and networking opportunities.

Yet Web-based learning environments are new, and principles for the design of this environment are just emerging (Duffy, Dueber, and Hawley, 1999; Kirkley, in preparation). In particular, supporting practicing professionals in a "learning anytime, anywhere" environment can be quite challenging. Yet it is the design of these types of environments that hold unique opportunities for enabling preK-12 teachers to seek convenient but high quality professional development opportunities to help them meet personal and professional goals.

Examining Issues of Developing an Online Professional Development System

The Learning to Teach with Technology Studio (LTTS) is one example of a Web based professional development system offering quality instruction in preK-12 technology integration. Funded through a five-year grant from the Department of Education's Funding for Improvement in Post Secondary Education (FIPSE), the LTTS is being developed at Indiana University to provide high quality Web-based learning modules emphasizing preK-12 technology integration. Teachers can work towards gaining professional credit units, certification, or graduate credits through partner institutions. Using an e-commerce model, teachers pay for taking modules, and module developers receive royalties.

Modules are designed by exemplary teachers who have experience integrating technology into their own K-12 classrooms. All modules use an inquiry based learning approach. Students are first presented with scenario where a problem or project is posed, and then they produce a product, such as an instructional plan, to address the problem. Problems are ill-structured because there are many ways students may develop and present a solution. Modules are centered on meeting learners' needs, which is critical for an online professional development system for inservice teachers. The LTTS also has a set of personalized tools that support the learner in reaching his or her professional goals.

There are four main issues related to designing a high quality web-based professional development environment. The first issue is developing strategies to provide learners with just-in-time guidance and assessment feedback. Currently most of the instructional design for Web based learning environments uses the information transmission-based model of learning where instruction occurs through written lectures, papers, and online tests. Yet new types of distance learning environments are being called for that promote student engagement using inquiry and problem solving (Institute for Higher Education, 1999). Inquiry based learning is one example of a learning methodology that creates opportunities for online collaboration and problem solving (Duffy et. al., 1999). Yet supporting learners in an inquiry based, learning anytime environment can be challenging and requires new methods of instruction, scaffolding, and guidance as well as tools to support them.

The second issue relates to how to balance educational theory and practice. From a situated learning theory perspective, the learner is enculturated into a community of practice (Brown, Collins, and Duguid, 1991) where cultural norms, values, communication, and knowledge are part of the interwoven process of learning. Skills, strategies, and learning processes are closely connected to their context of practice (Naidu and Oliver, 1996). Building on the notion of situated practice, LTTS offers educational experiences that help teachers examine issues and develop materials based on their own students, classroom, and teaching context. LTTS is using inquiry based learning to enable teachers to examine questions, problems, and issues from their own context and produce a final product they can use in their own classroom. Modules are designed to help teachers apply theory to their own teaching practices. Yet depending on the educational outcome, there is not always agreement to how to balance theory and practice. This is an important issue to address in order to make professional development meet the needs of learners as well as institutions granting credit.

The third issue deals with understanding how to build long term partnerships with preK-12 educators. For an online professional development system to be successful, there must be strong partnerships established with key preK-12 educational organizations. The challenge is not only in developing these linkages but designing a system that can be tailored to support those needs of these partners

The fourth and final issue is developing tools and strategies thatsupport online peer collaboration and online community. Peer interaction and collaboration has been found to have a valuable impact on learning. The joint application of the individual efforts of two or more persons to a learning-related task provides students with the opportunity develop critical thinking skills (Webb, 1989). Also, it can help students develop conceptual change and new understandings (Roschelle, 1992). Although we value collaborative learning, understanding how to support it in an online learning environment is critical to the success of any online learning system. The online learning community that LTTS will attempt to foster is influenced by the environment of instruction, peer and instructor interactions, and tools to support the learning process.

In conclusion, this demonstration will offer participants the opportunity to not only explore an innovative web-based professional development system but examine the key issues related to helping systems such as this one scale up to meet the needs of preK-12 educators as well as other audiences.

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European Computer Driving License Online Course for In-Service Teachers and Public Administrators

Karel Kveton
UNESCO International Centre for Scientific Computing
at the Czech Technical University - Prague
Czech Republic
kveton@vc.cvut.cz

Abstract: The European Computer Driving License (ECDL) is the European-wide qualification, which enables people to demonstrate their competence in computer skills. The UNESCO International Centre for Scientific Computing (ICSC) and the Czech Technical University specialists developed a first version of an ECDL Online Course in WebCT. This online course is used on a graduate level as well as for lifelong learning of teachers and public administrators.

Introduction

In the next years the Czech Republic is going to be affected by globalization and European regionalization. It will also be exposed to further global scientific and technological development of hardly predictable speed and intensity, which however indicates a number of significant surprises unprecedented in the past. The remarkably intensive internationalization will also affect the field of education. It is necessary to assume a realistic attitude to the future behavior of investors. The investors, big as well as small, expect to find in any country employees and managers who master the newest technologies and highest standards of ICT, who can run operations in branches and lead subordinates, manage the demands of new methods of work organization and who are able to communicate in an international and multi-ethnic environment.

Each of the generations will need a specific conception of lifelong learning with differentiated content, methods and approach. Such education must involve orientation towards long-term individual life planning and support active attitudes to individual employability. The Czech education system will have to change fundamentally to be fully comparable with the successful international systems, their formal aspects, but above all their content and methods.

Example of an ECDL Online Course

UNESCO International Centre for Scientific Computing (ICSC) at the Czech Technical University - Prague and the Czech Technical University specialists developed a first version of a European Computer Driving License (ECDL) Online Course. See http://www.cvut.cz/online, Demo - English version. The ECDL Online Course was developed in WebCT, which is a tool that facilitates the creation of sophisticated World Wide Web-based educational environments. For more information see http://www.webct.com/

ECDL is the European-wide qualification, which enables people to demonstrate their competence in computer skills. Key benefits for you as an individual are that it:

- raises your level of competency in IT & computer skills
- improves your productivity at home & work
- requires no prior knowledge of IT or computer skills
- provides you with an industry recognized qualification

Conclusions

The domestic and international indicators of lifelong learning show that especially our adult education develops too slowly and with poor results. Only one fourth of Czech businesses hold education and training to be the prior component of their personnel policy and the human resources development to be an integral part of their development strategy. Most sectors lack consistent education and training of the staff. The expenditures on education in Czech businesses and other organizations are less than half, compared to the same expenses in the Western European countries. Only every twentieth job applicant participates in retraining. Despite the increasing proportion of older generation in population, there has been no considerable development in their further education.

The above-mentioned reasons indicate an urgent need for a resolute turn. The following measures will be necessary:

- To specify the unclear responsibilities in various fields of adult education and to acknowledge lifelong learning as a key aspect of the national, regional, business and individual development.
- To establish support of lifelong learning using the experience of the successful countries.
- To motivate secondary schools, higher professional schools and universities to a larger use of their educational capacities for further education.
- To devise and implement accreditation mechanisms for educational programs and institutions.
- To encourage building of compatible and accessible databases listing providers of various lifelong learning forms and programs.

UNESCO International Centre for Scientific Computing (ICSC) at the Czech Technical University - Prague and the Czech Technical University specialists developed a first version of a European Computer Driving License (ECDL) Online Course. This online course is used on a graduate level as well as for lifelong learning of teachers and public administrators. See http://www.cvut.cz/online, Demo - English version, User Name "guest", Password "guest".

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Diversified Instructional Modality System for Learning Transfer

Doo Hun Lim
University of Tennessee
dhlim@utk.edu

Abstract: Transfer of learning in online learning environment has become an emerging issue in colleges and universities as more institutions try to develop and deliver instructions online. In an effort to develop effective instructional development system to promote transfer of learning in online learning environment, the Department of Human Resource Development at the University of Tennessee has initiated a project called DIMS (Diversified Instructional Modality System) and developed online courses for undergraduate students. This paper will discuss the instructional design, technical, and development issues applied to the system for meaningful and transferable learning experience.

Introduction

Many researchers have conducted studies on instructional factors affecting student's learning, but seldom are found in instructional design factors affecting learning application. Attaining high degree of learning during and after a course is important, but students value such learning experiences that can be applicable and transferable to their personal situations and future careers. In order to satisfy students' needs for learning transfer, instructional designers of online instruction are required to identify appropriate instructional strategies and events that support students' learning and application of learning. The DIMS team was created in 1997 to develop an effective instructional development system to deliver undergraduate courses online. After the startup years to develop the system and four online courses, the DIMS team members recognized that the next step to upgrade the system was adopting instructional strategies increasing students' transfer of learning as well as learning itself. As a result of the speculation, a more diversified instructional modality system was developed and applied to create transferable online instruction.

Theoretical foundation

To identify learning transfer variables in organizations, many researchers studied instructional principles and strategies supporting learning transfer. Some example factors affecting learning transfer found include the principle of identical elements (Baldwin & Ford, 1988), the relevance of the content to the learners' jobs (Bates, et al. 1997), and the teaching of general rules and principles that underlie the instructional content (McGehee, 1961). As an instructional process to promote learning transfer, Gagne introduces nine events of instruction: gain attention, inform learner of objectives, recall prerequisite knowledge, present stimulus, provide learning guidance, elicit performance, provide feedback, assess performance, enhance retention and transfer. Evaluation was another factor to assess and improve instructional quality for better learning transfer through formative and summative evaluation. All these principles and guidelines were considered to develop a comprehensive course development system by the DIMS team.

Instructional Design and Technical Consideration

When the DIMS team was initiated, direct conversion from the classroom instruction to online format was utilized for course development. This method adopted presentation based delivery format (posting slide presentations on the web) because it helped develop online instructions from exiting classroom courses in a speedy and economic way. In 2000, the DIMS Wave II, which was the next generation of the development system, was created. In this system many advanced instructional design considerations and technologies were applied.

To make students' learning experiences meaningful and transferable four major learning principles were applied in the new system. First, self-directed active learning asked the learner to engage in learning content through web interaction. The learner, therefore, was mainly responsible for getting information and knowledge for specific subject area. Instructor guided the learners with carefully planned interventions whenever they are needed and considered to be appropriate to enhance students' learning experiences. Second, networked collaborative learning was adopted to promote learners' direct and/or indirect involvement in group activities to augment their learning. Third, to make the networked learning experience successful, the learners were asked to contribute shared knowledge building by active interaction with other peer learners through question/answer sessions, group discussions, and other team based reflective learning processes conducted online. The cyclical knowledge building processes made by all students in each semester eventually have turned into a master course knowledge database that was utilized by learners, instructors, and tutors to enhance instruction later. Finally, to ensure mastery and transfer of core competencies required by each course, learners were asked to develop a plan to apply learning to their works, current studies, and daily lives at the early stage of the semester. The application plan was then evaluated and modified throughout the semester for maximumtransfer of learning to occur. By applying these learning principles, the following learning framework was developed.

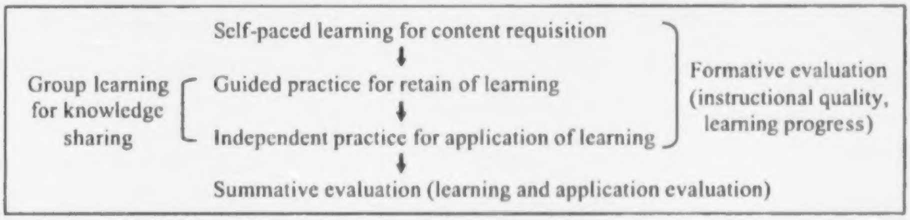
Self-paced learning for content requisition
Group learning for knowledge sharing
Guided practice for retain of learning
Independent practice for application of learning
Formative evaluation (instructional quality, learning progress)
Summative evaluation (learning and application evaluation)

Figure 1: Learning framework for DIMS

To effectively manage course development and delivery diverse web technologies were utilized. First, Java-based quiz generator was used to develop online tests and quizzes. CGI scripting enabled the use of forms for interactive activities and discussion sessions. Class assignments were also submitted through web forms using the CGI scripts. A database enabled interface system was adopted to present content of group case study and elicit group decision making through group communication and consensus. Streaming and multimedia plug-ins were required to view diverse multimedia learning contents developed for online delivery.

Outcomes and Future Needs

As a result of applying valid instructional principles and evaluation standards, the students learning experiences could have been increased to a successful degree. For example, the overall learning increase resulted from the new system was significant when it was measured and compared between the beginning and end of a course. Evidences of a high degree of learning application made by the students during the learning were also found. Many students commented their learning experiences were enhanced due to the interactive and supportive features of the delivery system.

As a future need enhance the system and quality of online instruction, the DIMS team is planning to embed a reflective mentoring system in the online instruction delivery. The major benefits of the system include stimulating the processes of analysis, synthesis and evaluation of learning content into students' learning experiences through reflective thinking and mentoring processes. Another issue is improving instructor quality for online instruction. Since those competencies required to teach online classes are different from classroom instruction, instructor development through training sessions is necessary.

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The Question of Quality: Evaluating the Effectiveness of Distance Education

Barbara Lockee, Virginia Tech, US
John Burton, Virginia Tech, US
D. Michael Moore, Virginia Tech, US
Harold Daniels, East Tennessee State University, US

Determining the effectiveness of distance-delivered courses and programs is important not only from an instructor's perspective, but a necessary function for many stakeholders involved in the support of distance education (DE) efforts. This session will address the various aspects of DE that should be assessed in order to ensure a comprehensive evaluation strategy for distributed learning experiences.

Problem Statement

The outcomes of distance education initiatives can provide valuable insights to program effectiveness, as well as justification for program continuance. Unfortunately, the questions that are often asked about DE are either too few or inaccurately focused. For example, one of the common inquiries about distance learning is how it compares to face-to-face instruction. Although prevalent, this question is a poor one, as it is based on the premise that the delivery medium is the only factor that affects learning. The field of instructional technology discourages the use of such "media comparison studies" and offers a variety of solutions for determining the instructional efficacy of DE events.

Besides the effectiveness of the instruction, many other factors contribute to the success (or failure) of distributed learning initiatives. Student support services, technology functionality and accessibility, and participant completion rates are all indicators of the quality of a distance course or program. Cost effectiveness is yet another factor that draws great attention in terms of program justification and continuance. Some institutions expend tremendous monetary resources to create technological infrastructure and student support systems, and as such, must determine if the resources invested produced the desired outcomes. As anyone involved in the implementation of DE is well aware, the complexity of DE systems can make the assessment of such efforts quite challenging.

Description of solution

All of the aforementioned issues can be addressed by a comprehensive evaluation program. Such an assessment will require the involvement of various stakeholders in the DE delivery process. This presentation will offer strategies to create a thorough and informative approach to answering the question of quality for distributed learning experiences. Recommendations will be made regarding effective questions and techniques for distance education initiatives so that attendees can implement such solutions at their own institution.

Outcome

This presentation will be conducted by a group of faculty who have both subject knowledge of evaluation design, as well as three years of experience in the delivery of an on-line Master's program in Instructional Technology. The presenters will draw from their experiences in determining their own program's effectiveness and translate that to a set of generalized evaluation practices. Having to analyze the program that they offer has been informative in terms of defining what is meant by program "success" and what factors affect successful outcomes.

Relevance to other institutions

This session will be of interest to many conference attendees, who are likely stakeholders in the success of distance education programs at their own institution. Being able to demonstrate that the heavy resource requirements of distributed learning environments produce effective returns and meet the goals of the institution will likely attract a variety of participants across the spectrum of SITE attendees.

Accessibility for Distance Education

Lisa Katherine Lundy
College of Agricultural and Life Sciences
University of Florida
USA
lkj@ufl.edu

Abstract: As cutting-edge technology enable universities to offer distance education courses to a diverse population, it becomes increasingly important that efforts are made to help students break potential technology barriers to learning. One of these potential barriers is the issue of accessibility, referring to the degree to which a person with a disability can access technology. Students taking distance education courses are required to interact with technology, often engaging in sophisticated use of technology. This also extends to research they might be required to do at a distance, once again requiring the use of technology. For students with disabilities, it is important that instructors and instructional designers consider their special needs and try to adapt the technology in their course so the students will not be at a disadvantage. This project involves the development of a web site to help instructors evaluate the accessibility of their courses and make necessary changes to increase accessibility.

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Preparing Teachers for Active Online Learning Environments

Doug MacLachlan, Online Instructional Support
Chinook College, Canada
dmaclachlan@email.cbe.ab.ca

Building a Vision

At Chinook College, we work with both classroom teachers and online teachers, preparing them to create meaningful and interesting online activities and programs for their students. The establishment of an effective professional development path is critical in creating a climate of confidence in which teachers feel supported and competent for the task. Our *right on time* professional support gives teachers the courage to be innovative, implementing new technologies in their work with students.

As educators create active online learning experiences, best practices from traditional face-to-face interaction must be adapted to the virtual setting. But more than this, students must be enabled to interact with content and community in different ways. Emerging technology tools invite us, demand of us, to consider new strategies for working with our learners.

Online teaching requires a significant cultural shift on the part of teachers and curriculum designers in order to optimize the interactive and collaborative potential of networked activities. (Kearsley, 2000). It may, in fact, require a lengthy process in terms of changing well-developed teaching methods. Teachers often have to adapt to a world unfamiliar to them yet very familiar to their students. Helping educators to make this shift will be a critical factor in the effectiveness of any virtual learning program. Staff development for teachers must prepare them for a role of both coach and resource facilitator whereby they nurture active learners toward participation in their own learning processes. (Kearsley & Lynch, 1994)

Who creates the staff development opportunities when the environment is so young, compared to traditional classrooms? How does a rapidly evolving technological system allow for effective vision-building and skill development? Philip Schlechty (1997) uses the term *trailblazers* to describe those who take the first steps in systemic change. These paradigm-breakers are the very few who have strong enough beliefs in themselves to pursue their novel ideas, in the face of a lack of belief displayed by the current system.

While there may be a number of trailblazers in a large institution, there is an art to finding and empowering them. The desired systemic change calls for at least a minimum of support and recognition along with the freedom to make and learn from mistakes. Gathering and mentoring those with a love for learning and a pioneer spirit must be done in a manner that is sustainable and purpose-driven. Our experience is that the desired outcome is best realized through a planned staff development initiative. Teachers require a timely support environment in addition to entry points commensurate with their skill level. This is in contrast to *drive-by staff development* (Senge, 2000) where training is viewed as a one-shot event, disconnected from the essential work of schooling.

In Chinook College's professional development program, educators start at a common point, and then choose their route based on the context of their teaching. Classroom teachers are given support as they create activities designed to enhance the learning experience of their students. Teachers who facilitate courses in our online program are mentored in a different way through participation in a virtual hub, a source of ideas, information, intervention, solutions, tutorial help and modeling. The themes of designing and facilitating online learning are explored in our PD courses, all of which are offered online, within a framework of understandings validated by the most current research. These themes will be developed in the remainder of this paper and illustrated through sample activities from our professional development courses.

Illustrating Themes of Online Learning

Participants in Chinook College's PD courses become online students for several weeks in courses facilitated by one or more trained instructors. By identifying strategies for building an online learning community, teacher-students come to see the range of learning options that support interaction, collaboration, and social presence.

Creating a Community of Inquiry

When teaching and learning migrate from the classroom to cyberspace, there are significant changes in the way that learners interact with the instructor and with each other. Palloff and Pratt (1999) make a case for a new paradigm of education arising out of cyberspace communities. "Key to the learning process are the interactions among students themselves, the interactions between faculty and students, and the collaboration in learning that results from these interactions" (p. 5).

Social interaction in a virtual learning environment has the potential to create a "community of inquiry" in which socially shared cognition takes place and critical thinking skills are practiced (Garrison, Anderson & Archer, 2000). A community of inquiry allows for the critical analysis of subject matter, questioning, and the challenging of assumptions. Such a community consists of three interacting components: cognitive presence, social presence and teacher presence. Cognitive presence describes the relative ability of the learner to construct meaning through sustained communication. Social presence is an emotionally and intellectually attractive telepresence, the degree to which a learner is perceived as a *real person* in the online learning community. Teacher presence includes both the design and management of the learning sequences, the provision of subject matter expertise, and the facilitation of active learning.

In our professional development courses, a variety of threaded discussions allow teachers to engage one another in meaningful inquiry. Following is a sample exchange over the issue of "cheating" in the online environment. The purpose of the activity is to allow teachers to experience an asynchronous discussion and determine in their own minds *the value this form of critical discourse might bring to their work with students.* The topic chosen is one that invariably brings out strong feelings from educators and results in some interesting exchanges.

Message no. 1367: posted by Course Facilitator on Fri Nov 30, 2001 23:39
A major concern about online learning revolves around the authenticity of student work. What responses would you provide if you were asked "How do we know that the student we are communicating with online really did the work?"

Message no. 1376: [Branch from no. 1367] posted by Ellie on Sat Dec 1, 2001 11:18
I think that over a variety of assignments including the discussion forums, chat and writing assignments, the student's "voice" emerges. Inconsistencies would certainly show. Bottom line, even with passwords, user names and established processes, the element of trust and the importance of knowing the student are critical. I guess that the same question could be asked about the completion of courses for students who meet face to face- and many of the answers would be the same.
Ellie

Message no. 1400: [Branch from no. 1376] posted by Loretta on Sun Dec 2, 2001 13:38
I think that after spending time with the student, and getting to know their level of commitment to completing their course, you develop a "sense" of that student, their comfort level and abilities. Hence, you would know their work and be able to recognize any discrepancies.
Loretta

Message no. 1417: [Branch from no. 1400] posted by Sylvie on Sun May 13, 2001 18:35
I agree with Ellie's first statement however, another question emerges. What if a friend or a parent has been doing the course work (chats, discussions, quizzes...) from the beginning. It would be very difficult to distinguish the students "voice". I believe that trusting the students is very important, but establishing a social presence among the students of the online class is just as important as the students' abilities.
Sylvie

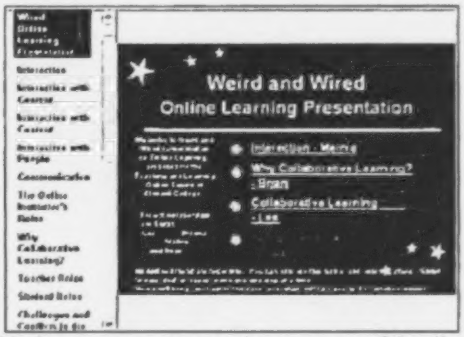
Figure 1: Transcript of Asynchronous Discussion

The postings by teachers in Figure 1 illustrate how conferencing contributed to the growth of a community of inquiry in an introductory online PD course. Garrison, Anderson and Archer (2001) have concluded from their research that computer conferencing lends itself well to critical, practical inquiry. A computer conference will serve as a true educational environment if it moves beyond "undirected, unreflective, random exchanges and dumps of opinion." (p. 21). Accordingly, our conferences are directed, focused and mediated if necessary by the facilitator.

Promoting Collaborative Learning

Far too much current training is aimed at short-term knowledge or skills acquisition—dealing with immediate needs (Drucker, 1995). "Learning how to learn" and project-based collaborative learning skills are rarely part of this training, yet these are the kinds of skills that employers say they want and that a knowledge-based economy demands. If individuals do not want to be left behind in the "turbulent, white water systems" of the new economy, they will require constant learning of new information and new skills (Vaill, 1996).

Many educators have discovered the role that technology can play in building collaborative learning group environments (Harasim et al, 1997). One of our professional development activities gives teachers the opportunity to experience the challenges and rewards of collaborating with colleagues electronically. The assignment requires group members to allocate responsibilities, choose a group leader and establish benchmarks for work completion. Each group is allocated a private discussion forum for planning and web space within the course, to which they post their final project as a presentation to the class. Following is a screen capture of one page from one presentation:



Weird and Wired
Online Learning Presentation

- Why Collaborative Learning? - Brian
- Collaborative Learning - Lee

Fig. 2 Slide from a group presentation on successful online learning

As we prepare our learners to be knowledge workers, a major focus must be on their ability to work with others in completing a project. Teacher-students not only extend this critical competency to the online world, but are also invited to reflect on their experience, frustrations and all.

Offering Interactivity and Visualization

What is interactivity in the context of an online course? Gilbert and Moore (1998) focus on the reciprocal exchange between the technology and the learner. Using this definition, one might conclude that any assignment is interactive if it involves human or computer-generated response to learner input. Gilbert and Moore do take the argument further, though, citing the factor of "influence" as critical. Interaction, or interactivity (they use the terms interchangeably), occurs when there is an interplay and exchange in which learners are influenced by technology, groups or other individuals.

While the first level of Chinook's PD courses focus on facilitating student learning, the second level provides opportunities for in-depth examination of designing for active online learning. A question we always ask is "what difference would it make if we printed the course and handed it to the student to complete offline?". This speaks to the issue of optimizing the incredible potential of the Internet for interaction and visualization. The fact that our K-12 students are described as the *Net Generation* creates a whole new pressure and impetus to be creative in our use of technology (Tapscott, 1998). These young people engage with information sources on the net, as well as with other people, then construct higher-level structures and mental images.

One activity in our eDesign course requires teacher-students to collaboratively create a learning activity that will require learner interaction with a micrometer, a device used to measure small objects. An interactive java applet is embedded in a page of the PD course, as it would be in a mathematics course. Teachers are put in virtual groups and

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asked to dialogue with each other and come up with an activity that would guide students in their manipulation and exploration of the micrometer. The groups then post their activity for others in the class to critique.

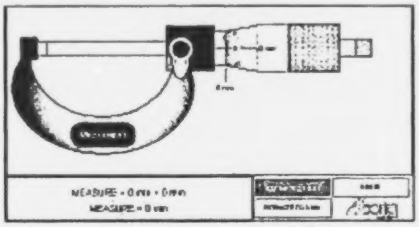

Fig. 3 Screen capture of interactive Micrometer Applet

One of the ideas generated involves: 1) holding up a few different objects (such as coins) to the monitor, then measuring by manipulating the java applet; 2) changing the resolution of the monitor and measuring each object again; 3) finding the ratio of the two measurements for each object and looking for a constant. The process involves both individual and group construction of knowledge, though no physical measuring device is ever utilized. Similar activities are included to address outcomes of other curricular areas.

Providing for Active Assessment

Teachers are designers as well as teaching and learning experts. We design learning experiences to lead our students to the achievement of learning outcomes. We modify those learning experiences so that we can be sure that all our learners understand. In addition, we design assessments that enable us to determine whether students have achieved those outcomes.

In creating an activity that integrates ICT (Information and Communication Technology) into curriculum, thoughtful planning is crucial. There are a variety of instructional design models that can help us in planning learning experiences. e-Valuator, a Professional Development course on assessment, invites teachers to design an assessment based on a model called "backward design", described more fully by McTighe and Wiggins in their book, *Understanding by Design* (1998). There are three stages in the process of backward design: identify desired results, determine acceptable evidence, then plan teaching and learning experiences.

The course helps teachers to examine the many issues related to effectively assessing students in online programs and activities. Additionally, they are provided with training in using the assessment tools available in the course management software. One of the directed activities in this course requires the teacher-learners to write a one-page proposal for an ICT activity they would like to design, using the backward design model. In doing so, they must come up with an "essential question" around which the activity is based and decide what will be accepted as evidence that the student has achieved curriculum and ICT outcomes. In other words, how will learning be assessed? Finally, they must write a rationale for the activity, describing where they would use it in their course.

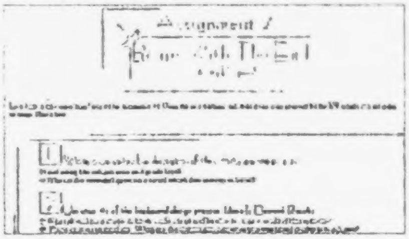

Fig. 4 ICT Assignment Introduction

Conclusion

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Four themes of active learning have been discussed and illustrated in this paper. Several other themes must also be addressed by training initiatives for online educators. Some of these include reflection and feedback, thought-provoking entry points, clear outcomes and criteria for success, choice in process and product, focus on real-world applications and fostering emotional intelligence.

An exploration of changing instructor roles must accompany the hands-on investigation of each theme. Through semi-structured interviews of 20 university professors, Coppola, Hiltz and Rotter (2001) determined that instructors experience role changes in three domains as they move into e-learning environments: cognitive, affective, and managerial. Both online instructors and teachers who choose to include a distributed learning component in their classroom work must recognize and prepare for this crucial transformation.

No medium, in and of itself, will likely improve learning in a significant way when it is used to deliver instruction (Owston, 1997). The important professional development will focus on curriculum opportunities and teaching strategies that will improve learning by bringing the power of new technologies into the daily life of the classroom, virtual or face-to-face (McKenzie, 2000).

Abstract: This paper describes a professional development path designed to support teachers as they shift from the traditional teaching environment to one that incorporates a virtual component. Several key themes of designing and facilitating online learning activities are discussed, in the context of preparing teachers to take on these roles. Each theme will be illustrated through sample activities from online PD courses and will also be discussed within a framework of understandings validated by current research.

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Remote Assessment Methods for Deaf and Hard-of-Hearing, On-Line Learners

James R. Mallory, MS, Associate Professor
Applied Computer Technology Department
National Technical Institute for the Deaf
Rochester Institute of Technology
United States of America
jrmnet@rit.edu

Abstract: One challenge with online, remote teaching is properly evaluating the learner's knowledge in a fair, secure and efficient manner. Many teachers are apprehensive about online testing for a variety of reasons. One cannot touch upon the issue of remote assessment without also getting into the issue of ethics on the part of the student audience.

When implementing a testing method, factors such as security, ease and timeliness for data collection, ease of use by the students, turn around time and feedback to the students, flexibility of how the testing is done and administration/implementation are but a few of the issues that one should consider when implementing remote testing, whether the audience be deaf, hard-of-hearing, or hearing.

Introduction

Asynchronous, remote, online learning (also referred to as distance learning, e-learning, virtual learning, etc.) has evolved over the past 20 years in secondary education and is now rapidly growing. Much of this growth is due to increased Internet access speeds and new demographics of remote students who are enrolling in these types of courses. This same evolution is also occurring with the deaf and hard-of-hearing population. RIT, one of the largest providers of online learning classes in the U.S., enrolls 30 to 50 deaf and hard-of-hearing students each quarter into their online courses.

The growth of this online type of instruction brings with it a host of other issues, among them being the assessment of the learner's knowledge and the ethical practices of students taking these assessments. Although online assessment is available, traditional on-campus teachers do not readily embrace it like online learning teachers do for a variety of reasons. There are various commonly shared concerns by faculty using remote assessment methods. Some of these issues are covered in this paper, along with three proven methods of remote assessment used at RIT.

The Study

The findings reported in this paper were based on assessments used during RIT academic quarters and on surveys given to students at the end of the quarter in actual classes taught by either the author or by other RIT faculty. Data includes feedback from traditional, on-campus as well as distance learning deaf, hard-of-hearing and hearing students. Opinions, experiences and statements from various RIT faculty and distance learning technical administrators are also considered in the findings described in this paper. These assessment methods were used to not only evaluate the students' knowledge in the traditional or virtual classroom, but also to conduct preliminary research in an attempt to enhance distance learning specifically for the deaf and hard-of-hearing population. The "findings" are thus tentative and provide suggestions for more formal research in this area.

Three assessment methods used at RIT/NTID are remote proctoring, web-based testing through multiple choice and fill in questions, and downloading and uploading answers using electronic conferencing software.

1. Remote Proctoring Testing Method

With this method, a remote proctor, (usually the student's supervisor, manager of an office area, library or other establishment) administers the exam and then collects it and submits this to the online learning office via FAX or US Mail. The exam is usually a traditional paper format where the student fills in the appropriate answers. The tests can be open book or closed book, and a time limit can be established if appropriate. Upon receiving the test from the instructor, the online learning office then forwards the test to the proctor. The proctor has signed a contract with the online learning office agreeing to certain terms. This testing method provides as much flexibility as the traditional paper tests handed out in a traditional class.

2. Web-Based Testing Through Multiple Choice and Fill in Questions

This is the method the author prefers to use after six years of delivering online instruction to deaf, hard-of-hearing and hearing students and experimenting with the three methods described in this paper. In this online testing method, the instructor develops a number of questions, usually in a multiple-choice type of format, and posts this on a virtual system or web site with protected access. The students login to the site with their own unique username and password and take the test. The student has to select the correct answer from a list of potential solutions.

There is a way to also incorporate essay types of questions into these tests with systems such as Ideatools™ if this feature is needed. Ideatools is a turnkey, Web-based course development system developed by Simon Ting, an instructional developer at NTID. Ideatools is currently a local application that has some unique features lacking in commercial products. The trademark for Ideatools is currently pending. For more information about this system, contact Simon at his email address: SKTNMP@rit.edu.

When the student finishes answering all of the questions to his/her satisfaction, he/she then presses the *submit* button and the test is automatically posted in the administrator section of the site and the multiple-choice questions are automatically graded. Open-ended questions need to be graded individually by the instructor by accessing each student's test individually.

This Web-Based testing could also be combined with a lab assistant or other proctor to add another layer of security if the teacher felt it was needed as described in method 1 above.

3. Downloading and Uploading Answers Using Electronic Conferencing Software

In this method, a test *template* is developed using a common software format such as Microsoft Word. This template is designed so that the students can download the test from a folder in the electronic conference, type the answers to the questions directly into the template and then upload the exam to the secure conference drop box during the allotted time period. FirstClass™ conferencing software was used by the author and a number of his RIT colleagues to evaluate this method of assessment.

Findings

The most prevalent teacher concerns with any remote type of assessment seem to be: the integrity issue of whether a student is actually taking the test himself/herself and is not getting help or is not really someone else; the teacher's discomfort with the technology; conceptual limitations of the assessment; ease of use of the technology by students; how easy and how timely data collection will be; how difficult administering the testing will be. These issues will be discussed as they relate to each type of remote testing method below.

1. Remote Proctoring Testing Method

Remote proctoring seems to be the most secure of the three methods and allows the maximum flexibility for asking questions in a format that does not limit the teacher in a conceptual way. Instructors can design the tests in the manner they have been accustomed to with no limitations. The only thing to keep in mind is that students cannot ask for clarifications. Mistakes in the test cannot readily be clarified for the students, so tests should be as clear and as error free as possible.

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One pitfall of this type of assessment could be the lack of integrity of a proctor, which from the author's experience is rarely an issue. Normally a professional person with visibility and accountability within a company or a public service sector normally sings the proctor contract and actually proctor's the test. Another downside could be if remote students knew each other, took the test at different times and clued each other in on the content of the test. This could happen since this testing is asynchronous (students take it at their convenience as arranged by the proctor). Several years experience with thousands of students and faculty at RIT has shown that these issues are rarely a problem.

Another pitfall from an instructor/student perspective is turnaround time. There is usually at least a one-week window between the time the instructor submits the test to the online learning office for dissemination to the time it is graded and returned to the student. Tests seem to trickle into the instructor's traditional paper mailbox using this method. Grading has to be done manually one test as a time similar to traditional classroom exams. This slow turnaround time is often annoying to the remote student who is anxious for prompt feedback.

2. Web-Based Testing Through Multiple Choice and Fill in Question Method

This is the most time efficient way of distributing, grading and providing feedback to the students, but it is also the most limiting conceptually. Most of the work for this kind of testing is done up front developing the exam to fit the online format. An exam has to be designed in a format that fits properly on the computer monitor when viewed through a web browser. The author chose NTID's IDEA Tools designed by NTID developer Simon Ting to implement this, although there are many other products on the market that would work fine for this task.

Multiple-choice types of questions are ideal for this type of system. There are also ways to incorporate fill-in types of essay questions, but they are much harder to grade and immediate student feedback for fill-in questions is not possible due to the way in which these are graded and the automated nature of reporting the results. There are usually automatic grading instruments that will provide timely feedback to a student on how they did as soon as they complete the test or at a time designated by the instructor. Different weighting of questions is often difficult to achieve with these systems, so it is easiest to design an exam where each question is worth the same number of points.

Students enjoy the prompt feedback from this kind of assessment system, but this feedback may not incorporate a curve or a slight change that the instructor may have added after the test was posted. Again it is advisable to have the test as error free as possible once it is posted.

Another logistical item to pay attention to is that spacing sometimes changes once it is viewed on the web through a browser. The instructor could design a perfect, error free test in Microsoft Word, but once it is posted on the Web and viewed from a browser, it may look slightly different. The author has experienced several situations where one space or a shifted character could determine whether the output to a computer programming question is correct or incorrect, and this has become an issue.

Each question must also be limited in size so that the sample code and the output choices all fit on the monitor screen. If there are several multiple-choice answers for a particular section of programming code for example, the students need to be able to see the original code for each answer that is provided. If the questions were not designed correctly, the user would have to scroll up and down to view the entire question and all of the corresponding answers.

The online method is a great way to test students who are not able to take advantage of the proctor system, such as technicians who are out in the field, people who work swing shifts, or independent consultants who travel frequently or are stuck in remote geographical areas. It is also a great way to combine and compare the results of on-campus students to remote students. During one quarter, the author was able to test traditional, on-campus, college aged deaf students along with a group of 15 hearing Pittsburgh Telephone company technicians using the same online testing method and compare their results. The deaf students took the test in their department's lab while being proctored by a lab assistant and the remote students took the test independently on their own. The results of the two groups were similar.

3. Downloading and Uploading Answers Using Electronic Conferencing Software

This method is fairly secure for remote testing, because the electronic conference can detect which student downloaded the test, at exactly what time the test was downloaded and what time the test was submitted back to the conference. Tests uploaded to a drop box are very secure, because only the teacher can read each of the tests. The advantage to the student is that they can view their submission details to assure that the test was received by the instructor and see the time and date at which it was received as well as when the teacher viewed and downloaded their test to grade it. FirstClass™ was used for the electronic conference of choice for the author's study.

Teacher Opinions and Issues with All Types of Remote Assessment

Whether talking to a teacher or doing a literature search, the issue of audience integrity frequently arises when the topic of remote assessment comes up. For this reason, many online teachers also choose to include authentic assessments such as student projects, group projects, term papers, portfolios of student work, and so on to determine the overall grade of a student for a given course.

One NTID faculty member, Dr. Greg Emerton, summarized what the author has found to be typical faculty concerns using online testing in a traditional classroom. Greg opted not to use computer testing for some of the following reasons: "I do my exams in class to maximize control of the testing situation." G. R. Emerton (personal communication, May 22nd, 2001) This security issue is probably the most prominent concern in online testing when talking to most teachers. Another faculty member, Dr. Marc Marschark, states his opinion of online testing. "I was concerned that if I had students answer essay questions online, they might be getting assistance (my tests are 'open book' -- not 'open friend'). Of course, that's no different than would be the case for take-home exams...but I never use those." M. E. Marschark (personal communication, May 22nd, 2001) Emerton also was concerned about the conceptual limitations of online testing. "My exams typically consist of a mixture of true/false and multiple choice questions and a number of short answer essays will allow the individual student to express what he or she knows about the topic. Reading across all of the answers for a given question also gives me a better sense of how the class is responding than scoring individual tests." This particular concern could easily be addressed by any one of the three remote assessment models previously described.

The responses of professors Emerton and Marschark are not uncommon. They are both master teachers and have many years experience teaching deaf and hard-of-hearing students at the post-secondary level. Their mindset is common among secondary and post-secondary instructors that the author has had a chance to interview.

Authors Findings on Remote Student Testing Integrity

The author has periodically allowed selected groups of on-campus students to take online tests both remotely on their own as well as in a controlled lab environment with a proctor present in his C++ and Visual Basic (VB) programming courses. Overall there was virtually no difference in the selected students' test scores, whether they take the test in a class or remotely on their own. Plenty of students have done poorly in their remote testing, when they could have easily booted up their computer and copied and pasted the program into a VB or C++ compiler to get the correct answers.

Distance Learning (DL) students' responses on remote tests also indicate that they did not cheat, as they could have easily uncovered the answers using the same computer that they were using to take the test. As a whole, DL students tend to do better, but according to the author's survey findings, this was because of the students' age and work ethic rather than due to the fact that they are using remote testing.

Authors Findings from Student Surveys

For the past two years, the author has collected data from deaf and hard-of-hearing students who participated in both on-campus and DL classes in an effort to better understand the advantages and disadvantages of the DL format and delivery and assessment methods for deaf learners. There is very little data or information currently available about deaf, online learners themselves and how useful online assessment is to their overall learning. The presence of the National Technical Institute for the Deaf (NTID) on Rochester Institute of Technology's (RIT) campus with 30 - 50 deaf and hard-of-hearing students

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enrolled in Distance Learning (DL) courses each quarter provides an opportunity for examining these DL learners.

Because of the author's interest in the topic and the lack of information available, two questionnaires, with overlapping items, were developed to obtain deaf students' perceptions of the DL experience and to gather data on the work ethic and other characteristics of these students. (Mallory & Long, 2001). One questionnaire was general to all RIT DL students (of which 20 out of 33 responded) and a second was specific to computer programming courses taught in the Applied Computer Technology Department on campus (of which 19 out of 26 responded). This paper focuses on the work ethic and assessment parts of these questionnaires for the fall, 2001 quarter. This questionnaire consisted of 35 items, (12 demographic, 6 open ended, and 17 Likert items) which asked students to rate the importance of various instructional components for their overall learning. Students were asked to rate course components on a five-point scale from "not important at all" to "very important". They were also asked demographic and other types of questions, such as how old they were, what their communication preferences were and how many hours per week they spent working on this course. (Mallory & Long, 2001)

Within the ACT department, DL students put substantially more time each week into course preparation. For the ACT programming courses, 100% of the DL students put in at least 11-15 hours per week or more into the course each week, with 33% putting in 11-15 hours, 33% putting in 16-20 hours and 33% putting in 21 hours or more each week into course preparation. Their on-campus peers did not even come close to the same work ethic, with 35% putting in 1- 4 hours, 59% putting in 5-10 hours, 6% putting in 11-15 hours and nobody putting in 16 hours or more per week.

Conclusions

Online assessment has become the model of choice for most remote teaching faculty at RIT and elsewhere throughout the country. This method of assessment is slowly gaining acceptance into the traditional classrooms for the deaf and hard-of-hearing in a variety of NTID classes as a viable alternative to traditional paper test taking. There are always trade offs, of course, and there are still things that traditional campus test taking can do that remote testing cannot. The application of these remote models depends to a large extent on the student population that it is serving and the comfort level of the instructor using this technology. A less mature audience or students with certain learning disabilities may not be a good fit for this type of assessment.

The evolution of traditional classroom teachers to online testing is growing slowly. It is often more work and not worth it pedagogically for teachers in traditional classrooms to change their method to a more automated way of assessing students. Online or distance learning instructors are more enthusiastically adapting these models.

Most teacher concerns are due to a lack of knowledge and experience of what remote assessment can actually do. These teachers do not have or are unwilling to spend the time to convert and debug their testing methods to an online format.

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Electronic Conferencing in the Classroom

James R. Mallory, MS, Associate Professor
Applied Computer Technology Department
jrmnet@rit.edu

Kathryn L. Schmitz, MS, Assistant Professor
English Department
kls4344@ritvax.rit.edu

National Technical Institute for the Deaf
Rochester Institute of Technology
United States of America

Abstract: Electronic Conferencing (also referred to as groupware) has become a frequently used tool in both on-campus and remote online learning classrooms. NTID faculty members have gained valuable experience with several electronic conferencing software products. The wide variety of class demographics covered in this paper included all deaf, all hearing and deaf/hearing mainstreamed student audiences in both traditional and on-campus, Distance Learning, and hybrid types of courses, with both traditional-aged college students and adult learners.

Introduction

College students today are constantly on the World Wide Web and regularly checking their email on the Internet. In fact, the United States as a whole is headed this way. The number of Americans with online access has more than doubled from 45 million users in 1998 to 105 million users in 2001. Of Americans with Internet access, the percentage of online users with home broadband access has grown from 6 percent in December 1999 to 19 percent as of September 2001. (Mount, 2001, pp. 44-45) In education and industry, email usage has increased also, as has the use of electronic conferencing. The number of email messages sent by America Online users on the busiest day of the year jumped from under 50 million in 1998 to just under 300 million in 2001(Mount, 2001, pp. 44-45). Although the authors were unable to find minimal usage statistics in electronic conferencing, it is increasing in the same proportions.

This paper focuses on the use of electronic conferencing in the education arena. One author, Kathryn Schmitz, teaches English. The other author, James Mallory, teaches computer programming. Both authors have experience using Blackboard Conferencing, and one author has extensive experience with First Class and the other author is a relatively new user with Prometheus in the classroom. This paper is intended to give the reader a balanced perspective from both a new and experienced teacher/user perspective as well as using electronic conferencing to deliver technical and non-technical courses both in the traditional on-campus manner and in an online format.

The Study

The author's combined anecdotal experience derived in this paper comes from teaching deaf students in a traditional classroom setting and hearing, deaf and hard-of-hearing students in remote online learning classrooms. Data in this paper will come from students directly taught by each of the authors as well as information that was derived from a survey of deaf and hard-of-hearing online learners. The experiences reported in this paper were conducted in search of ways to enhance on-campus and distance learning courses for deaf and hard-of-hearing students. The "findings" are thus merely suggestions for more formal research in this area.

Collectively, the two authors teach 80 to 100 deaf and hard-of-hearing on-campus students each quarter. One author teaches computer programming and the other teaches English to this similar population.

Each quarter RIT averages 30-50 online learners who are deaf or hard of hearing and enrolled in a variety of technical and non-technical classes. One hundred percent of the on-campus students and 85 percent of the deaf and hard-of-hearing DL students described in this paper had access to high-speed Internet connections. Of the online students, 60 percent were deaf and 40 percent were hard of hearing. In this group, 45 percent of these students stated that English was their first language, 45 percent reported that ASL was their first language, and 10 percent stated that a language other than English or ASL was their first language. For the on-campus population, 63 percent of the students reported that English was their first language, 26 percent stated that ASL was their first language, and 11 percent of these students stated that a language other than English or ASL was their first language.

Findings

Integrating Electronic Conferencing into Remote Online Classrooms

Conferencing is crucial in a remote classroom because this contact is the forum where students get to know their instructor and one other. Students reveal their personalities, helping to form an online community, which then helps to make challenging technical courses more palatable and improves retention. Conferencing is crucial when information needs to be shared in an asynchronous, "anytime, anyplace" manner. The drop box feature of conferences lends itself easily to secure submissions of homework assignments.

Integrating Electronic Conferencing into Traditional Classrooms

Conferencing has improved many on-campus courses as well. The online community interaction helped to remove communication barriers between deaf and hearing students and faculty. Passive students who are often dominated by their more aggressive peers in traditional classrooms frequently blossom in an online environment. Different course sections that share common course content have been successfully blended by combining remote hearing and deaf professionals with on-campus traditional college-aged deaf students through electronic conferencing. Students enjoy the luxury of access to course materials and information on a 24-hour/7-day-a-week basis.

Types and Categories of Electronic Conferencing

Of the two categories of groupware used in online learning, one uses Web browsers and the other uses a separate client program. The web browser approach to groupware, such as Blackboard™ and Prometheus™, is often referred to as a "thin client" product. The groupware product that uses separate client programs, such as FirstClass™ are referred to as a "fat client" type of product. Web browsers are ubiquitous, and for most students who are new to online learning, the thin client approach has the advantage of employing a familiar tool with generally familiar navigation. Fat clients on the other hand offer more features and may be faster in some aspects.

Among the most popular fat client products used today are FirstClass™ and Lotus Notes™. Among the most popular thin client products are Prometheus™, Blackboard™, and Web CT. This paper focuses on the experience of the author with three products, Blackboard, FirstClass, and Prometheus. These three products will be compared via survey results from students, faculty, and administrators.

Blackboard

Blackboard 5™, the version of this eLearning software currently in use at RIT, is easy for students to learn and use. Students use their RIT username and password to log on to the system to access any and all Blackboard-enabled courses for which they are registered. From this common "Courses" page, they can link to a catalog of all Blackboard courses on the campus, to a web search engine, or to the main page of a specific course.

The main page of the course presents them with announcements and a teacher customizable menu of buttons that link them to course documents, assignments, online assessments, a synchronous virtual classroom, and a variety of communication and support tools. A course map button gives students access to a schematic of the entire contents of the course web site that can be expanded to whatever level of specificity the student requires. Special areas can be created for study groups which are accessible only to group members and the instructor. These include a discussion board, group virtual classroom, file exchange capabilities, and email. Students can also easily create their own web pages, which allows them to express their individuality and share their interests with others in the course. One of the features that students seem to especially like is access to the grade book.

In addition to the "Courses" page, Blackboard offers students two other pages, a "Community" page with a calendar and open discussion board for use by the larger campus Blackboard community, and an "Academic Web Resources" page where students and faculty can access current news, information, and full text articles in a variety of disciplines.

Blackboard is also quite easy for the instructor to use and customize by accessing a variety of functions from the instructor's control panel. Course materials in almost any format can be uploaded with the click of a button. Several textbook publishers provide course cartridges that integrate their materials into the Blackboard program. Email can be sent to selected students or to all students with a mouse click. File exchange between student and teacher using a drop box is another useful feature. A pool of test questions can be created, and unique online assessments constructed from the question pool with only a series of point and click maneuvers. The instructor has complete control over the accessibility of online assessments, including whether or not they are timed, can be taken more than once, and if the students are allowed to view their errors and the correct answers after completing the assessment. The program scores the test and enters the scores automatically into the grade book, a feature that makes online testing attractive to both faculty and students.

Blackboard Negatives

The speed and robustness of a student's Internet connection is a potential constraint on use of an interactive browser-based program like Blackboard. Students with slow dial-up modem connections may have problems viewing or downloading graphics intensive material or even navigating through the course. Students may lose their connection for a variety of reasons, including problems with the dial-up service, and be blocked from accessing a "one attempt" test. Although an indicator appears in the grade book alerting the instructor to an aborted test, there is no way to know if the disconnect was an accident or if the student was trying to get a peek at the test before actually taking it. Students who do not own a personal computer will need to access course materials from a campus lab computer. This may put them at a slight disadvantage to students who have 24/7 access. Finally, while Blackboard is relatively easy to learn, there are a few features that can be confusing. The drop box has two buttons – "Add file" which saves the file to the students own drop box, and "Send file" which sends the file to the instructor. A common error is for students to think they sent their instructor a file when they in fact have only saved it.

Prometheus

Prometheus™ is relatively new and has been available at RIT for about one year. The last time the authors checked, there are more than 30 colleges and universities using Prometheus, compared to more than 1,400 using Blackboard™. Prometheus includes almost all of the same features as Blackboard, noted above, with a few differences.

Prometheus is developed with Cold Fusion, an open-source code, which makes it attractive if the student user needs a customized solution. The product's open-source code allows the subscribers to modify their installation, and the community of Prometheus developers can then share enhancements they have made to their installation. The user community associated with Prometheus will have a lot to do with how successful the open-source code concept will be. Time will tell if the developer community can be effective in developing, testing, and delivering coherent improvements quickly and safely.

One of the most important features of Prometheus are course modules that allows the instructor to teach multiple sections of a course while managing only one set of course materials. The ability to provide direct URLs and link to files within and without the system enhances the provision of information resources. Prometheus also has a mathematics editor so the teacher can enter equations and symbols directly into the system. In addition, the text editor includes various colors and fonts.

Prometheus Negatives

Among the product features, the "Discussion" tool has been heavily criticized for being difficult to navigate. RIT has made a few changes to their installation to improve these difficulties, and more changes are expected to come. Uploading files to the instructor from within the drop box function can be confusing to new users, but that too is being improved. A significant negative to this system is how new material is flagged as unread. The system indicates which section the new material is posted in by showing a small blue circle with a letter in it, such as F for Files or O for Outline, in the user's main page, but upon clicking on the circle, the user is only taken to that section of the system, not right to the new material. In the case of the course Outline section, the user is shown the entire list of sessions with no indication of which one has new material.

Compared with Blackboard, Prometheus' visual appearance is busy and crowded. Course announcements are presented on the login page, not the main page, which students frequently miss in the process of getting right into the course materials. At this time, the text editor in Prometheus does not include a Track Changes feature such as MS Word offers, which would be useful in editing student essays online. In addition, the system has difficulty running movies smoothly at times, even with broadband access.

FirstClass

FirstClass™ has an online chat feature similar to the previously two mentioned software products, which works well for occasional synchronous chats. If a student is not able to participate in the chat, then the discussion can be posted within the conference for later usage.

This system's folders and sub folders are great for organizing and storing items that don't need to be discussed, such as submitted homework and exams. Conferences and sub conferences are ideal for interacting on a topic or for dividing up topics that need to be discussed or shared. It is easy to change permissions in FirstClass so that only a certain student group can access the information in a certain sub older.

The authors found the permission feature useful when combining both remote online courses with traditional on-campus courses into a common conference. As an example, in a C++ programming class at NTID, the on-campus students had a weekly quiz, whereas the remote students only had three tests per quarter. One sub folder was accessible for remote online students only, and another was limited to only the on-campus students. When demo instructional programs were posted, these were posted in a folder that was readable by both of these populations.

FirstClass Negatives

The fact that FirstClass is a fat client type of product requires the user to load the software on each computer that he/she wishes to use. Some students find this to be inconvenient, especially if they are required on their job to work on a variety of computers or if it is an on-campus student and the particular lab they are using does not have FirstClass loaded. The web version of FirstClass is not as functional as the client version.

One must maintain relatively flat folder architecture due to the way in which FirstClass flags messages. A red flag attached to the message indicates a message has not been read. This flag only propagates up one level, so if a folder is several levels down, a newly posted message would not be readily evident. If a folder structure is deep, the red flag would not be seen when a student or instructor first logs into the conference. Another negative using this software is if a message is already marked as read and the instructor wishes to move this message to a sub folder, the message will be moved and pop up as being unread again.

Conclusions

Electronic conferencing is a useful tool in both the on-campus and online classroom. When combined with the other strategies and tools in the classroom, the authors found electronic conferencing a wonderful communication enhancement which leveled the communication playing field and opened up the classroom. It also promoted personal responsibility on the part of the students, who could not so easily claim that the course resources were not available to them since they all were already online 24/7.

In general, the authors found First Class to be a bit more challenging in the beginning to get everything set up and get students rolling, but easier to use and manage once it was set up. Prometheus was easier for students to learn upon startup, but the inadequate flagging of new material made it difficult for the instructor to be sure that students saw new homework assignments or revisions to the course syllabus or outline.

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Evaluating the Effectiveness of Online Instructional and Delivery Technologies for Deaf and Hard-of-Hearing Students

James R. Mallory, MS, Associate Professor
Applied Computer Technology Department
jrmnet@rit.edu

Gary L. Long, PhD, Associate Professor
Research Department
gllerd@rit.edu

National Technical Institute for the Deaf
Rochester Institute of Technology
United States of America

Abstract: This paper summarizes the authors' findings for student ratings of the variety of instructional technologies used for RIT's online learning courses and discusses implications for deaf and hard-of-hearing learners. The authors have been using varied technologies for delivering instruction and interacting with both on-campus and Distance Learning (DL) classes for many years with deaf, hearing and hard-of-hearing students. Some of the technologies used include electronic conferencing, VHS tape and web-streamed videos, web based instruction with text and graphics, digital video conferencing, multimedia desktop capturing simulation, sample source code and executable programming examples and Windows Media Player.

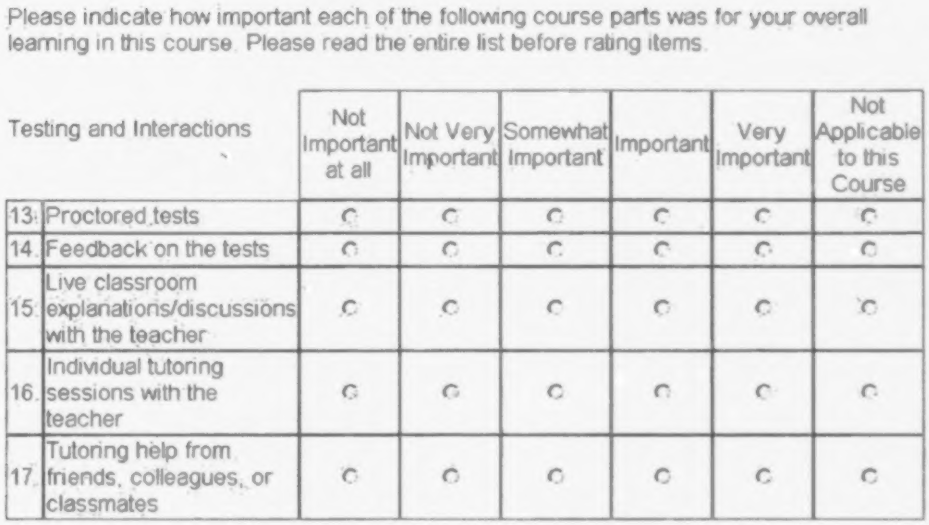
Introduction

For the past two years, the authors have collected data from deaf and hard-of-hearing students who participated in both on-campus and DL classes in an effort to better understand the advantages and disadvantages of the DL format and delivery methods for deaf learners. There is very little data or information currently available about deaf, online learners regarding which components of online learning are important for their mastery of course material. The presence of the National Technical Institute for the Deaf (NTID) on Rochester Institute of Technology's (RIT) campus with 30 - 50 deaf and hard-of-hearing students enrolled in Distance Learning (DL) courses each quarter provides an opportunity for examining these DL learners.

Because of the authors' interest in the topic and the lack of information available, two questionnaires, with overlapping items, were developed to obtain deaf students' perceptions of the DL experience. One questionnaire was general to all RIT DL students and a second was specific to computer programming courses taught in the Applied Computer Technology Department on campus. This paper focuses on the questionnaire for all of the deaf DL learners at RIT for the fall, 2001 quarter. This questionnaire consisted of 35 items, (12 demographic, 6 open ended, and 17 Likert items) which asked students to rate the importance of various instructional components for their overall learning. Students were asked to rate on a five-point scale from "not important at all" to "very important" the following course components:

1. Testing and Interactions
2. Groupware Conferences
3. Web, Textbook and Instruction, Videotape
4. Homework and Interactions

A sample of the online survey can be seen in (Fig. 1) below.



Please indicate how important each of the following course parts was for your overall learning in this course. Please read the entire list before rating items.

Testing and Interactions		Not Important at all	Not Very Important	Somewhat Important	Important	Very Important	Not Applicable to this Course
13.	Proctored tests	○	○	○	○	○	○
14.	Feedback on the tests	○	○	○	○	○	○
15.	Live classroom explanations/discussions with the teacher	○	○	○	○	○	○
16.	Individual tutoring sessions with the teacher	○	○	○	○	○	○
17.	Tutoring help from friends, colleagues, or classmates	○	○	○	○	○	○

Figure 1: Likert Question Samples from the RIT Online Survey

The Study

Procedure

Thirty-three students with a declared hearing loss enrolled in online learning courses taught at Rochester Institute of Technology (RIT) during the fall, 2001 academic quarter. Twenty of these students responded to a 35-item questionnaire that was administered online at the end of the quarter. Respondents were entered into a lottery and two individuals were randomly selected and received a $25.00 gift certificate for their participation.

Subjects

Participants were volunteers who were enrolled in graduate (30%) and undergraduate (70%) courses at RIT during Fall Quarter 2001. Approximately 35% of the students were enrolled in applied science/computer science courses, while the remainder of the students, (65%), were enrolled in liberal arts or business courses.

Sixty percent of the respondents considered themselves deaf while (40%) considered themselves as hard-of-hearing. An equal percent of respondents indicted that their first language was English (45%) said that their first language was American Sign Language (ASL)(45%). Ten percent of the sample was deaf students who indicated that a language other than English or ASL was their first language.

Findings

As a group, the respondents were not new to online learning and expected to do well in the present class. Seventy-five percent of the students had participated in a DL course prior to this one and 65% of the students indicated that they had used electronic conferencing before. Eight percent of the students expected to receive either an A or B in the course they were evaluating.

Communication

Instructor and student comments posed on an electronic conferences were seen as important or very important for students' overall learning by (80%) and (70%) respectively. The following comments from students further clarify how the electronic conference was important for their learning.

> *"Everyone has a different insight of quality management. The students that I am in class with has different background in their job, when they share their experience, you can see overall that not all management is the same or effective."*

> *"I like this course because it is easy to communication with teacher and student at anytime, I mean 24 hours a day to contact him instead of sign up on the door to see him in person."*

> *"Very effective and simple. I have a problem, immediately contact the teacher and will hear from them asap!~ I love it!"* (Mallory & Long, 2001)

Sixty-five percent of the students indicated that the textbook or materials developed by the instructor were important or very important for their overall learning. Similarly, (60%) of the respondents indicated that a reference book was important or very important for their overall learning. Less traditional approaches for delivery of instruction web text, and graphic-based explanations, were rated as important or very important for overall learning by (40%) of the students. Lastly, feedback on the class tests was rated as important or very important for learning by (50%) of the respondents. These ratings take on more meaning when the following student comments are added to the total picture:

> *"It's a wonderful textbook."*

> *"Online quiz can be taken over till you get 100%."*(Mallory & Long, 2001)

Homework

A real strength of online learning seems to be the availability of feedback/comments related to homework assignments. Eighty-five percent of students felt that teacher's written explanation of homework was important or very important for their overall learning. Seventy-five percent of the students perceived online interaction/comments by the instructor and fellow classmates as important or very important for their learning from homework.

Deafness and Distance Learning

When asked, "What did you like about distance learning," 35% of the students indicated that the flexibility and pact of the learning were attractive features. Examples of these comments are:

> *"The flexibility of doing things on my own pace, with a time frame."*

> *"I can do this on my own time, it frees me from having to go to boring classes."*

> *"...going at my own pace is excellent about distance learning, and it makes my schedule more flexible ____ not requiring class attendance."* (Mallory & Long, 2001)

Thirty percent of the respondents indicated that one of the advantages of distance learning for a deaf or hard-of-hearing learner is the ease of communication. These student comments are illustrative:

> *"ability to communicate freely without barriers."*

> *"Everything is text based and hearing isn't a problem."*

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> *"freedom of participation"* (Mallory & Long, 2001)

The following statement by graduate student presents a direct comparison of the traditional classroom and the distance learning format for a deaf learner:

> *"I think I am a natural distance learning student! For my bachelor's I was in terrible shape since I couldn't really follow what was going on in the classroom. I didn't know enough sign to really understand the interpreters, the material moved too fast for me to get it from the instructor, so I felt I was a bad student and so on, so my GPA was horrible even though I honestly worked hard. I was lucky to have graduated with a 2.5 GPA. Now through distance learning I get the exact same material presented in the exact same way as everyone else in the class, hearing or deaf. It makes no difference, and I am able to make a positive contribution. I'm much more confident because I don't have the doubt that I'm missing something just said. For my Master's I have a 3.9 GPA, my sole B was, ironically, not a distance learning class but in a classroom, and on top of that without an interpreter available, and with a lot of classroom discussion. So I doubt I'll take an in-class course if I can ever help it."* (Mallory & Long, 2001)

Finally, when students were asked, "What did you not like about distance learning?" thirty-five percent of the students said "nothing." The remaining comments focused on feeling more isolated in the distance-learning format:

> *"No class discussion."*
>
> *"I missed the interaction with teacher and peers on RIT campus."*
>
> *"Students in telecourses sometimes feel isolated ... sometimes miss the real-timing face-to-face interaction."* (Mallory & Long, 2001)

A couple of students mentioned that a distance-learning student needs to be disciplined:

> *"I do not have the discipline for it."*
>
> *"Having to check FC on more than a daily basis. Too many things were done last minute and I couldn't keep up."* (Mallory & Long, 2001)

Conclusions

This paper verified the preference that deaf students have for most aspects of a virtual, asynchronous type of classroom over a traditional on-campus classroom. Many RIT students saw the "flexibility" of the DL format as its most positive aspect. This perspective was reflected by one student who said "I like being able to do the homework and tests when I can." Other deaf students pointed to increased ease of communication allowed by online learning, "I like to sit by my computer and discuss with the teacher as much as I can, compared to the classroom where I will have to listen to the professor and have a limited time to discuss." (Mallory & Long, 2001) Frequently the asynchronous aspect of DL learning is mentioned as a preferred means of gathering knowledge and communicating.

The results from this paper with deaf and hard-of-hearing online learners in many ways is consistent with findings by Long and Richardson in a study at the Open University, London, England with approximately 200 deaf and hard-of-hearing adult respondents. (Long & Richardson, 2000) The English deaf and hard-of-hearing students were older, average age of 50, compared to this paper's study where 45% of the students were 23 years old or less, 35% were 24 – 30 years old, 20% were 31 – 40 years old and 0% were over 40. In the Long and Richardson study, deaf learners were positive about the flexibility and pace of the online learning environment. Deaf learners also pointed to the ease of communication in this environment as compared to a more traditional classroom setting. In some ways, it appears that this instructional format helps "level the playing field" for deaf learners.

One of the potential side effects discovered in the England study which was not found to be true with the RIT population with this new mode of interacting with teachers and peers was a reported sense of isolation. One deaf respondent in the Long and Richardson study said "I often feel isolated from others when taking a DL course, but as a deaf learner I am used to that" The feeling of isolation would represent a small percentage of the population from the author's perspective and data described in this paper. The authors' felt that this was due to the lack of proper considerations and accommodations for the delivery and conferencing systems used in England. This situation did not seem to exist at the RIT classes, as all the video types of instruction were captioned or developed with the deaf audience in mind. Online communities were actually developed while students regularly interacted with each other asynchronously within the electronic conferences. In fact, Mallory used electronic conferencing to successfully combine remote, online hearing and deaf students with traditional on-campus college aged deaf students taking programming classes into one large online community. (Mallory, 2001) This diverse population of young, college aged deaf and hard-of-hearing students regularly interacted with deaf and hard-of-hearing adults who were out working full time in the corporate world. One remote class of hearing adult Pittsburgh Telephone company technicians were also integrated with deaf on-campus and corporate programmers in a C++ programming class.

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Integrating Multimedia and Video Streamed Instruction into a Deaf and Hard-of-Hearing Classroom

James R. Mallory, MS, Associate Professor
Applied Computer Technology Department
jrmnet@rit.edu

Harry G. Lang, Ed.D., Professor
Research Department
hgl9008@rit.edu
National Technical Institute for the Deaf
Rochester Institute of Technology
Unites States of America

Abstract: Multimedia and video streamed instruction delivered remotely via the web is becoming more prevalent for both the deaf and hearing Distance Learning (DL) population. Video streaming is becoming more popular because more students are connected to the Web at higher access speeds at home, work or school. Multimedia instruction is becoming more viable due to computers with faster CPU speeds, more RAM memory and larger hard disk storage.

There are various factors to consider when an instructor incorporates video streaming or multimedia instruction into their remote or on-campus lesson plans. Some methods are cost effective and simple to implement, while others are more expensive and complex, with longer learning curves. Some of the multimedia concepts discussed in this paper include the use of screen capturing software, screen graphic tools, video streaming from small desktop cameras and the use of camcorders for recording streamed videos.

Introduction

Today there are many cost efficient ways to deliver instruction to a remote audience, regardless of whether they are deaf, hard-of-hearing or hearing. The tools used and discussed by the authors in a "Multimedia Toolbox" include:

1. HiLighter™ – a screen visual tool, which turns a computer monitor into a flexible, artistic means of displaying and emphasizing information. Screen enhancement tools such as HiLighter cause computer generated presentations to become more lively and clear.
2. Snagit™ - A monitor sequence capture program which captures a computer screen and saves and stores it in a variety of different formats (*.bmp, *.jpg, *.tiff, etc.).
3. Camtasia Recorder™ – A monitor sequence capture software program which captures a computer monitor's sequence of events, allowing the instructor to deliver step-by-step animated instructions. This can be stand-alone instruction or used in conjunction with text and graphic based explanations.
4. Video Streamed Instruction, using sign language, recorded by: a digital camcorder; a small Logitech Camera mounted to a laptop computer; a studio grade production camera (and also streamed simultaneously with computer monitor captures, captioning and audio.

The Study

Multimedia tools

Multimedia screen tools were studied and initially tested in order to discover the best way to deliver technology instruction to a remote deaf and hard-of-hearing audiences. These tools proved to be extremely useful for delivering instruction to traditional classroom students and in other presentations as well. Streaming was studied as a way to incorporate sign language with other aspects of remote instruction. This paper will describe the authors' successes and failure in these areas. The authors hope that the findings in this paper will provide suggestions for more formal research in the future.

The authors at the National Technical Institute for the Deaf (NTID) at Rochester Institute of Technology (RIT) investigated the use of "smart" white boards for delivering online Visual Basic (VB) instruction. This was found to be awkward, due to the need for the teacher to move around and also be able to use the computer. Shadows resulting from using sign language and front projections caused interference in the visual communication, the primary means of communication for most of the deaf and hard-of-hearing students. Rear projection may have been a feasible alternative, but was cost prohibitive. A more acceptable solution was to turn the computer monitor itself into a usable white board. There are two software products that allowed use of the monitor as an online classroom white board – Altiris HiLighter and TechSmith's Camtasia. HighLighter allowed graphics and text to be drawn on the monitor while Camtasia captured any movements or action which occured on the monitor.

HiLighter™ is a unique, desktop enhancement software which is easy to learn and will allow the remote instructor to use his/her monitor as a whiteboard for instructional purposes. Some of the HiLighter features include:

- Draw on-screen with transparent or solid color pen (similar to a television sportscaster)
- Zoom in on a user-defined area of the screen
- Shine a spotlight of any size or contrast around the screen
- Point arrows or other icons of any size to any screen location

HiLighter is produced by Altiris™ and can be found at: http://www.altiris.com/.

SnagIt™ is a tool that can produce customized screen captures with the press of a hotkey. SnagIt capture software will capture images, text, and video from a Windows desktop. Snagit allows the instructor to capture text or graphics from all applications, even those that don't offer Cut and Paste. Images from Web sites, scanners, digital cameras or anything that can be seen on the computer screen can be captured. Captures can be sent to a file, the clipboard, the Web, as an e-mail attachment or posted on an electronic conference for the benefit of the remote audience. Snagit is a Techsmith™ product. (www.techsmith.com)

The use of moving pictures or animation to supplement text-based instruction is invaluable for explaining complicated course content to a deaf or hard-of-hearing remote audience. Camtasia™ captures the action and sound, (this is irrelevant for our deaf but not our hard-of-hearing audience) from any part of the Windows desktop and saves it to a standard AVI movie file or streaming video. The Camtasia screen recordings can then be posted on the remote course's electronic conference, shared on a Web site, or distributed via e-mail, an Intranet or CD. Camtasia is also a Techsmith™ product.

The first author successfully explained to a remote deaf audience how to construct computer programming designs in Visual Basic (VB) software code. The VB graphical user interface design and properties as well as the coding of each object could be exactly described within one instructional unit using this type of software.

Video Streaming

Video streaming can be thought of as a progressive downloading of a video file. Instead of waiting a long time for a movie to be downloaded to one's desktop all at once and then viewing it, the video is fed or "streamed" in small units of information at a time and is viewed as it is being downloaded. Streamed video is much more conducive to viewing large video files that may last from many minutes up to an hour or more. The video could be live or prerecorded and stored on digital media.

The three most popular video file types are Quicktime™, an ".mov" type of file, Microsoft Media Player™, an ".avi" type of file, and RealPlayer™, a ".rm" type of file. RealPlayer became the streaming software of choice for most of the NTID projects. Real Player works on both Macs and PC's. It has a proven track record in the streaming video arena. It was found to be complicated when embedded into HTML, however. When a RealPlayer streaming presentation contains multiple clips, such as sign language videos, computer screen images, captioning, etc., it needs to use the Synchronized Multimedia Integration Language (SMIL) to coordinate all of the parts. SMIL is a simple but powerful markup language for specifying how and when clips play. A SMIL file is not required to stream just one clip, so if an instructor wanted to simply send a streamed video clip with sign language, dealing with the SMIL file would not be necessary and this would greatly simplify the implementation of streaming. When multiple clips exist such as in the project described by the authors below, the process becomes much more complex because more than one stream is involved and a SMIL file needs to be used. After writing the SMIL file, the video is then ready to put on the RealServer and link to the Web page.

NTID has experiences with a large variety of streaming video projects and pilots — several conducted by the authors are described in this paper.

Visual Basic Programming

A pilot study implemented by the first authorinvolved delivering Visual Basic Programming instruction remotely to students enrolled in either on-campus or distance learning programming courses offered by the Applied Computer Technology Department. Each video streamed unit was linked from the teacher's instructional web site, which can be viewed at: http://idea3.rit.edu/jmallory2/vb/. RealPlayer and SMIL were used to simultaneously stream four events at the same time, including the computer monitor, sign language, audio and captioning. These multiple streams captured the Visual Basic (VB) programming demonstrations and were stored on a server and accessed asynchronously. These streamed files can be accessed in the "Visual Basic" folder located at the URL: http://nisvideoserver.rit.edu/OnlineWhole.htm. If the user needs to download a free version of Realplayer, it can be found at: http://www.real.com/. These video streams are best viewed using a recent version of Internet Explorer.

A hand held Panasonic camcorder was also used to record student responses during a national, week-long Visual Basic Programming workshop that he offered on campus to alumni who came from across the country. The participants' comments were recorded with the camcorder and posted on the server after the addition of captioning. These can be found in the "DHT VB Workshop" folder located at the URL: http://nisvideoserver.rit.edu/OnlineWhole.htm.

Technical Signs

The authors also developed some pilot modules illustrating technical sign language for a forthcoming in-depth study of signs used for science instruction of deaf students. Using desktop Logitech™ cameras at several locations and in two different formats available from Logitech (*.exe file and *.rm file), several streaming videos were produced to evaluate the quality of reception on different platforms. These can be seen in the "Pilot Modules" folder at the URL: http://nisvideoserver.rit.edu/OnlineWhole.htm.

Streaming videos in *.mov format were easily produced with a digital camera and embedded in html as part of a National Science Foundation grant titled *Clearinghouse On Mathematics, Engineering, Technology and Science* (COMETS). Several "Video Examples" are shown at http://www.rit.edu/~comets/pages/cos/signguidelines.html.

Classroom of the Sea

The third video streaming pilot study involved the Classroom of the Sea (COS), also a National Science Foundation sponsored grant project. COS involves a collaborative team from the National Undersea Research Center for the North Atlantic and Great Lakes, University of Connecticut, American School for the Deaf in Hartford, and the second author of the present paper at Rochester Institute of Technology. To develop a means for communicating in sign language with high quality transmissions over the Internet, VBrick™ from VBrick Systems (www.vbrick.com) was used to set up a "vbx server". Ivar Babb and Peter Scheifele worked with their technical staff in using a digital video camera with the deaf students on a boat, the *RV Connecticut*, on the Atlantic during a water sampling activity. This signal was fed into the RV Connecticut's network and then transmitted from the vessel to the antenna on the Marine Sciences building into the building's LAN. From there it was picked up/split to 1 or 2 Vbricks to test the high quality imagery coming to the shore. One of these signals was sent to the vbx server which will trans code the signal to Windows Media™. This was the streaming format for viewing the web video with Streamplayer2™. The transmissions could also be viewed on the project's web page. Both a static video camera and a mobile camera were used to transmit the messages in American Sign Language describing the at-sea research.

Findings

Multimedia Tools

All of the multimedia tools, HiLighter, Snagit and Camtasia, worked well when creating instruction to be directly delivered or when embedding instruction into streamed videos for use with deaf and hard-of-hearing students in remote locations. HiLighter was also found to be useful for working with visually impaired students in the computer labs on-campus.

Video Streaming

Technical Signs

The video stream modules produced with a Logitech QuickCam™ were successfully sent back and forth via email and posted them on the web using both a PC and an iMac. Logitech's software allows the user to create and save the video as either a *.exe or *.rm file. These streaming files are very easy to create and email to people. Storing them on a server proved to be a bit more challenging due to software requirements and conflicts. In addition, only PC's can read the *exe type of Logitech file, whereas both PC's and Mac's can read the *.rm type of file. These two formats can be viewed at seen in the "Pilot Modules" folder at the URL: http://nisvideoserver.rit.edu/OnlineWhole.htm, and also at: http://www.rit.edu/~jrmnet/Streaming/Index.htm. The sign language was of fairly high resolution when a video was sent via email or stored on the server. Live video, depending on the connection, can be choppy, as found in the pilot study with the Classroom of the Sea project. The authors' felt that this was due to the connection topology as found in the study done by Mallory and Laury (2001) at NTID. In this study, desktop cameras and various network topologies and connections were studied as part of Laury's Master thesis. (Laury, 2001; (Mallory & Laury, 2001). One challenge reading the *.rm files produced by Logitech was not due to the Logitech software itself, but rather due to bugs in browser software. At first, the authors could view the files from a PC but they did not work with a Mac G4. The use of Netscape™ appeared to be the problem. Microsoft's Internet Explorer™ proved to be far easier to read files that were posted on a server. Conflicts arose depending on which was loaded first, the browser software or RealPlayer. Browsers often contain their own version of RealPlayer, so conflicts can occur if Realplayer is loaded separately. The browsers in this pilot had to be reloaded so that there would not be a conflict when running the streamed videos. More systematic study is needed under the four conditions (Mac/Netscape, Mac/IE, PC/Netscape, PC/IE).

Visual Basic I Project

Assistance was obtained from NTID's Instructional Television and Technical Services departments in an attempt to develop high-end, multiple streamed instruction which could be remotely and asynchronously accessed by students. Capturing a video and digitizing it is relatively easy. Converting the video-to-video stream into Real Player format is the difficult part if multiple streams are being combined; otherwise it also a fairly simple process. The easiest way to record a video is to have a camcorder that is digital and a connecting Fire Wire. This will allow the user to directly port the movie into the computer in a digital format. This movie can then easily be edited with a product such as Adobe Premier or other similar product. This would produce a high quality video. An analog camcorder could be used with the standard Audio Visual (AV) ports and a video capture card on a computer. Using this method requires more steps, because the movie has to be converted from analog to digital by going through the AV port and back. This method would work, but the video quality would degrade.

Streaming of the video is the most difficult part of this process if the developer is synchronizing multiple streams. If only a recorded video of sign language is being posted, the procedure is quite simple. The goal is to code the streamed video onto a web page for asynchronous viewing. The clearer the movie file is to view, the larger its file size will have to be. There is a trade-off between what file size is adequate to be able to understand sign language and the instruction when it is streamed to the user's desktop and what is a practical file size to store and stream video over a broadband connection. For video by itself, 15 frames per second throughput is normally fine to adequately view on the web. When combining multiple streams as mentioned above in the Visual Basic Programming instruction, however, throughput of 30 frames per second is recommended for the best clarity. The signal speed and clarity will tend to degrade as the various streams are combined and posted on the web. There are various PC Video editing software available. One product, Adobe™ Premier™ runs on either platform and was chosen for this project. There is also another Mac based video editing software, named iMovie, which is very popular. A large capacity server needs to be used for video stream hosting. A good "rule of thumb" to use is video typically consumes one megabit per minute for an average video.

Conclusions

Multimedia tools such as HiLighter, SnagIt and Camtasia can be used very successfully in delivering instruction to remote deaf and hard-of-hearing students. Video streaming is also ready to use for this same instructional purpose, but it is still not perfected yet due to a variety of evolving technology factors related to browsers, various streaming formats and connection speeds of the end users.

The authors found the streaming implemented for the Visual Basic Programming Course to be satisfactory. Primary concerns in this pilot project were related to the synchronizing of four different streams into a single instructional video, which demanded higher bandwidth. The streamed VB instruction worked fine, as long as the audience was connected at a high-speed Internet connection and used a recent version of Internet Explorer and RealPlayer. Using a Netscape browser, a low speed connection or a loaded system rendered the multiple streamed videos unacceptable.

During the initial tests of live video streaming, the streams were found to be very good quality for understanding sign language and seeing the science students working, although the signals were choppy at times, and at other times frozen for a while. Much was also learned about how to place the camera and, especially, use proper lighting for the primarily visual communication among deaf people.

Continued study of these technologies will assure enhanced streaming video quality in the future instruction of deaf and hard-of-hearing students, who will certainly benefit from the highly visual nature of these products.

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Synchronous, Remote, Internet Conferencing with Deaf and Hard-of-Hearing Students

James R. Mallory, MS, Associate Professor
Applied Computer Technology Department
jrmnet@rit.edu

Harry Lang, Ed.D., Professor
Research Department
hgl9008@rit.edu

National Technical Institute for the Deaf
Rochester Institute of Technology
United States of America

Abstract: This paper focuses on the authors' experiences with interactive, synchronous internet video conferencing with deaf and hard-of-hearing students in two different settings. One setting involved teaching computer programming to remote deaf and hard-of-hearing students. Within the realm of this remote teaching, synchronous, remote tutoring was set up using Desktop Video Conferencing (DVC) using Logitech cameras and Microsoft's NetMeeting software. Another setting involves a science project that used one static and one mobile camera with Vbrick™ software to transmit sign language communication from a boat at sea to computers located at the university.

Introduction

In the past, distance learning with two-way video was out of reach for many remote students and institutions. Recent innovations in telecommunications have lowered equipment and transmission cost, making two-way desktop video feasible for businesses, classrooms, libraries, and even homes. In the education of deaf students, video conferencing is also becoming more prevalent due to the inexpensive pricing of desktop cameras and hand-held camcorders as well as the increased access speed at which the deaf and hard-of-hearing audience is accessing the Web.

The horrendous events of September 11th have also discouraged travel and encouraged the use of remote interactions. For example, one of the authors, who himself is deaf, was supposed to travel to England to present at a conference in mid September but "due to the disruption caused to flights from America following the terrorist attacks Dr. Lang was unable to attend" (Evening Telegraph, 2001, p. 2). An mm225 ISDN dual mode videophone was used in Derby, England, to project the speaker on a large screen. The presenter transmitted his lecture on the topic of video telephony from the Rochester Institute of Technology in Rochester, New York, to the conference in Derby, England. Remote interactions as demonstrated by this example are becoming more prevalent with the advance of technology.

In this paper, the authors share their experience in two different arenas. One area is teaching computer programming courses to deaf and hard of hearing students in remote locations. In these courses Desktop Video Conferencing (DVC) was used in remote, synchronous tutoring sessions. Initial experiments in delivering science concepts and sign language from a boat with deaf students and their teachers out at sea will also be briefly summarized.

Affordable broadband connections and technologies at home, work and school are rapidly growing. These high-speed connections are changing the capability of carrying large amounts of text, voice and video data over existing telephone and cable lines. Microsoft summarized the technology in a very concise manner: "For years now, computer networks such as the Internet have been carrying text-based messages around the world. Most often, these messages take the form of electronic mail, though real-time chat programs are also used. As the quality and speed of computer networks increase, so do demands for higher levels of interaction that include voice, graphics, and video exchange in real-time. This growing trend toward richer communications via computer is known as Internet Conferencing." (Microsoft, 2001, USA-L_News@yahoogroups.com)

Various researchers have investigated the transmission of sign language, which features significant motion of the arms and hands, and requires a frame rate high enough for smooth motion perception (Schumeyer, Heredia, & Barner, 1997). Science teachers such as Mary Ellsworth at the Model Secondary School for the Deaf in Washington, DC (http://csc.gallaudet.edu/soarhigh/SHMAHOM.HTM), have also previously experimented with computer-based videoconferencing over ISDN lines. Such research and instructional efforts are pioneering. Educators of deaf students eagerly await progress with the new technologies.

The Study

The experiments reported in this paper were action research projects conducted in search of ways to enhance distance learning. The "findings" are thus tentative and provide suggestions for more formal research.

Most of the Distance Learning (DL) courses at Rochester Institute of Technology (RIT) and the National Technical Institute for the Deaf (NTID), one of RIT's colleges, have focused on asynchronous (any time, any place) delivery of instruction. After teaching multiple remote, DL computer programming courses to a deaf and hard-of-hearing audience, however, it was found that both synchronous and asynchronous types of online instruction are necessary for some students to have a successful distance learning experience.

One author tutored remote deaf and hard-of-hearing students via a QuickCam Desktop Camera in conjunction with Microsoft's NetMeeting as an asynchronous tool for clarifying concepts with one deaf student and one teacher. This is often referred to as point-to-point video conferencing, where only two people can talk and see each other at a time. Although this hardware and software can easily incorporate group conferencing of remote students by the instructor, the project reported on in this paper involved only point-to-point video conferencing. The students selected were tutored on an individual basis in a credit-bearing DL course in Visual Basic Programming.

Desktop Video Conferencing (DVC) is one of many different types of conferencing tools. The DVC components include a video conferencing camera, such as the QuickCam camera used for this project, an Internet telephony application, a microphone, and speakers mounted to the local computer (the microphone and speaker built into a laptop computer were found to be adequate). DVC links two or more participants at different sites by using computer network(s) to transmit data. DVC is based on Codec (compressor-decompressor) technology. A Codec works via a mathematic computer algorithm to compress and decompress digital data. The data can be video, audio, or text based. A Codec is an important part of any Internet telephony application such as Microsoft's Netmeeting.

To use Desktop video conferencing, the student and instructor both need to have a computer, a camera, and an Internet connection to send and receive the video. From the authors' experience, the computer should be a Pentium-based PC running on Windows 95, 98, NT or Windows 2000. The authors have no experience with the new XP, Linux or other operating systems yet. The faster the processor speed the better the video will run. All the Pentium based processors are more than adequate to handle DVC. The user should have at least 32 MB RAM, although more memory will be better, especially if the user plans to have other applications open when using DVC. The PC should have enough hard disk space for file swapping; at least 20 MB would be a minimal requirement. A video capture card is also necessary.

The Internet connection for conferencing should be as fast as possible. It is recommended that both users be connected at speeds much faster than the Plain Old Telephone System's (POTS) 28.8 kb per second. A Local Area Network (LAN) with Roadrunner™, Integrated Services Digital Network (ISDN™), the Digital Subscriber Line (DSL™), or T1 connection would be optimal. Temasek Polytechnic does an excellent job of laying out system requirement and step-by-step instructions on how to set up DVC on their website. (Temasek Polytecnic, 2001, http://eicu.tp.edu.sg/DVC/index.htm)

The camera chosen should be a desktop type of camera that easily interfaces with the computer. Although the QuickCam had many features for storing photographs, it was the video feature of the DVC and the low price that was the most appealing for the project discussed in this paper. The QuickCam camera is capable of recording video at up to 30 frames a second.

Classroom of the Sea Experiments

The Classroom of the Sea is a National Science Foundation sponsored grant project with a collaborative team from the National Undersea Research Center for the North Atlantic and Great Lakes, University of Connecticut, American School for the Deaf in Hartford, and the second author at Rochester Institute of Technology. To develop a means for communicating in sign language with high quality transmissions over the Internet, VBrick fromVBrick Systems (www.vbrick.com) was used to set up a "vbx server". A digital video camera was used with the deaf students on a boat, the RV Connecticut, on the Atlantic during a water sampling activity. This signal was fed into the RV Connecticut's network and then transmitted from the vessel to the antenna on the Marine Sciences building into the buildings LAN. From there it was picked up/split to one or two Vbricks to test the high quality imagery coming to the shore. One of these signals was sent to the vbx server which transcoded the signal to Windows Media. This was the streaming format for viewing the web video with Streamplayer2. The transmissions could also be viewed on the project's web page.

Both a static video camera and a mobile camera were used to transmit the messages in American Sign Language describing the at-sea research. Initial experiments proved successful. The ability to read sign language over the Internet was of sufficient quality to continue planning for two-way transmissions on an ongoing basis. Experiments with classroom lectures, including the use of Power Point slides, using this system were also successful. This will allow the team of scientists and educators in four different locations to interact during various science learning excursions with deaf students.

Conclusions

DVC is both inexpensive and easy for instructors and students to implement. The technology significantly enhanced remote tutoring sessions by making remote interactions more personal. Communication with the deaf and hard-of-hearing relies heavily on facial expressions, body language and gestures. DVC, when combined with the other tools mentioned in this paper, provided an adequate environment for successful remote tutoring sessions.

In distance learning tutoring for the deaf and hard-of-hearing, DVC is often too slow and choppy for fluid, extended sign language conversations, but it does allow the sharing of some limited sign language, gestures, facial expressions and body language. This real-time interaction significantly enhances chat sessions and white board viewing of instructional material such as text explanations or computer program source code. Netmeeting also allows the use of highlighting and drawing on top of instructional materials, which can easily be posted on the online white board or even saved later in an electronic conference.

Video conferencing is becoming more affordable as use of broadband connections and technologies such as ISDN, DSL and Road Runner at home, work and school increase. These high-speed connections will change the capability of carrying large amounts of text, voice and video data over existing telephone and cable lines. Videoconferencing systems also incorporate compressed digital video. This compression technology makes the transmission of video less costly by reducing the size of the video needed to be transmitted.

Broadband access has also impacted DVC and other types of video conferencing. A survey taken last year of 2000 online RIT students, of which 50 were deaf, gathered a 10% response rate and found that 70% of these students had access to broadband Internet access at home, work or school. (Fasse, 2000) Of the 20 respondents to a fall , 2001 academic quarter survey of exclusively 33 RIT deaf and hard-of-hearing online students, 85% of these learners had access to high-speed internet access while 100% of all on-campus students have capability to this access. (Mallory, Long, 2001) According to AOL, Americans with online access has increased from 45 million users in 1998 to 105 million users in 2001. Of these online users, those with home broadband access has grown from 6% in December, 1999 to 19% as of September, 2001. (Mount, 2001, pp. 44-45) This shift in the access speed of the student population makes video streaming an increasingly viable option for delivering synchronous communication and instruction.

Desktop Video Conferencing (DVC) is a widely available, low cost, practical technology that can be used in synchronous, online tutoring/teaching sessions. Although the limited throughput on the Web makes it challenging to observe sign language in a fluid and practical manner as a primary instructional or conversational tool in online courses, it has been useful as one means of tutoring remote deaf students when used in conjunction with a complete DVC package. A DVC package with a desktop camera allows the sharing of some sign language, gestures, facial expressions and body language. This real-time interaction significantly enhances chat sessions and white board viewing of instructional material such as programming code. Netmeeting also allows the use of highlighting and drawing on top of instructional materials, which can easily be posted on the online white board along with a chat session interaction.. When the DVC video was combined with Microsoft NetMeeting's other features, the total package was found to be an excellent communication and instructional tool.

The hardware, software, and Internet connections are now available to provide a complete Internet conferencing solution such as DVC at a very reasonable price. DVC incorporates the use of desktop cameras and software that can provide an adequate environment to perform remote, synchronous tutoring for deaf and hard-of-hearing students. With the increase in digital compression technology and students increased connectivity at high-speed, broadband access speeds, use of digital video conferencing will continue to grow.

Preliminary experiments with the VBrick software also show promise. In order to keep the education of deaf and hard-of-hearing students abreast with the rapidly growing distance learning opportunities, these and other emerging technologies need to be continually explored for successful synchronous instructional efforts -hearing learners over the Internet.

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Model of a Planning Strategy for Online Courses

Yahya Matsom
Department of Adult and Career Education
Valdosta StateUniversity
United States
ymatsom@valdosta.edu

Abstract: This paper is a report on the findings of a study that utilized a modified Delphi method. Forty four faculty from eleven universities participated in this study and developed a planning strategy for the development of distance/online courses. Along with the model there were 42 factors and 135 sub-factors generated from the analysis of the data. Also included in this report are the model and the steps of utilizing the planning strategy.

Introduction

Advanced digital and electronic technologies are influencing instructional activities and redefining the meaning of formal education realities. Using these technologies education can no longer confined to a walled classroom and is accessible at any time, place and context. This transformation poses new challenges to educators, especially when effectiveness and efficiency of teaching and learning is concerned (Simonson, 2000).

A few years ago various digital and electronic technologies were used individually for different forms of distance education (Rosenberg, 1998). However, in the contemporary distance education settings most of these technologies are integrated to meet the demand of the dynamic and sophisticated teaching and learning activities (Dede, 1997). As a result, technologies that are used in distance/online courses are no longer selected based on the suitability and logistical reasons but are driven by how effective and efficient these technologies can be used to promote optimal learning.

Challenges in Distance Education

There are many attempts made by scholars to define distance education. They claim that distance education could be an effective form of education if it is properly planned, developed and implemented (Holmberg, 1995). However, there are disagreements among these scholars on what should constitute distance education. Based on this argument, therefore, it is critically important for educators to consider various teaching and learning factors before designing and developing distance/online courses.

Planning and developing instruction are always major issues in distance education (Moore & Kearsey, 1996). Distance educators who advocate the use of the systematic approach of planning instruction see its usefulness (Seels & Glasgow, 1998). Those who oppose to this approach argue about its ability to promote "reflection" and "real-world context" during its implementation. However, both groups agree that the utilization of the systematic approach for planning instruction have many advantages to promote effective instruction

There are many incidents where distance educators are unable to effectively implement their distance courses (Ndahi, 1998). This problem is related to the misuse or misunderstanding about data to be used and lack of a desired planning approach to properly design and develop their distance courses. The problem becomes even more alarming when these educators have limited understanding of the interaction of the many factors that are involved in the planning for the development of distance/online courses.

Model of Planning Strategy

This model (Figure 1) is developed using a modified Delphi method that involves forty four faculty from eleven universities. Unlike models of Instructional Design, the primary purpose of the model is to help educators in the planning phase of the development of distance/online courses. Major emphasis is given to assure that the right decision can be made before designing and developing distance/online courses.

The model constitutes of eight elements that are important to be considered before converting a traditional course into a distance/online course. In each element there are several factors and sub-factors (Table 1) that need to be addressed in order to make a sound decision. Although the elements of the model are presented in a sequence, however, the planning process for the development of distance/online courses can be started from any of the elements.

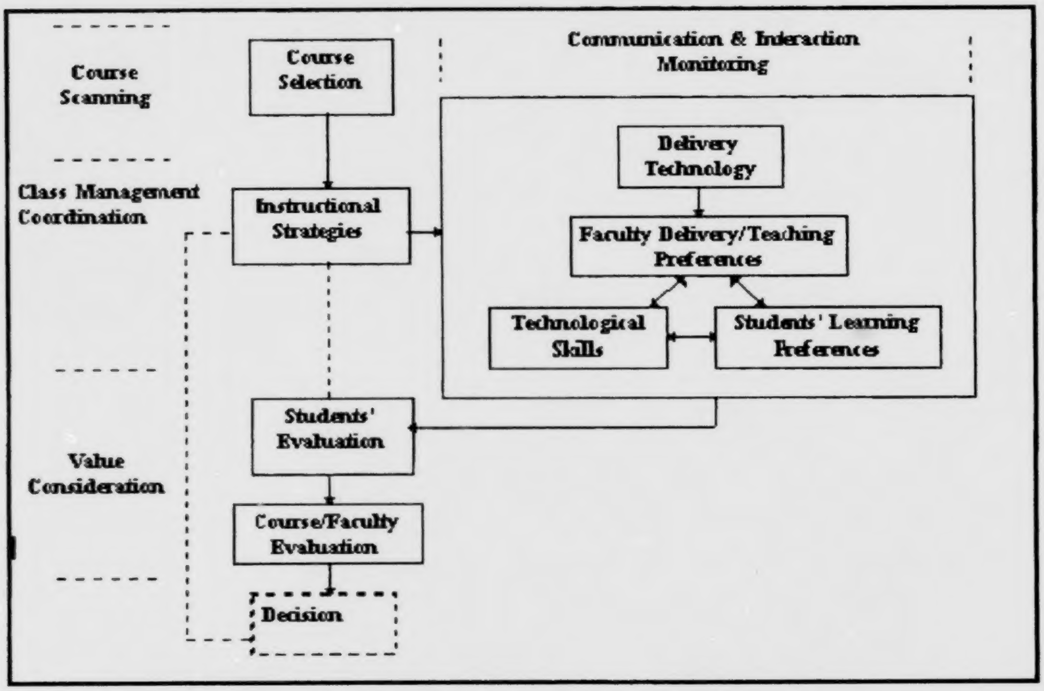
Course Scanning
Course Selection
Communication & Interaction Monitoring
Class Management Coordination
Instructional Strategies
Delivery Technology
Faculty Delivery/Teaching Preferences
Technological Skills
Students' Learning Preferences
Value Consideration
Students' Evaluation
Course/Faculty Evaluation
Decision

Figure 1. A Planning Strategy for the Development of Online Courses

Factors (F) & Sub-factors (SF)	Guiding questions
Step One: Course Selection	
F - Goal of course SF- Objectives/outcomes/competencies	Will the sub-factors be achievable in online environment?
F -Nature of course SF-Face-to-face/multi-disciplines/technology involvement or incorporation	How would the sub-factors effect teaching-learning processes in the online environment
F -Need for the course SF-Target population/faculty and students proficiency	What are the probable reactions of the sub-factors and how to accommodate their involvement in online environments

F -Content of course SF- Static/dynamic/academic level/academic rigor/course integrity	How would the sub-factors affect teaching-learning process in the online environments
F -Learner composition SF-Level/quantity/motivation/diversity	How to serve learners based on the sub-factors and would it be viable and cost effective?
F -Regulatory SF-Required/elective/occupational placement	What effect do the sub-factors have on completers of this course
Step Two: Instructional Strategies	
F - Interaction strategy SF- Mode – synchronous & asynchronous/ level/ frequency/ accessibility/ interactiveness/ learning community	What, when, where and how to increase/enhance interaction based on the listed sub-factors.
F - Support needed SF- Technical/content/ administrative/ organizational	How instructional strategy can be accomplished? What and how the listed sub-factors can do to ensure the accomplishment of the instructional strategy
F - Communication strategy SF- Media type/feedback type/ length of class	What, when, where, why and how to achieve the goal of the course based on the listed sub-factors in order to enhance communication among participants
F - Learning & Teaching resources SF- Online/ digital/ mode/electronic links	What, when, where, why and how to address the issue in the listed sub-factors in order to increase the quality of teaching and learning
F - Scope of assignments SF- Individual/group/on-going/fixed date	What, when, where, why and how teaching and learning can be accomplished effectively based on the listed sub-factors.
F - Type of course SF- Open entry-exit/fixed term	What should be emphasized and how to address the issues as listed in the sub-factors.
F - Faculty involvement SF- Frequency/depth	When, where and how faculty should be involved in the learning process to improve facilitation and class management. How and what are considered as adequate involvement?
F - Off class dialogue SF- E-mail/web site/bulletin board/streaming video etc.	When, where and how to utilize the listed sub-factors to improve teaching and learning. What and how to motivate student's participation?
Step Three: Delivery Technology	
F - Accessibility SF- Learner/remote site/ communication	How, when and where could both faculty and students get, maintain and improve access to the class. What are the appropriate measures of accessibility to be considered
F- Tools - software & hardware SF- Scalability/ availability/age/compatibility	How and what the listed sub-factors can affect the efficiency and effectiveness of the teaching-learning process
F - Support needed SF- Technical/staff/ organizational	How and what the listed sub-factors can do to ensure the effectiveness of the utilization of delivery tools to enhance teaching and learning
F- Operational cost	How delivery technology can impact cost and affect the effectiveness of learning and teaching.
Step Four: Faculty Delivery/Teaching Preferences	
F - Purpose of teaching SF- Academic rigor/ course integrity/ content determination	How to achieve and what can be done to maintain or increase the listed sub-factors

F - Faculty needs and supports SF- time/incentives/ workload/ professional development	How teaching can be facilitated and what can be done to increase faculty commitment within the "limited" supports as listed in the sub-factors. Why and what could effect faculty commitment
F - Faculty characteristics SF- Attitude/ motivation	How teaching quality and faculty commitment can be maintained or improved based on the listed sub-factors
F - Course management SF-web site/digital content/planning/feedback	Why and how the listed sub-factors could affect faculty teaching. What and how to improve faculty performance?
F - Distance learning knowledge SF- Faculty training/comfort level	Does faculty performance affected by this factor? How to determine and what can be done to increase faculty performance?
Step Five: Students' Learning Preferences	
F - Learner characteristics SF- Attitude/maturity/level/background/ motivation	What and how teaching can be facilitated to serve different characteristics of learners based on the listed sub-factors
F- Students' needs SF-Impaired/academically challenge/disadvantage/ excellent/average	What and how teaching should be administered to serve the listed sub-factors
F- Students' learning style SF-Visual/auditory/contextualized/ individualized/lock-step	How should teaching/instructions be managed and delivered to accommodate the listed sub-factors
F- Learner interest or favor SF-Auditory/visual/text/print	How to determine and what to be included or excluded in the teaching process to enhance learning based on the listed sub-factors
F- Computer skills SF-Training/self-acquisition/peer learning	How and what should be done to increase students participation in the learning that will address the issues of the sub-factors
Step Six: Technological Skills	
F - Support needed SF-Personal/infrastructure/policy	What, when, where, why and how the sub-factors can/able to do for effective teaching-learning
F - User experience SF-Teacher/students/support personal	What technological skills and knowledge are needed for effective teaching & learning, and how to improve or upgrade them?
F - Distance Learning experience SF-Prerequisite/on-going/one-shot	What, how and when this factor could be utilized and be developed, improved/upgraded to enhance teaching-learning process (class management)
F - Personal knowledge acquired SF-Technology/teaching	To what extent and how frequent this factor should be addressed to enhance teaching-learning
F - Feedback tools utilization SF-Flexible/various/fixed	Are faculty and students familiar with the delivery tools? What, when, where and how to improve/upgrade skills for effective management
Step Seven: Students' Evaluation	
F - Quality of assessment SF-Level/assignments types/accuracy/validity/reliability	What are needed, how and when to administer, and where should it be implemented to ensure the assessment address the sub-factors
F - Types/Methods of feedback SF-Test/presentation/interviews/papers/etc.	Who, what, when and where the sub-factors are relevant. How to administer effectively.

F - Accountability of assessment SF-Site coordinator or facilitator/continuous monitoring	How, where and what should be done to ensure accountability
F - Interactivity of assignment SF-Frequency/depth/maturity	To what extent the assignment should address the sub-factors, and how it can be done.
F - Format of assessment SF-Summative/formative	Should address the issue of relevancy of assessment based on context, content & time. How to do and what should be emphasized?
F - Ease of management SF-Navigation/frequency	How user-friendly the interface layout and to what extent this would help faculty/students management
Step Eight: Course/Faculty Evaluation	
F - Faculty teaching SF- face-to-face versus online/integration of modes	Address the issue of effectiveness and capability of faculty to transfer teaching skills. What, when, where, why and how to adjust?
F - Faculty/course management SF- weakness/strengths/potential/ improvement	Address the issue of transferring/transforming knowledge, skills and course content in traditional class into online environment
F - Cost-effectiveness SF - in-state/our-state students/course relevancy	Address the issue of effectiveness and benefits of the course content and management to diverse group of students.

Table 1: Steps of Utilizing the Planning Strategy

Conclusion

It is obvious from the literature that online education is still at its infancy and a sound planning is vital to the success of an online course. The current approaches of developing online courses are implemented without considering the transitional aspects that "connect" the institutional or system planning to the instructional planning. The author presented a new model for planning online courses by identifying the "missing link" through a study conducted using a Delphi technique.

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Fostering Inquiry-Based Learning Online

Gail Matthews-DeNatale, TERC/Lesley University, US

Presentation Overview

Because the Web is a relatively new environment for teaching and learning, the first wave of research on distance learning has centered on the larger lessons to be learned about creating successful online courses. This paper narrows its analytical focus to a specific pedagogical approach, learning through inquiry. Using examples from three web-based distance learning courses that are part of an online Masters in Science Education program, this presentation will explore instructional design features that foster inquiry-based learning online.

What is involved in capturing the inquiry experience online?

The successful inquiry learning experience is carefully planned and focused on a clear goal, yet the process by which the lesson unfolds is collaborative, fluid, and open-ended. For this reason, each academic topic presents a unique set of challenges for course developers, faculty, and educational technologists who strive for inquiry.

These challenges have both technical and pedagogical dimensions. The process of fostering inquiry online requires re-examining old questions even while grappling with new issues:

- What does it mean to learn through inquiry? What are the central characteristics of inquiry-based learning?
- To what extent do online environments support or detract from a learner's inquiry experience? What can educators do to craft the online environment and facilitate the learning experience in such a way that course participants experience inquiry?
- How will faculty be able to tell if course participants are genuinely engaged in inquiry?

In the proposed presentation, the author will compare the design decisions made during the development of three graduate-level online courses (the introductory Try Science program course, Investigating Physics, and Biological Explorations). The author will identify common concerns and patterns of difference, present examples of original session plans, provide excerpts from formative assessment done with a pilot group of course participants, and discuss how the plans were revised in response to course participant feedback.

Project Research Sources and Methods

The paper grows out of a multi-year project to develop an online Masters in Science Education program (http://scienceonline.terc.edu). The program is a collaborative venture developed by TERC, a Cambridge-based educational non-profit organization, in conjunction with Lesley University. The project, funded by NSF and FIPSE, includes a research study of online learning conducted under the advisement of science educator Wynne Harlen.

Indicators of inquiry learning in program-sponsored courses are obtained from the following sources:

- weekly formative assessment questionnaires completed by a pilot group of course participants and submitted through an email list;
- participants' messages to colleagues and faculty in course discussion fora;
- participant course work, including investigation reports, write-ups of clinical interviews with children, and investigations developed by participants;
- course participant email correspondence with faculty; and
- post-course face-to-face interviews with course participants.

Preliminary Conclusions

While the process of fostering inquiry in an online learning environment bears some resemblance to the inquiry process in face-to-face settings, there are notable differences that must be considered if the course is to achieve its pedagogical goals. Because verbal cues and opportunities for on-the-spot clarification are largely absent in online learning, educators need to ensure that all communication and assignments are congruent with the inquiry approach.

To craft online experiences that set the stage for successful inquiry, developers and educational technologists also need to identify the inquiry challenges and opportunities that are unique to the subject matter. For example, a challenge in investigating the physics of motion is to gather data and discern patterns in motions that last only a few seconds. In contrast, a challenge inherent to biological investigation is tracking growth and making meaning of processes that unfold over the course of days or weeks.

The learning context also needs to be situated in inquiry -- it must be a place where participants experience the power of prediction, firsthand observation, and generating theories out of evidence. This requires an attention to detail, writing tone, timing of messages, and assignment structure that is unfamiliar to most classroom educators.

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An Online Solution to Educational Technology Leadership Certification: A Case Study

Ronald McBride
College of Education
Northwestern State University
mcbride@nsula.edu

Robert Gillan
College of Education
Northwestern State University
gillan@nsula.edu

Frank Fuller
College of Education
Northwestern State University
fullerf@nsula.edu

Emily Tweed
Northwestern State University
Office of Electronic Learning
tweed@nsula.edu

Karen McFerrin
College of Education
Northwestern State University
mcferrin@nsula.edu

Abstract: As schools continue to invest heavily in technology, more trained technology leaders are needed to manage the use of it and prepare teachers to integrate technology in the classroom. To address this the State of Louisiana has created a new certification for technology facilitators. Three universities collaborated to develop seven courses for online delivery that assist teachers seeking certification as building-level or district-level technology managers. This study attempts to present a case study on a collaborative effort to design and evaluate online courses that apply to state technology certification.

Introduction

The need in K-12 schools for technology leaders, planners, trainers and managers continues to grow across the country. To address the need, state certification offices are changing procedures for certification of educational technology personnel to accommodate changes in certification requirements but driven by pressures to redo certification requirements that are out of date or inappropriate for 21-century schools. Louisiana is no different. As a result of changes in technology certification by the Board of Elementary and Secondary Education in Louisiana a variety of new courses were needed to prepare teachers to become building level technology facilitators or key educational technology leadership coordinators, directors or specialists. Taking into account the large and continued investment in technology K-12 education, adding to the mix initiatives from the Governor's Blue Ribbon Commission's Technology Consortium for Teacher Education in collaboration with the State Department of Education's Louisiana Center for Educational Technology, and recommendations from the Board of Regents for new certification guidelines to encourage emergence of new leaders in technology, certification guidelines were changed. To accomplish such an imposing task institutions must collaborate with others to develop curriculum appropriate for new certification guidelines and train faculty to serve as online developers for classes that support certification. Furthermore, limited resources at colleges and universities mandate collaboration between institutions not only because it demonstrates sound practice but, out of necessity, is influenced by dwindling budgets. Courses offered online toward technology certification require a substantial investment in resources and faculty. Yet they offer a solution that is practical and accommodating to those who seek certification as building-level or district-level technology managers.

The Need For Certification

School districts across the country continue to spend additional funds and dedicate resources for educational technology. The State of Louisiana is doing the same in a concerted effort to reduce the ratio of computers in the classroom to at least 5:1 by the year 2004 (Louisiana Center for Educational Technology, 2001). The State Department of Education in Louisiana has a number of programs that support the use and training of teachers for technology integration. The Louisiana Center for Educational Technology assumes the leadership role in overseeing these technology programs which include InTech, InTech2 Science, LEADTech, FIRSTTech, regional technology centers, and Teach Louisiana (State Department of Education). "Taking into account the huge investment in technology for K-12 and higher education and the urgent need for leaders who are prepared to address the myriad of issues surrounding integration of technology in our educational system, it is critical that we take steps to expand the pool of qualified technology leaders" (Technology Consortium for Teacher Education , 2001, p.1). The certification of technology facilitators at the school and district levels addresses a primary goal in the state technology plan; all teachers will receive technology support from a certified technology facilitator. Certified facilitators will also assist teachers in achieving technology competency (Louisiana Technology Plan).

The Certification Program

The design of the certification process was a result of a study by educators to determine what was needed to improve the skills of technology facilitators and to address standards developed by ISTE (International Society for Technology in Education) called ECT (Educational Computing and Technology) Standards. This new certification process satisfies not only ISTE but also NCATE (National Council for Accreditation of Teacher Education) standards that are at the core of teacher education reform. Louisiana's two new certifications for building and district level facilitators are based upon two ISTE ECT standards, Educational Computing and Technology Facilitation Standards (ISTE, 2001a) and Educational Computing and Technology Leadership Standards (ISTE, 2001b).

Certification for technology coordinators includes two areas, building-level and district level. The certification in Educational Technology Facilitation prepares building-level technology facilitators to provide professional development and resource materials for technology integration, and solve routine technical problems for teachers at their schools (Technology Consortium for Teacher Education, 2001). The second certification, Educational Technology Leadership, addresses the need for leaders to serve as technology coordinators at the district, state or regional levels. "These professionals focus on the overall planning acquisition, administration, management, and professional development for their district, regional, or state responsibilities" (Technology Consortium for Teacher Education, p. 3).

Design and Implementation of the Online Certification Program

Technology certification is typically offered at colleges and universities either as an "add-on" option or folded into a degree plan such as an M.Ed. These certification procedures take years to complete especially when those seeking certification cannot attend classes regularly on campuses that offer certification courses or degrees. An online solution is available in Louisiana as a result of collaboration between three institutions in Louisiana who designed and built courses that comply with Louisiana technology certification requirements. The Board of Regents in Louisiana proffers a program to support the development of online courses and initiatives, the Louisiana Educational Technology Facilitation and Leadership Program. This program is a grant source to provide funding for initiatives that promote online instruction in higher education.

In the wake of the online certification initiative, new courses were needed to comply with the updated certification requirements rendering old technology courses useless for application to technology certification. Recognizing that a mechanism was needed to build courses appropriate for the new certification requirements, a group of three institutions--Northwestern State University, the University of Louisiana at Lafayette and Nicholls State University--collaborated on a project to redesign, field test and model new classes to be taught online that equal or exceed all State Department of Education certification requirements for certification as a building level technology facilitator or staff designee in Educational

Online Course Development Matrix for Technology Certification

Activity	Action	Evaluation
Establish introduction forum for general discussion on Blackboard	Introduce team members for the online course to which they are a participant and to other members of the online course development team	Establish a working relationship with team members so they are comfortable with each other and with the lead developer
Establish a course descriptions/outcomes forum on Blackboard	1. Faculty discuss course descriptions, objectives and requirements 2. Faculty post opinions and visions for the course	Course descriptions were provided from the Technology Consortium for Teacher Education and ISTE standards were posted for review as a reference to standards-based online course design
Establish assignments/activities forum on Blackboard	Post activities and assignments for online course with special attention to course type, content and objectives	Review course activities and assignments with development team
Establish a "lecture" forum on Blackboard	Develop content for each course as pieces appear for possible inclusion	Review content for use in online course
Establish a links/resources forum on Blackboard	Post Internet based references to support development of the course	Review Internet resources for relevancy to online class
Establish a syllabus forum on Blackboard	Discuss the organization of the syllabus and post rough drafts for discussion	Review the rough syllabi and produce the final with development team
Establish a comments/questions forum on Blackboard	Address questions and comments by all team members	Provide suggestions, answers, recommendations from instructional designer or team member with experience or expertise related to the issue
Produce online course	Post components for discussion by team members	Review components and modify
Establish an evaluation plan for online courses developed	Evaluate the course by submitting reports from the development team leader who usually was the first to teach the new online certification course	Internal evaluation by development team leader
Evaluation continued	External evaluator reviews data from student surveys and examines the course looking at instructional design, syllabus, and activities	Review based upon Technology Consortium for Teacher Education and ISTE standards

Technology Leadership. A grant was written to the Board of Regents Distance Education Initiative, Louisiana Educational Technology Facilitation as the primary funding source with the impetus to include three institutions in a collaborative effort to create courses that apply to educational technology certification through the Department of Education. In addition, Northwestern State University would use these classes for the core of a Masters in Education with an Emphasis in Educational Technology online. This degree was already available but did not align itself with new state certification guidelines. The design of the project proposed that seven online courses be developed, fulfilling the new requirements for certification in Educational Technology Facilitation and Educational Technology Leadership recently approved by the Board of Elementary and Secondary Education. A survey revealed that over 300 people would be interested in pursing the proposed certifications. Furthermore, superintendents, technology supervisors, school site administrators, and teachers had been interviewed to assess potential need for certified technology personnel.

The project was divided into three phases: design including faculty training, course development and evaluation of online courses. Moreover it was a model of collaboration between three universities that demonstrated the need to share resources between and within institutions. Seven courses were proposed for development for online distribution at Northwestern State University, University of Louisiana at Lafayette, and Nicholls State University--all institutions under the University of Louisiana System. The original grant was designed as a two-year process to include training of College of Education faculty who were new to electronic learning in the design and delivery of online courses. It also included development of a shared M.Ed. with a technology emphasis that meets state certification requirements. Other components of the grant called for designing and evaluating seven online courses; defining, developing and institutionalizing faculty support for distance delivery; and developing a model for online student support for courses taught at a distance. These included the obvious such as financial aid, advising, administration, student services, business affairs, library and bookstore.

The operating system and web-based software is Blackboard which is used for creating online classes, collaboration and evaluation. Northwestern State University was the host institution for the project. Most online classes included a development team of three to four faculty per course. The development team used Blackboard as a forum for course developers. Course descriptions, objectives and criteria were posted by faculty for discussion with each team. One participating team member served as the lead developer. An instructional designer coordinated the project and established the parameters for collaboration in course development. Several electronic forums, created on Blackboard, accommodated the planning and development of online courses for certification. First, a forum was created to introduce the course developers on a team to each other and to other members of the project. Second, a course Description/ Outcomes forum was established for faculty to post course descriptions and elaborate their vision of the online course. Standards-based course descriptions from the Technology Consortium for Teacher Education and ISTE were posted. They were provided for faculty to review as they developed their course descriptions and objectives. A third forum was posted for Assignments/Activities. To support this a "Lecture" forum was created to allow developers to post and share pieces of content relevant to the courses. Fifth, a Links/Resources forum was created to post Internet references for the online class. A syllabus forum was posted for faculty to discuss the components of an appropriate syllabus for online certification courses. To address questions and comments from team members regarding other forums, a discussion forum for Questions/Comments was created. The target date to complete course development was Spring 2001 with implementation, RE: teaching courses already developed to follow in the summer and fall. Three (Technology Leadership in Schools, Technology Planning and Administration, and Advanced Telecommunications and Distance Learning) of the seven were completed and piloted during the summer at Northwestern State University. The remaining courses were completed in the summer of 2001 and offered in the fall by respective campuses. Nicholls State University offered Educational Telecommunications Networks and the Internet, Technology Leaderships in Schools and Professional Development for K-12 Technology Integration. The University of Louisiana at Lafayette added Design and Development of Multimedia Instructional Units and Technology Leadership in Schools.

Evaluation of Online Classes

There was a two-stage process for evaluation. The first was an internal evaluation performed at each campus by each primary investigator as designated from the grant. The PIs provided reports about student participation in the online classes including the number of logins. An external evaluator will provide the second stage of evaluation. This evaluator will provide and analyze data from student surveys to determine student satisfaction in the online course and other affective data. The external evaluator will also review components of the courses such as the syllabus, activities and assignments to insure they correspond to standards established by ISTE. The evaluator will also examine the instructional design of the course to see if it is appropriate for online delivery.

Inherent Problems With Online Classes Developed For Technology Certification

The development of these courses was a collaborative effort, which proved challenging to say the least. Communication between participants was limited as evidenced from postings and exchange on Blackboard. While some faculty were less than comfortable with this procedure, especially those that had never taught online before, they benefited greatly from the exchange and opportunity to use software for online instruction. Some course developers took liberty with their course objectives and how they compared to ISTE standards. Some teams represented from different campuses had an array of opinions as to course content for certain courses. Some wanted to take a theoretical approach to satisfy course objectives; others promoted a practical approach. Under the category of "lessons learned," a longer timeline was needed to design and produce online classes; at least from one to two semesters. Regular progress reports from participants would have better served the grant. In addition, the faculty who had never taught online had a larger learning curve to overcome, as they were uncomfortable communicating with team members online and could not "envision" what differences are inherent between online and face-to-face instruction. Finally, the faculty had too many "irons in the fire" to dedicate adequate time to online course development not uncommon with faculty who volunteer for projects like this.

Conclusion

In an attempt to provide an online solution to deliver technology certification in Educational Facilitation and Leadership a grant was secured by three institutions for development, implementation and evaluation of seven online courses. In retrospect the project was not without problems and delays. But, the work was completed and the classes tested by the toughest critics of all, online students. What resulted is a cadre of courses for technology certification that are now offered intoto at participating universities. A by-product of this project was a model of collaboration between three institutions with a common goal: design, implement and evaluate online courses that apply toward state technology certification. Furthermore, the effort provides credence to the notion that successful online classes must be properly designed, defined, evaluated, institutionalized to garner support for faculty to deliver courses at a distance, and modeled to include online student support, issues that continue to challenge distance learning initiatives.

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An Online Solution to Educational Technology Leadership Certification: A Case Study

Ronald McBride
College of Education
Northwestern State University
mcbride@nsula.edu

Robert Gillan
College of Education
Northwestern State University
gillan@nsula.edu

Frank Fuller
College of Education
Northwestern State University
fullerf@nsula.edu

Emily Tweed
Northwestern State University
Office of Electronic Learning
tweed@nsula.edu

Karen McFerrin
College of Education
Northwestern State University
mcferrin@nsula.edu

The need in K-12 schools for technology leaders, planners, trainers and managers continues to grow across the country. To address the need, state certification offices are changing procedures for certification of educational technology personnel to accommodate changes in certification requirements but driven by pressures to redo certification requirements that are out of date or inappropriate for 21-century schools. Louisiana is no different. As a result of changes in technology certification by the Board of Elementary and Secondary Education in Louisiana a variety of new courses were needed to prepare teachers to become building level technology facilitators or key educational technology leadership coordinators, directors or specialists. Taking into account the large and continued investment in technology K-12 education, adding to the mix initiatives from the Governor's Blue Ribbon Commission's Technology Consortium for Teacher Education in collaboration with the State Department of Education's Louisiana Center for Educational Technology, and recommendations from the Board of Regents for new certification guidelines to encourage that new leaders in technology emerge, certification guidelines were changed. This new certification process satisfies ISTE (International Society for Technology in Education) and NCATE (National Council for Accreditation of Teacher Education) standards which are at the core of teacher education reform. In the wake of the initiative, new courses were needed to comply with the updated certification requirements rendering old technology courses useless for application to technology certification.

Recognizing that a mechanism was needed to build courses appropriate to the new certification requirements a group of three institutions, Northwestern State University, the University of Louisiana at Lafayette and Nicholls State University collaborated on a project to redesign, field test and model new classes to be taught online that equal or exceed all State Department of Education certification requirements for certification as a building level technology facilitator or staff designee in Educational Technology Leadership. A grant was written to the Board of Regents Distance Education Initiative, "Louisiana Educational Technology Facilitation" as the primary funding source with the impetus to include three institutions in a collaborative effort to create courses that apply to educational technology certification through the Department of Education. In addition, Northwestern State University would use these classes for the core of a Masters in Education with an Emphasis in Educational Technology online. This degree was already available but did not align itself with new state certification guidelines. The design of the project proposed that seven online courses be developed, fulfilling the new requirements for certification in Educational Technology Facilitation and Educational Technology Leadership recently approved by the Board of Elementary and Secondary Education. A survey revealed that over 300 people would be interested in pursing the proposed certifications. Furthermore, superintendents, technology supervisors, school site administrators, and teachers had been interviewed to assess potential need for certified technology personnel.

The original grant was proposed as a two-year process to include training of College of Education faculty who were new to electronic learning in the design and delivery of online courses. It also included development of a shared M.Ed. emphasis meeting state certification requirements. Other components of the grant called for designing and evaluating seven online courses; defining, developing and institutionalizing faculty support for distance delivery; and developing a model for online student support for courses taught at a distance. These included the obvious such as financial aid, advising, administration, student services, business affairs, library and bookstore.

The development of these courses was a collaborative effort, which proved challenging but successful as evidenced by the courses produced by the participating institutions. Communication with participants resulted from postings and exchange on Blackboard, online software currently used at Northwestern State University. While some faculty were less than comfortable with this procedure, especially those that had never taught online before, they benefited greatly from the exchange and opportunity to use software for online instruction. Under the category of "lessons learned," a longer timeline was needed to design and produce online classes; at least from one to two semesters. Regular progress reports from participants would have better served the grant.

The purpose of the paper is to present a case study on a collaborative effort between three institutions to design and evaluate online courses that apply to state technology certification. Moreover, the paper will attempt to provide credence to the notion that successful online classes must be properly designed, defined, evaluated, institutionalized to garner support for faculty to deliver courses at a distance and modeled to include online student support, issues that continue to challenge distance learning initiatives.

An Online Solution to Educational Technology Leadership Certification: A Case Study

Ronald McBride
College of Education
Northwestern State University
mcbride@nsula.edu

Robert Gillan
College of Education
Northwestern State University
gillan@nsula.edu

Frank Fuller
College of Education
Northwestern State University
fullerf@nsula.edu

Emily Tweed
Northwestern State University
Office of Electronic Learning
tweed@nsula.edu

Karen McFerrin
College of Education
Northwestern State University
mcferrin@nsula.edu

Abstract: As schools continue to invest heavily in technology, more trained technology leaders are needed to manage the use of it and prepare teachers to integrate technology in the classroom. To address this the State of Louisiana has created a new certification for technology facilitators. Three universities collaborated to develop seven courses for online delivery that assist teachers seeking certification as building-level or district-level technology managers. This study attempts to present a case study on a collaborative effort to design and evaluate online courses that apply to state technology certification.

Introduction

The need in K-12 schools for technology leaders, planners, trainers and managers continues to grow across the country. To address the need, state certification offices are changing procedures for certification of educational technology personnel to accommodate changes in certification requirements but driven by pressures to redo certification requirements that are out of date or inappropriate for 21-century schools. Louisiana is no different. As a result of changes in technology certification by the Board of Elementary and Secondary Education in Louisiana a variety of new courses were needed to prepare teachers to become building level technology facilitators or key educational technology leadership coordinators, directors or specialists. Taking into account the large and continued investment in technology K-12 education, adding to the mix initiatives from the Governor's Blue Ribbon Commission's Technology Consortium for Teacher Education in collaboration with the State Department of Education's Louisiana Center for Educational Technology, and recommendations from the Board of Regents for new certification guidelines to encourage emergence of new leaders in technology, certification guidelines were changed. To accomplish such an imposing task institutions must collaborate with others to develop curriculum appropriate for new certification guidelines and train faculty to serve as online developers for classes that support certification. Furthermore, limited resources at colleges and universities mandate collaboration between institutions not only because it demonstrates sound practice but, out of necessity, is influenced by dwindling budgets. Courses offered online toward technology certification require a substantial investment in resources and faculty. Yet they offer a solution that is practical and accommodating to those who seek certification as building-level or district-level technology managers.

The Need For Certification

School districts across the country continue to spend additional funds and dedicate resources for educational technology. The State of Louisiana is doing the same in a concerted effort to reduce the ratio of computers in the classroom to at least 5:1 by the year 2004 (Louisiana Center for Educational Technology, 2001). The State Department of Education in Louisiana has a number of programs that support the use and training of teachers for technology integration. The Louisiana Center for Educational Technology assumes the leadership role in overseeing these technology programs which include InTech, InTech2 Science, LEADTech, FIRSTTech, regional technology centers, and Teach Louisiana (State Department of Education). "Taking into account the huge investment in technology for K-12 and higher education and the urgent need for leaders who are prepared to address the myriad of issues surrounding integration of technology in our educational system, it is critical that we take steps to expand the pool of qualified technology leaders" (Technology Consortium for Teacher Education , 2001, p.1). The certification of technology facilitators at the school and district levels addresses a primary goal in the state technology plan; all teachers will receive technology support from a certified technology facilitator. Certified facilitators will also assist teachers in achieving technology competency (Louisiana Technology Plan).

The Certification Program

The design of the certification process was a result of a study by educators to determine what was needed to improve the skills of technology facilitators and to address standards developed by ISTE (International Society for Technology in Education) called ECT (Educational Computing and Technology) Standards. This new certification process satisfies not only ISTE but also NCATE (National Council for Accreditation of Teacher Education) standards that are at the core of teacher education reform. Louisiana's two new certifications for building and district level facilitators are based upon two ISTE ECT standards, Educational Computing and Technology Facilitation Standards (ISTE, 2001a) and Educational Computing and Technology Leadership Standards (ISTE, 2001b).

Certification for technology coordinators includes two areas, building-level and district level. The certification in Educational Technology Facilitation prepares building-level technology facilitators to provide professional development and resource materials for technology integration, and solve routine technical problems for teachers at their schools (Technology Consortium for Teacher Education, 2001). The second certification, Educational Technology Leadership, addresses the need for leaders to serve as technology coordinators at the district, state or regional levels. "These professionals focus on the overall planning acquisition, administration, management, and professional development for their district, regional, or state responsibilities" (Technology Consortium for Teacher Education, p. 3).

Design and Implementation of the Online Certification Program

Technology certification is typically offered at colleges and universities either as an "add-on" option or folded into a degree plan such as an M.Ed. These certification procedures take years to complete especially when those seeking certification cannot attend classes regularly on campuses that offer certification courses or degrees. An online solution is available in Louisiana as a result of collaboration between three institutions in Louisiana who designed and built courses that comply with Louisiana technology certification requirements. The Board of Regents in Louisiana proffers a program to support the development of online courses and initiatives, the Louisiana Educational Technology Facilitation and Leadership Program. This program is a grant source to provide funding for initiatives that promote online instruction in higher education.

In the wake of the online certification initiative, new courses were needed to comply with the updated certification requirements rendering old technology courses useless for application to technology certification. Recognizing that a mechanism was needed to build courses appropriate for the new certification requirements, a group of three institutions--Northwestern State University, the University of Louisiana at Lafayette and Nicholls State University--collaborated on a project to redesign, field test and model new classes to be taught online that equal or exceed all State Department of Education certification requirements for certification as a building level technology facilitator or staff designee in Educational

Online Course Development Matrix for Technology Certification

Activity	Action	Evaluation
Establish introduction forum for general discussion on Blackboard	Introduce team members for the online course to which they are a participant and to other members of the online course development team	Establish a working relationship with team members so they are comfortable with each other and with the lead developer
Establish a course descriptions/outcomes forum on Blackboard	1. Faculty discuss course descriptions, objectives and requirements 2. Faculty post opinions and visions for the course	Course descriptions were provided from the Technology Consortium for Teacher Education and ISTE standards were posted for review as a reference to standards-based online course design
Establish assignments/activities forum on Blackboard	Post activities and assignments for online course with special attention to course type, content and objectives	Review course activities and assignments with development team
Establish a "lecture" forum on Blackboard	Develop content for each course as pieces appear for possible inclusion	Review content for use in online course
Establish a links/resources forum on Blackboard	Post Internet based references to support development of the course	Review Internet resources for relevancy to online class
Establish a syllabus forum on Blackboard	Discuss the organization of the syllabus and post rough drafts for discussion	Review the rough syllabi and produce the final with development team
Establish a comments/questions forum on Blackboard	Address questions and comments by all team members	Provide suggestions, answers, recommendations from instructional designer or team member with experience or expertise related to the issue
Produce online course	Post components for discussion by team members	Review components and modify
Establish an evaluation plan for online courses developed	Evaluate the course by submitting reports from the development team leader who usually was the first to teach the new online certification course	Internal evaluation by development team leader
Evaluation continued	External evaluator reviews data from student surveys and examines the course looking at instructional design, syllabus, and activities	Review based upon Technology Consortium for Teacher Education and ISTE standards

Technology Leadership. A grant was written to the Board of Regents Distance Education Initiative, Louisiana Educational Technology Facilitation as the primary funding source with the impetus to include three institutions in a collaborative effort to create courses that apply to educational technology certification through the Department of Education. In addition, Northwestern State University would use these classes for the core of a Masters in Education with an Emphasis in Educational Technology online. This degree was already available but did not align itself with new state certification guidelines. The design of the project proposed that seven online courses be developed, fulfilling the new requirements for certification in Educational Technology Facilitation and Educational Technology Leadership recently approved by the Board of Elementary and Secondary Education. A survey revealed that over 300 people would be interested in pursing the proposed certifications. Furthermore, superintendents, technology supervisors, school site administrators, and teachers had been interviewed to assess potential need for certified technology personnel.

The project was divided into three phases: design including faculty training, course development and evaluation of online courses. Moreover it was a model of collaboration between three universities that demonstrated the need to share resources between and within institutions. Seven courses were proposed for development for online distribution at Northwestern State University, University of Louisiana at Lafayette, and Nicholls State University--all institutions under the University of Louisiana System. The original grant was designed as a two-year process to include training of College of Education faculty who were new to electronic learning in the design and delivery of online courses. It also included development of a shared M.Ed. with a technology emphasis that meets state certification requirements. Other components of the grant called for designing and evaluating seven online courses; defining, developing and institutionalizing faculty support for distance delivery; and developing a model for online student support for courses taught at a distance. These included the obvious such as financial aid, advising, administration, student services, business affairs, library and bookstore.

The operating system and web-based software is Blackboard which is used for creating online classes, collaboration and evaluation. Northwestern State University was the host institution for the project. Most online classes included a development team of three to four faculty per course. The development team used Blackboard as a forum for course developers. Course descriptions, objectives and criteria were posted by faculty for discussion with each team. One participating team member served as the lead developer. An instructional designer coordinated the project and established the parameters for collaboration in course development. Several electronic forums, created on Blackboard, accommodated the planning and development of online courses for certification. First, a forum was created to introduce the course developers on a team to each other and to other members of the project. Second, a course Description/ Outcomes forum was established for faculty to post course descriptions and elaborate their vision of the online course. Standards-based course descriptions from the Technology Consortium for Teacher Education and ISTE were posted. They were provided for faculty to review as they developed their course descriptions and objectives. A third forum was posted for Assignments/Activities. To support this a "Lecture" forum was created to allow developers to post and share pieces of content relevant to the courses. Fifth, a Links/Resources forum was created to post Internet references for the online class. A syllabus forum was posted for faculty to discuss the components of an appropriate syllabus for online certification courses. To address questions and comments from team members regarding other forums, a discussion forum for Questions/Comments was created. The target date to complete course development was Spring 2001 with implementation, RE: teaching courses already developed to follow in the summer and fall. Three (Technology Leadership in Schools, Technology Planning and Administration, and Advanced Telecommunications and Distance Learning) of the seven were completed and piloted during the summer at Northwestern State University. The remaining courses were completed in the summer of 2001 and offered in the fall by respective campuses. Nicholls State University offered Educational Telecommunications Networks and the Internet, Technology Leaderships in Schools and Professional Development for K-12 Technology Integration. The University of Louisiana at Lafayette added Design and Development of Multimedia Instructional Units and Technology Leadership in Schools.

Evaluation of Online Classes

There was a two-stage process for evaluation. The first was an internal evaluation performed at each campus by each primary investigator as designated from the grant. The PIs provided reports about student participation in the online classes including the number of logins. An external evaluator will provide the second stage of evaluation. This evaluator will provide and analyze data from student surveys to determine student satisfaction in the online course and other affective data. The external evaluator will also review components of the courses such as the syllabus, activities and assignments to insure they correspond to standards established by ISTE. The evaluator will also examine the instructional design of the course to see if it is appropriate for online delivery.

Inherent Problems With Online Classes Developed For Technology Certification

The development of these courses was a collaborative effort, which proved challenging to say the least. Communication between participants was limited as evidenced from postings and exchange on Blackboard. While some faculty were less than comfortable with this procedure, especially those that had never taught online before, they benefited greatly from the exchange and opportunity to use software for online instruction. Some course developers took liberty with their course objectives and how they compared to ISTE standards. Some teams represented from different campuses had an array of opinions as to course content for certain courses. Some wanted to take a theoretical approach to satisfy course objectives; others promoted a practical approach. Under the category of "lessons learned," a longer timeline was needed to design and produce online classes; at least from one to two semesters. Regular progress reports from participants would have better served the grant. In addition, the faculty who had never taught online had a larger learning curve to overcome, as they were uncomfortable communicating with team members online and could not "envision" what differences are inherent between online and face-to-face instruction. Finally, the faculty had too many "irons in the fire" to dedicate adequate time to online course development not uncommon with faculty who volunteer for projects like this.

Conclusion

In an attempt to provide an online solution to deliver technology certification in Educational Facilitation and Leadership a grant was secured by three institutions for development, implementation and evaluation of seven online courses. In retrospect the project was not without problems and delays. But, the work was completed and the classes tested by the toughest critics of all, online students. What resulted is a cadre of courses for technology certification that are now offered intoto at participating universities. A by-product of this project was a model of collaboration between three institutions with a common goal: design, implement and evaluate online courses that apply toward state technology certification. Furthermore, the effort provides credence to the notion that successful online classes must be properly designed, defined, evaluated, institutionalized to garner support for faculty to deliver courses at a distance, and modeled to include online student support, issues that continue to challenge distance learning initiatives.

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Learning in Online and Desktop Video Conferencing Courses: Are Some Students Plugged In and Tuned Out?

Karen McFerrin, Ed.D.
College of Education
Northwestern State University (LA)
United States
mcferrin@nsula.edu

Paula Furr, Ed.D.
College of Liberal Arts
Northwestern State University (LA)
United States
furrp@nsula.edu

Abstract: According to research conducted in two studies examining incidental learning activity within a complex of asynchronous online courses and compressed desktop video courses at a mid-sized university, incidental learning outcomes not identified as part of the formal curriculum are evident. Learning to use technology and individual and group attitudes and behavioral patterns are two particular outcomes. The results of both studies illustrate the importance of incidental learning and of developing a learning environment that fosters positive outcomes. Theory and application concerning teaching and learning in online distance education courses and desktop video conferencing courses may differ. This paper compares and contrasts current online and DVC learning theory with observations and reflections of the researchers that show what may actually be happening with some students in today's distance education classrooms.

Introduction

A dichotomy may exist between theory and application concerning teaching and learning in online distance education courses and desktop video conferencing courses. According to research conducted in two studies examining incidental learning activity within a complex of asynchronous online courses and desktop video conferencing courses (DVC) at a mid-sized university (Furr 2000, McFerrin 1998), incidental learning outcomes not identified as part of the formal curriculum are evident. Learning to use technology and individual and group attitudes and behavioral patterns are two particular outcomes. The results of both studies illustrate the importance of incidental learning and of developing a learning environment that fosters positive outcomes.

Actual student observations uncovered specific student behaviors that produced a less than desirable classroom environment. Technology problems and lack of sufficient class interaction and participation cause students to become distracted from focusing on course content. While frustration levels in students in the DVC courses are higher than those in the online courses, elements of frustration exist in both. A comparison and contrast of current online and DVC learning theory with observations and reflections of the researchers show what may actually be happening with some students in today's distance education classrooms (Furr 2000, Hara & Kling 2000, Johnston 2000, Robertson 2000, Collins 1999, McFerrin 1998).

Asynchronous Online

The first study, titled "Incidental Learning in a Higher Education Asynchronous Online Distance Education Course" (McFerrin 1998), was designed to examine and describe the incidental learning activity of students in an asynchronous online course in a higher education setting. While literature concerning student performance and experiences in higher education online courses is available (Everett 1999, Neal 1997, Hites & Ewing 1996, Thomerson & Smith 1996, Jegede & Kirkwood 1994), little has been researched concerning incidental, or collateral, learning at the higher education level (Ragsdale 1997, Mealman 1993). McFerrin's research was conducted with data collected from interviews, journals, observations, email messages, and online conferencing software postings of 22 members of three sections of a graduate-level asynchronous online distance education course at a mid-sized four-year university in the spring of 1998. Each graduate student was interviewed at the beginning of the semester and at the end of the semester. A late-semester questionnaire was sent to all participants. All email and conference postings were analyzed. Each was asked to keep a journal throughout the semester.

Two types of incidental learning outcomes occurred. The first developed from the students' learning to use the technology itself. Accessing the Internet, developing search skills, working within an online course, and using conferencing software were teamed with an increase in researching, writing, and word processing skills. The second type of incidental learning outcome centered on an improvement in certain areas of the students' personal development. An increase in time management ability, self-directive behavior, self-confidence, and self-discipline occurred. Students in the online course exhibited an increase in self-knowledge and a belief that more new goals can be set and successfully accomplished. All students obtained unplanned and unanticipated learning outcomes not identified as part of the formal curriculum.

The results of the study illustrated the importance of incidental learning in an asynchronous online course. When developing coursework for graduate students in a life-long learning field such as education, faculty and administrators must seek to develop a climate in which incidental learning is likely to occur. Both students and instructors must see the value of incidental learning to the student and must foster its development.

Desktop Video Conferencing

The second study, "The Occurrence of Incidental Learning in Higher Education Desktop Video Conferencing Classes: An Ethnographic Study" (Furr 2000), addressed learning in desktop video conferencing (DVC) courses, a relatively new delivery medium for college courses. This study examined the incidental learning within a complex of compressed desktop video courses at a mid-sized university. Although ample literature covers incorporating technology into the classroom (Russell 2000, Saba 1998, Moore & Kearsley 1996, Cuban 1986), little documents the experiences and perceptions of students and faculty in distance education courses (Johnston 2000, Jegede et al. 1999, McKee 1999, Biner & Dean 1997). Because DVC is a new technology, even less literature targets its effects on teaching and learning environments (Cifuentes et al. 1999, Merisotis & Phipps 1999, Thorpe 1998, Mize 1996).

The DVC study was structured to replicate McFerrin's 1998 examination of incidental learning in asynchronous, on-line college instruction. The researcher employed grounded theory to examine the experiences and perceptions of participants--faculty, students, and staff--in five desktop video conferencing courses offered spring 2000 through a synchronous audio and video delivery system that allowed students in eight rural sites to complete education courses. The researcher triangulated data from field observations, interviews, surveys, participants' journals, and course materials. Quantitative measures of participant satisfaction and content analysis of journals and course documents also were used.

Consistent with McFerrin's findings, the researcher discovered two types of incidental learning outcomes not identified as part of the formal curriculum: learning to use technology and individual and group attitudes and behavioral patterns. Factors that afforded positive experiences and perceptions were convenience and reduced driving time, informal class atmosphere, small classes, prior computer skills, access to a computer and the Internet, internal student traits, and instructor facility with technology and distance education pedagogy. Factors that diminished a positive experience were technical problems, insufficient administrative support, inadequate training, weak proctor system, and negative student behaviors.

Unlike McFerrin's study, Furr (2000) found a higher level of frustration among participants in the DVC courses. Of the 52 students polled at the semester's end, 48% said they would take another DVC course, 17% said "no," and 21% said the type of course offered would determine their decision. The remaining percentage of students either did not answer the question or said they were graduating. Of those willing to take another DVC course, convenience was the top-cited reason. They were also willing to forgive technical problems, believing "bugs would be fixed." Nonetheless, a sizable number of students reported either a negative or neutral stance regarding DVC.

> One graduate student commented: Today's class was very frustrating - just like all the other times. We could hardly hear [instructor x] and were having the usual technical difficulties. We only covered [one topic], and I was still confused after we finished it. I had typed a question in the chat box, but [instructor x] never saw it so it never got answered. And it takes forever to just get the class started. It seems like by the time we get everybody logged in and settled, the class is almost half over.

> An undergraduate student said: Once they work the kinks out, it will be a great program, but I think the program is better suited for rural sites and better for nontraditional students. It's not so great for your typical undergraduate. I don't have any interaction with the teacher. Normally, you could see the teacher before or after class.

Faculty, students, and proctors shared with the researcher their frustration at the negative student behaviors that festered during the semester. One proctor, also a DVC student, said she had learned adults do not always behave like adults and that once instructors lost control of their classes, "they've lost it all." She said many students were frustrated with initial and ongoing technology problems and never got past the frustration, which they vented aloud in class. "It became ongoing and public and diminished a professor's authority and respect," one proctor said.

The researcher observed many students coming to and leaving classes at will, napping, surfing the Internet, playing games on the computer, sending and receiving e-mail, completing homework for other courses, calling on cell phones, inserting music CD's to listen to during class, badmouthing instructors, carrying on conversations totally unrelated to the course, and generally being completely off-track. One instructor noted that the array of technology available to students during class and the added focus and concentration needed for instructors to deliver a course and for students to process the content prompted students to go "mentally off-line."

The DVC study's results illustrated the importance of incidental learning in a desktop video conferencing course and of developing a learning environment that fosters positive outcomes. If a positive outcome is to occur, then DVC requires substantial technical training and support, administrative support for faculty, and a strong proctor system. Importantly, educators must continue to refine the pedagogy of effective teaching and learning with DVC. It is not an intuitively easy system to operate while simultaneously delivering course content, promoting student participation, managing student behavior, and troubleshooting technical problems.

As with any program, ongoing local evaluative studies that monitor participants' experiences and perceptions are critical if a DVC's program is to succeed, improve, and be sustained. Erhmann (1998) defined the technology of a program as its "hardware, software, and social technology" (p. 2). He emphasized the importance of knowing "what is happening right here, right now, this year, with these people" (p. 3). Fulk, Schmitz, and Steinfield (1990) constructed a Social Influence Model of technology use that considered influences such as work group norms and co-worker and supervisor attitudes and behaviors that positively or negatively influence attitudes, media use, and choices. Fulk (1993) proposed that an organization's members could be expected to develop coordinated patterns of behavior based on observations of each other's behaviors, the consequences of behaviors, and emotional reactions. Detecting those patterns, whether faculty, student, or staff, is crucial to avoid falling into the trap of the "rapture of technology" and failing to assess how different learners use technology differently with different and sometimes unexpected results (Ehrmann 1998).

Similarities and Differences

The two studies highlighted similarities that existed between these particular asynchronous online and synchronous DVC courses, including the:

1. Need for students to be self-disciplined, self-motivated, and patient
2. Variance in computer skills and technology accessibility that existed among the students
3. Use of email for communication between student and instructor
4. Compulsiveness of students
5. Unrealistic expectations of students
6. Lingering technology frustration
7. Vulnerability of at risk students
8. Lack of driving time and expense devoted to travel
9. Newness and niftiness of the technology
10. Expense to operate courses successfully
11. Smaller size of the classes
12. Lack of University-wide system for student evaluation

Key differences noted between asynchronous online and synchronous DVC courses included the following:

1. In a text-based online course, students tend to be more careful in their comments about other students, the course, and the instructor. In a DVC course students at remote sites can informally converse among themselves, with negative behaviors and comments often going unchecked. A strong proctor system, particularly with younger or more immature students, is key for DVC.

2. In a DVC course, negative individual attitudes and behaviors can affect an entire group, with an instructor unable to monitor individual and group behaviors simultaneously. Classroom management issues and strategies become accentuated in DVC courses.
3. In an asynchronous course, students understand the "transactional distance" between themselves and the instructor and do not expect immediate, real-time feedback. A DVC course gives students the illusion of one-to-one contact with the instructor and active participation. When a student's electronic raised hand or comment in the chat box goes unnoticed or unacknowledged for even a brief time, students tend more easily to disengage from class.
4. Students in online classes are accustomed to and expect a primarily text-based system, whereas the camera and monitor in a DVC class prompt in students a "TV" attitude. However, current DVC technology with its small video window and jerky transmission often relegates faculty and other students to tiny, out-of-focus talking heads. Boredom and disengagement again can result if students are not themselves focused, motivated, and disciplined.
5. A DVC system requires more technical support during class for both the instructor and students at remote sites. While an online class can weather downtime, a DVC course cannot. A DVC course requires more faculty technical training and preparation for technical contingencies.
6. In an online course, students can choose the time, pace, and duration of their course interaction. In a DVC course, the hours are set just as in a traditional course. Being tethered to a computer for two to three hours and staring at a computer screen can be physically tiring and boring, conditions ripe for frustration and disengagement. For DVC courses, changing activities and frequent breaks are key.

Conclusion

The two studies highlighted the differences and similarities in learning and teaching environments fostered by the two different delivery systems. Both researchers have years of experience as students, educators, developers, and researchers of distance education courses Although "good teaching" has many universal tenets, the notion that faculty or students can seamlessly transfer from the traditional classroom to varied electronic formats should be dispelled. These findings underscore the importance of specific faculty development, curriculum planning, and administrative support for distinct electronic venues.

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Tennessee Board of Regents - Regents Online Degree Programs

Robbie Melton, Tennessee Board of Regents, US
Carol Puryear, Tennessee Board of Regents, US
Bettie Phillips, Tennessee Board of Regents, US

Tennessee Board of Regents' colleges, universities, and technology centers joined in Fall 2001, to offer the **Regents Online Degree Programs (RODP)**. All the institutions are fully accredited. All thirteen TBR two-year colleges deliver and award the noted associate degrees, while all six TBR universities deliver and award the noted bachelor degrees. Courses completed in the Regents Online Degree Programs are entirely online and transferable among all the participating institutions. Students are able to choose the college or university (home school) for their admission, registration, and the award of their degree.

The degrees offered are:

- Associate of Applied Science in Professional Studies: Concentration in Information Technology
- Associate of Arts in General Studies (University Parallel)
- Associate of Science in General Studies (University Parallel)
- Bachelor of Professional Studies with concentrations in Information Technology or Organizational Leadership
- Bachelor of Interdisciplinary Studies (General Studies/Liberal Studies/University Studies)
- Masters in Education (in development for Fall 2002)
- Certificate in Computers Operations Technology (TN. Technology Centers Fall 2002)

The Regents Online Faculty and Staff have been highly trained in teaching, learning, and assessing the needs of online students. The Regents Online Courses are designed for a 12 week semester--in an interactive, asynchronous (accessing courses at your convenience) format. These courses contain the same content and rigor as courses on campus. Student Services such as advising, library services, student support, and other forms of student assistance are offered for online delivery. Technical support for accessing course lessons and assignments are available 24 hours 7 days per week.

Vision: "A better life for Tennesseans through education"

Mission: "The Regents Online Degree Programs, using technology, will improve access to high quality, affordable, student-centered learning opportunities through cooperation among TBR institutions."

Goals:

To increase access to higher education for adult Tennesseans, especially those with some college experience. Census data document that Tennesseans lag behind both the national and regional averages of educational attainment. Further, attainment is uneven across the state, with rural areas lagging far behind urban areas. Economic development of the state depends on increasing the skill levels of the population.

To maximize the effective use of technology for delivery of college-level instruction. Distance delivery through the use of technology will increase access to higher education, especially in remote areas of the state and for adult learners for whom time flexibility is a critical resource.

To provide student access to web-based courses and degree programs. Web-based courses will reach populations not currently enrolled in higher education, and will also permit students who are currently enrolled in on-campus courses to take additional courses, thus completing their programs sooner.

Partnership with Eduprise E-learning Corporation

Eduprise, the leading provider of enterprise e-Learning services for education institutions and businesses, partnered with Eduprise to provide strategic planning, infrastructure hosting support and instructional development services. Eduprise established a major role in TBR's bold initiative by providing the infrastructure support services to underpin the strategic plan for the Regents' web-based degrees. These services include a hosted WebCT course management system, 24x7 technical help desk for students and instructors, WebCT software training for instructors, instructional design assistance.

Current Success

It was projected that the Fall 2001 enrollment would total to 300. However, the final enrollment number was 1,954 with a withdrawal rate of less than 12% and a dropout rate of less than 20% compared to the national average of 42%.
The student and faculty surveys indicated an overall satisfaction rate of 79%.
The early Spring 2002 registration (conducted in Nov. 2001) ended at 2,732 enrollments, far exceeding, the Fall 2001 numbers.
(This proposal is being submitted before Spring Final Registration)
Final registration will convene on January 7th, 2002. It is predicted that all courses will be closed due to full enrollment. If this proposal is accepted, the participants will receive data regarding the program, student, and faculty evaluations, Spring registration figures, average retention rate, and new degree programs.

Sexual Harassment Training Online: Incorporating Layout, Design, and Pedagogy

Robert L. Miller
Office of Civil Rights
Eastern Illinois University
csrlm2@eiu.edu

Link to site: www.eiu.edu/~civil/sh
Password: eiu37

(This version is online for testing purposes and future modifications will include using streaming as opposed to embedded audio.)

Abstract: In order to provide a better working and learning environment, and to comply with state and federal law, Eastern Illinois University requires new employees to complete a sexual harassment training session within their first six months of employment. Because of scheduling conflicts or demands, this seminar is now being offered online. There are many challenges in developing this type of online course and special care must be taken to create the most interactive, informative, and user-friendly version possible. An effective course design will encourage and facilitate active user participation and will incorporate animation, audio, and other multimedia elements that enrich the learning process.

The focus of this paper describes how this course was developed and details design and pedagogical techniques educators can use to enhance their online seminar materials.

Introduction

The decision to offer sexual harassment training online should not be arrived at lightly. Face to face seminars still have the advantage when it comes to audience participation and interaction. Question and answer sessions provide valuable opportunities for members to get immediate answers to their questions. Advocates of online learning point out that while the technology itself is important, effective learning methodologies are crucial for a site to be successful (Turoff, 1999). Additionally, authors of online sexual harassment courses must be able to draw from experience and expertise in order to come as close as possible to recreating the live seminar in an online format. There is a wealth of information available on the net regarding sexual harassment. Therefore, users of your online seminar must feel that there is some type of extra value, or ease of use associated with your site in order for them to "buy in" to the concept and ultimately absorb the information. It is also important to remember that at least some users will not be at the site by choice, which will make them even more prone to distraction.

Site Design

Designing this site was the author's first attempt at Web design. Macromedia Dreamweaver 4 was used along with Macromedia Fireworks 4 and Coursebuilder. Dreamweaver permits the user to design a site without knowing a single line of code and Fireworks (www.macromedia.com/software/fireworks/) makes it possible to animate and customize text and images. Coursebuilder, which can be downloaded for free from the Macromedia site, was extremely useful in making the site interactive.

Dreamweaver (www.macromedia.com/software/dreamweaver/) is a very user-friendly software package that comes with a how-to reference book along with movie tutorials and links to helpful websites. However, designing the first page still took approximately 10 hours. Successive pages were added more quickly. The use of templates is advised as this will streamline the design of the site and will provide uniformity. Integrating substantive content into the site was started two weeks after the project began.

Coursebuilder was used extensively in the site in order to get the user involved. This application makes it very east to incorporate questions and answers throughout the course. Formats range from multiple choice and true/false questions to drag and drop interactions. Additionally, the software will track and record test answers and send them to a central location. Inserting a Cousebuilder interaction is easy and can be done with just a few clicks. Typing the question and answer choices can be done either in the Coursebuilder folder or on the Dreamweaver work page.

Site Layout

Appropriate color schemes, graphics, and animations are essential in creating a successful site. However, artistic design is not the primary purpose of a Web page. The substantive content should not be overwhelmed by excessive graphics and colors. Additionally, buttons and other navigation devices should allow the user to move easily from one area to another (Bohannon, 2001). Animating text can also make the site come alive which serves to keep the attention of the user. However, excessive use can be distracting.

The use of audio is another consideration when designing this type of site. Audio files can be distributed by either streaming audio or file downloading (Gerth, 2001). For longer audio files, streaming audio works better because it allows small portions of the file to be delivered and then play while the rest of the file is downloaded just ahead of the playback portion. For smaller audio files, it may be easier to just download the file to the user's hard disk before playback begins. Because people retain only 20% of what they hear, and 30% of what they see, but 50% of what they see and hear, integrating audio to enhance learning is very useful (Gerth, 2001).

Pedagogy

As stated earlier, the substance of the site is of primary importance and must not be obscured by too many graphics, animations, etc. Additionally, the user must be involved in the course which is accomplished by making the site interactive. It is recommended that the user become involved as soon as possible. For example, in the instant course, after the user completes the registration materials and reads the course objectives, he or she is asked to complete a short quiz. Several general questions are asked regarding sexual harassment in the multiple choice and true/false format. Special care should be taken in selecting these questions because, in addition to providing interaction, the questions should be intriguing and create interest in the content.

For this particular subject matter, hypothetical scenarios are very useful and can be easily presented online. After providing the basic substantive information to the user, they should be asked to read a scenario and answer a short series of questions so that they can apply what they have learned. In Coursebuilder and Dreamweaver, the user can be taught many different concepts in the context of just a few scenarios by utilizing pop-up text boxes and links to other pages. For example, a user can be guided to the correct answer by pop-up messages that ask the user to consider additional information if they have trouble.

Conclusion

This paper has explored some of the basic technical and pedagogical concepts regarding the delivery on online sexual harassment training. A successful site takes time to create and requires the incorporation of appropriate colors, graphics, animation, and audio along with proper teaching techniques. The result is a very useful tool that provides much needed flexibility in the quest to educate faculty and staff members about sexual harassment.

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Old Ideas, New Approaches to Online Distance Learning

Charles Mize, West Texas A&M University, US
Keri Rogers, West Texas A&M University, US

Introduction

As the world moves steadily into the twenty-first century, schools are faced with a variety of challenges. The use of technology for the delivery of instruction is one challenge that is increasingly gaining notoriety in this new century. With increases in funding for instructional projects and the use of the Internet as a tool to enhance connectivity, schools have not only changed the way that technology is planned for, but also have changed the process of education which is adding new opportunities for educators, students, and the school community. One opportunity that is foremost in many technology based discussions is online distance learning.

Distance learning in itself is not new. Even the use of computer networks for the distribution of instruction can easily be traced back to the 1960s. However, with the development and expansion of the Internet, access to computer networks have become more readily available to the general public. Therefore the use of the Internet to deliver instruction at a distance is perhaps at best, a new approach to an older method of instruction. The situation in which many schools and institutions of higher education find themselves, is how to effectively design online programs that successfully facilitate the needs of both faculty and students.

An Innovative Approach

One university in the southwestern part of the United States has developed an innovative approach to online, web-based distance learning. The program is innovative in both its philosophy and its approach to web-based course delivery.

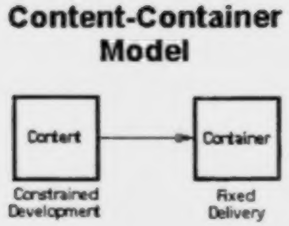
The innovative philosophy followed is one of seamless technology integration that sees all students simply as students of the university with no distinction being made in anyway between students who receive course delivery online or through traditional means. Through the application of this philosophy, online students are never left hanging without the support needed to help them succeed. Each student is placed with a faculty advisor who guides the student through the academic portion of his or her online studies. Further, student services are provided to assist students with the successful completion of their programs. Student services, ranging from admission, registration, financial aid, personal counseling, career counseling, and even student activities, are provided through the online environment. Additionally, a technical support facility is staffed with individuals trained in helping students with their technical questions or to help facilitate communication between the student and university or faculty members. At any point, a student can call, email, fax, or chat online with someone that can help with questions.

The program also follows an innovative approach to course development and delivery. All faculty who teach online must go through a 25 hour training program prior to delivering their first course. No distinction is made between faculty who teach online and those who do not. Faculty who teach for the distance learning program and those who teach traditionally delivered courses are the same with the exception of the additional training for teaching online. Most faculty go through the training program while developing their first course for online delivery. The training covers topic such as instructional design, methods of building strong communication and interaction, pacing the course, developing multiple methods of evaluation as well as the various technology tools available to the faculty member for use in a course. As a result of the online training program, most faculty have a major portion of their first course completed by the end of training. After training, faculty receive continued support through the Instruction Innovation and Technology Lab, which is the faculty development facility at the University.

The technical portion of the program is innovative with the in-house development of the course delivery software. Many course management packages are commercially available, but are often restricted to a single instructional design model for course delivery. It was determined that in order to provide the greatest amount of flexibility to faculty for the design of their courses while at the same time providing an easy to use consistent environment for students, a new course delivery system would have to be developed.

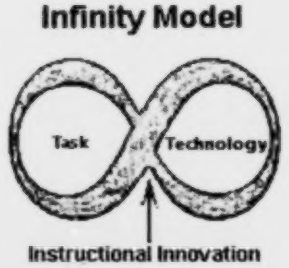
The software package has a strong theoretical basis and moves the theory into strong practice. Many commercial course management packages follow a content – container model for course delivery. This model sees the course content and the delivery container as being independent of one another. Faculty simply type up their content and copy it into the pre-defined container for delivery (Figure 1).

Figure 1.


Content-Container Model

However, the model used for this program sees the relationship between the content and the container as being reciprocal (Figure 2). In this model, faculty may choose many different instructional methods and designs to structure their content. Then the content and design is matched to the most appropriate technology for course delivery.

Figure 2.


Infinity Model

By providing faculty with the ability to develop a "best-fit" between the instructional task (content) and the delivery technology, instructional innovation can be achieved for the benefit of the student. The uniqueness of this distance learning program is the development of an environment that allows the flexible design of instructional task and content while maintaining a consistent interface for students and faculty to interact within.

Outcomes

The program began in 1997 with one course serving 24 students. For the Fall 2001 semester, the program offered 79 courses that served 1574 students with 2333 course enrollments. This number not only represents student access to a quality institution of higher education, but it translates into a student savings benefit of over 5,587,231 miles of driving, 94,787 hours of driving time, and over $1,834,424 in driving costs. Students who would have to spend many hours driving are now able to spend that same time engaged in their studies, increasing their opportunity for learning success.

Degree requirements for campus-based and distance students are the same. Currently, the program has 141 total courses in its course inventory with over 120 trained faculty ready to deliver their courses through this delivery method. However, the number of courses is not nearly as interesting as the number of complete degree programs offered. The university offers it's Master's degree in Business Administration and it's Master's degree in Education, Instructional Technology totally online. At no point is it necessary for students to physically come to campus to complete either of these two programs. At the undergraduate level, the university offers a Bachelor's of General Studies, Emergency Management Administration and in Nursing (RN Completion). The number of programs and courses are constantly expanding to assist students in their desire for educational opportunity.

Quality

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Survey research is conducted every semester to determine the demographic patterns represented by students who participate in the program. Further, student attrition, satisfaction, and benefits are monitored in order to inform faculty training, technological improvements and program development. Current research projects at both the graduate and faculty level covers such topics as online course quality assessment, mediated online communication, improved online instructional strategies, and improved interface design.

A Southern Association of Colleges and Schools (SACS) review committee made a physical visit to the university on May 8-9, 2000. After the review committee made its recommendation to the SACS board, a commendation and full accreditation of the university's Internet based program was awarded in January of 2001.

Conclusion

As will distance learning as a whole, the ideas utilized in the development of this online program are not necessarily new. However, this program has been highly successful in pulling many concepts together into a successful enterprise. Individuals attending this session will have the opportunity to see at least one method for delivering degree programs online. Attendees will be given an overview of how this program used the principles of seamless technology integration to build a program that represents and includes all areas of the campus community. Attendees will also see both the positives and negatives of building such a program. As has been seen with many failures with online education in recent history, the pit-falls that can doom this type of program are great. However, with strong vision of what the outcomes for a program should be, good planning based on sound theoretical principles, and a bit of luck, an online distance learning program can be a good choice for many schools.

Enriching Online Course Conferencing: Best Practices

Bruce A. Morgan, Course Website Designer
U.S. Open University
Denver, CO 80230
b.a.morgan@open.edu

Carl L. Reynolds, Professor
College of Education
University of Wyoming
Laramie, WY 82071
Aged@uwyo.edu

Bridget Arend, Adjunct Faculty
University College
University of Denver
Denver, CO 80208
barend@du.edu

Abstract: A pervasive issue in online learning is the effective use of communications tools. In many instances, the creative uses of discussions, chats, and e-mail makes for a positive experience for learners and are critical factors in the level of student involvement in the course. This is especially true when conducting in-service courses or other adult learning situations where learners bring a rich array of experience that require a vehicle by which these experiences can be shared and passed along to their peers. In the design and delivery of numerous on-line courses implementing various technologies, we have experimented with and established a variety of best practices that are designed to promote high interactivity among learners. In effect, the use of these tools can develop better communications in instructor/student and student/student interactions and provide for more active student involvement. This paper ventures to present a series of useful strategies and best practices for on-line communication.

Introduction: One of the most common complaints by students after taking their first online course has been the lack of personal interaction that is commonly associated with the traditional classroom setting. Facilitating in-depth rich discussions as part of online class activities is one of the most critical elements contributing to a student's success or failure in an online course. Interaction with students has been found to be the most critical factor in student perception of successful learning experiences online. (Palloff, R.M., Pratt, K., 1999) This is especially true when conducting in-service courses or other adult learning situations where learners bring a rich array of experiences that require a vehicle by which these experiences can be shared and passed along to their peers (Knowles, 1978).

The level of involvement between students and content is seen as a critical factor in the retention of college students (Astin, 1992). Students can be encouraged and compelled to become actively involved with course content through creative and interactive online conferencing strategies. While only a few teaching methods are typically used in higher education, instructors have at their disposal a variety of instructional strategies that could be used to elicit the various types of learning (Davis & Davis, 1998). In the design and delivery of numerous on-line courses implementing various technologies, we have experimented with and established a variety of best practices that are designed to promote high interactivity among learners.

Background: In early attempts at teaching on-line courses, many comments voiced ran along these lines: "I will never take an on-line course again!", "There were times when we forgot we had a professor.", and " I really miss the face-to-face contact with my fellow students." Students often hold preconceived notions of on-line education as impersonal, instructor-less courses. However, through experimentation and review we have developed a list of several practices to instill in students effective use of communication tools online. In effect, the use of these tools can develop better communications in instructor/student and student/student interactions and get students more actively involved in the course content.

Implementation: Through trial and error, several techniques have been tested over the last few years. Some of the techniques listed below did not always work well at first. But, through refinement and practice, the following methods have proven to work the best most consistently in promoting better interaction among students.

Use an icebreaker - This is a simple process. The first step is to ask students to introduce themselves briefly and then to follow up with an assignment to post photos and autobiographies to all class members. It is also important to create a practice area for students to feel free to practice interacting with each other between classes. It is important to lead with a question or assignment that encourages and requires each student to participate. Another warm up exercise is to devote the first 10-15 minutes of each class session communicating with each student about their work, their life events, etc. In effect, this begins to create a sense of community that is necessary to developing a successful teaching experience.

Student moderated discussions – This technique was designed to give the student control of the interaction and participate in the teaching process. Allowing learners to participate in the direction of the class has been proven to be an effective method of not only creating learner ownership but also to raise learner satisfaction. The process used is to have a student or group of students develop the discussion topic in which they would present or pose multiple concepts and controversial topics, which could be debated or discussed on-line. The individuals presenting are responsible to research a topic for the discussion board, and provide reading materials for the other class members. These materials are then disseminated either through e-mail or by posting to a designated website. During the class period, the assigned student(s) moderate the discussion through the use of an online chat. It usually works best to breakout the class into groups. Each group is then responsible to post their responses to their respective areas on the discussion board as well as report a summary when going back into the total class chat.

Role-play – One way to involve students more thoroughly with the class content is to turn the conferencing area into a dramatic scenario or role-play environment. For instance, political science students can each represent country's involved in a summit meeting such as the G-8, and through the discussions, role-play a summit meeting on one issue, each student arguing for the concerns of their respective country. Separate conferencing areas should be used, one for the discussion and preparation of the upcoming role-play, and one for the role-play itself where individuals will 'speak' with the voice of their assigned role. This strategy could be useful to dramatize interviews of group project proposals, argue two sides of a legal issue, or conduct debates among philosophers.

Alter egos – The creation of alter-ego characters who represent extreme viewpoints about a content area could be useful in forcing students to recognize and react to various perspectives. In a course on negotiation, a professor can intermittently interject the opinions of extreme views using characters and encourage students to write responses appealing to these viewpoints. Some course delivery platforms allow instructors to alter the name of the submitter to further augment the presence of various 'voices' within the class discussion.

Various forms of groups – Online groups can take many forms. The class structure and logistics will often play as strong a role in how to create groups as the group project itself. For example, allowing students to self-select into groups may be desirable for a group project, but may require two weeks for the formation of groups alone due to the asynchronous nature of online collaboration. Online groups are also typically much smaller than groups in the traditional classroom. Success in a classroom-based team often hinges on the level of facilitation by the instructor. "Too much involvement and the team has no chance to develop its own cohesion, but too little facilitation and the team struggles and may lack a sense of purpose" (Arend, 2000) Also, strategies for including self-reported and peer-reported group grading sheets greatly assist the instructors' task of ensuring an equal share of workload within groups.

Team presentations – Team presentations, while often a logistical challenge online, remain an important component of online collaboration and should not be overlooked. Teams need the opportunity to showcase their achievements and gain constructive feedback on their many decisions and conclusions. Online presentations can take the form of live chat-based 'question and answer', PowerPoint, web page or other multimedia, asynchronous feedback, or any combination of technologies and methods. One of the most successful approaches is to have teams submit their presentation in a convenient format, such as pdf files, to the instructor who then posts the presentation on a class web site prior to the class session. In this manner, other members can view the presentation during the class session.

Faculty responsibility – As the instructor in an online course, there is an explicit responsibility to engage as a member of the discussions. Students are reluctant to participate actively in an area where the instructor has no presence. However, too much interaction can prove equally detrimental. An instructor who responds to each student posting immediately may unwittingly create an environment of over-cautiousness and reluctance on the part of students to participate and to explore new ideas. Students will need a level of freedom to learn that online conferencing is a safe place to test out new thoughts. But, the instructor must balance this freedom with an obvious concern for the direction of the discussions, and input of expertise.

Finally, the Instructor must serve as a model and interact with the students throughout the course. If an instructor expects certain levels of thinking, formality, and even grammar and style, this should be modeled in all instructor comments. Students should be directed early on regarding the desired format so they may become familiar with essential communicating skills. They can more quickly focus on the quality of their comments. Some instructors choose to divide conference areas into informal, free exchange of idea forums, and more formal, graded discussion forums.

Conclusion: Ultimately, using these processes to encourage and develop confidence and skill with online interactions have had a number of highly positive implications for both the students and the instructor. There is greater ownership and cohesion among the students. Participation throughout the length of the course evolves as student investment in the course continues to grow. And, at the end, students are much more positive about their experience in the course.

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Beyond the Talking Head: Active Instruction in Online Instruction

Kathryn Morgan, Bemidji State Univeresity, US

What are the strategies for working effectively with students in online learning environments? What can educators do to stimulate meaningful student discussion? This presentation will provide examples of both written responses and online chat environments that reflect creativity, quality questioning strategies and online options that will increase the ability for the faculty to interact with students on a timely basis. Cartoons, case examples, and a collaborative response strategy will be used to illustrate the active concept.

QIICC:
Student Empowerment through Distance Assessment

Patrick M. O'Shea
Brunswick County Public Schools
patrick.oshea@brun.k12.va.us

Dwight W. Allen
Old Dominion University
dwallen@odu.edu

Abstract

The QIICC Analysis feature of the Telequiz Assessment Protocol is a revolutionary method for analyzing student learning. The Telequiz Protocol has been used in Dr. Dwight W. Allen's Educational Curriculum and Instruction courses at Old Dominion University since 1997. The protocol allows students to take quizzes over the Internet at their convenience. These quizzes are comprised of randomly assigned multiple-choice questions based on the content of the course.

The QIICC Analysis feature allows for students to rate individual questions on several variables: Quality, Interest, Importance, Confidence and Challenge. The first three of these are fairly straightforward, however, the last two need some explanation. The purpose of this protocol is to attempt to discern how accurate students are in their understanding of their own knowledge, and to train them on how important it is to "know what you know."

Project Summary

Students are asked to provide a confidence level for each question comprised of three levels (high, medium and low). This data is meant to show how confident a student is in his/her answer. This data is then used, along with the answer accuracy, in order to calculate the score for individual questions. The scoring rubric is shown in Chart A:

Chart A: QIICC Scoring Rubric

Confidence Level	Question Accuracy	Credit Assigned
HIGH	Correct	5 points
MEDIUM	Correct	4 points
LOW	Correct	3 points
LOW	Incorrect	2 points
MEDIUM	Incorrect	1 point
HIGH	Incorrect	0 points

As can be seen, the maximum credit that can be received for any one question is 5 points, however, during the implementation phase of this grant, several scoring alternatives have been utilized. Initially, each question was scored out of 5 points, thus making the theoretical maximum the goal for each quiz. During the initial testing of this protocol, it was found that this was in essence detracting for students who were not absolutely confident in their answers, and so the grading rubric was changed to grade out of 4 points. This grading scheme rewarded the students for high confidence levels. It was found that this grading process worked best in the k-12 educational setting, however, the students at the university level demonstrated much more confidence in their answers, and the bonus point for each question lead to extremely lopsided scoring – in some cases as many as 30 bonus points were awarded per test. Due to this, the scoring rubric at the university level was adjusted back to being scored out of 5 points.

The final variable, challenge, allows students to challenge any question on a quiz. A challenged question does not count toward a quiz grade. Each student is provided with 5 challenges at the beginning of the semester, and can be allocated more for any reason found appropriate by the instructional staff. If a student uses more challenges than they have left an email message is sent to them indicating this has occurred, and the challenges (over the number they have been allocated) are turned to non-challenged questions.

Results & Implications:

The data analysis for the implementation of the QIICC protocol shows that there are substantial benefits to using the process. Average confidence levels have consistently been above 4.0 (4 being MEDIUM confidence and 5 being HIGH confidence) – regardless of test site. In fact, the only instance where the average confidence dipped below this 4.0 plateau occurred at the university level, and even then only by hundredths of a percentage point (3.98 during the initial summer testing). The highest confidence levels, by far, were seen at the 3rd grade in Brunswick County (4.84), which demonstrates an important point that was learned during this testing of the protocol; students in the elementary grade levels have difficulty making the confidence judgments requires by the QIICC analysis. When asked directly if a student knew the answer to a question, often the student would admit that they did not, however, once a choice was made – regardless of whether the choice was correct or not – the student would show high levels of confidence in the chosen answer. The testing of students in the 5th and 6th grade in St. Louis showed a much more realistic understanding of their confidence levels - approximately the same, on average, as those students in the 11th grade that were tested (4.31 and 4.33 respectively).

More important than simply looking at the confidence levels, is looking at the difference that the QIICC scoring rubric makes in grades. Throughout the testing, analysis has been done to compare the QIICC grading rubric with the more traditional rubric involving 1 point for every correct answer. The results showed some startling trends. Every administration of the QIICC protocol showed that students performed much better, in terms of the scoring percentages, using the QIICC scoring rubric. Using the same tests, and running the two separate scoring schemes, the students scored as many as 22 additional points (on a 100 point scale) through the QIICC scoring. The process in the K-12 testing, where each question was graded out of 4, showed that the average score ranged between 78.4% (3rd & 5th Grade samples) and 88.9% (11th grade sample) on the assessments using QIICC. In comparison, these same tests, when scored using the traditional one point per correct answer showed the average score ranged between 61.1% (5th grade sample) and 66.6% (11th grade sample) depending on test site. The QIICC scoring rubric resulted in grading difference between 17.3 additional points and 22.3 additional points.

The results at the university level, where each question was graded out of 5 points, show similar differences. Depending on the quiz that was taken (each of the six quizzes was used as a distinct administration of the process), the QIICC scores ranged on average between 65.9% (6th Quiz during the summer) and 92.6% (2nd quiz during the fall), while the traditional scoring ranged between 49.8% (6th quiz during the summer) and 74.1% (2nd quiz during the fall). The comparison of the two grading rubrics shows a gain of between 16.1 and 21.1 additional points using the QIICC scoring rubric. Complete results are shown in Chart B.

Chart B: Scoring Averages Comparison

Administration	QIICC Scoring Average	Traditional Scoring Average	Additional Points Earned through QIICC Scoring
Quiz 1 Summer	79.0%	58.9%	21.1
Quiz 2 Summer	78.0%	60.9%	17.1
Quiz 3 Summer	83.5%	65.6%	17.9
Quiz 4 Summer	89.2%	70.3%	18.9
Quiz 5 Summer	76.8%	59.8%	17.0
Quiz 6 Summer	65.9%	49.9%	16.0
ODU Quiz 1 Fall	87.2%	68.9%	18.3
ODU Quiz 2 Fall	92.6%	74.1%	18.5
3rd Grade	78.4%	62.2%	16.2
5th & 6th Grade	78.4%	61.1%	17.3
11th Grade	88.9%	66.6%	22.3

Conclusions

Although further research is warranted, this initial study has allowed for a more complete understanding of how QIICC Analysis, in conjunction with the Telequiz Protocol, can influence the assessment of students at all different levels of schooling: elementary, secondary and post secondary. This research shows that there is tremendous potential for including students in the assessment process, and for making assessment a more meaningful process.

ELEARNING IN EDUCATION: AN OVERVIEW

Raymond S. Pastore, Ph.D.
Department of Educational Foundations & Secondary Studies
Bloomsburg University
United States
raypastore@hotmail.com

Abstract Elearning, as used in this presentation refers to the use of Internet technologies to deliver instruction. This objective of this presentation will be to examine the development of distance education from interactive video and computer-based courses to web-based instruction. The primary level of Elearning that this presentation will address is the use of web-based courses where 50% or more of the classes are online. This presentation will also address issues and problems associated with the implementation of Elearning.

Definition of Elearning

In a true sense, Elearning can be thought of as the delivery of information via all electronic media, including the Internet, intranets, extranets, satellite broadcast, audio/video tape, interactive TV, and CD-ROM. Although each delivery system has specific advantages and disadvantages, the power of the Internet has resulted in the rapid growth and expansion of Elearning in the form of web-based instruction. The most popular view today refers to Elearning as the use of web technologies to deliver instruction. Rosenberg (2001) has defined 3 criteria for Elearning:

- E Learning is networked, which makes it capable of instant updating, storage/retrieval, distribution and sharing of instruction or information.
- It is delivered to the end user via a computer using standard Internet technology.
- It focuses on the broadest view of learning – learning solutions that go beyond the traditional paradigms of training.

Types of Delivery

Elearning can be based on a dichotomous "blended learning" model (Selix, 2001) that views learning delivery modalities as synchronous/asynchronous and online/onsite. Synchronous learning is learning in real time. The instructors or a group of instructors may lead the class through a series of meetings to deliver course content. The advantage of synchronous learning is the "live" student/teacher interaction. The disadvantage of synchronous learning is the limitation to learning at a specific time. Asynchronous learning is learning on learner's time as decided by the student. The obvious advantage of asynchronous learning is the flexibility of the student to decide when the lesson will take place.

The advantage of online learning compared with on-site learning is the savings in money and time for travel. The obvious disadvantage that is given most often by critics of Elearning is the loss of personal interaction with the instructor, although this may be somewhat disputed through the use of interactive web technologies.

Advantages & Disadvantages of Elearning

Proponents of online learning claim that Elearning delivered via the Internet is both efficient and effective in terms of learning and costs. Although Elearning is generally though of as cost-effective, the degree of instructional quality in Elearning can vary as much as instruction led by traditional methodologies. Course completion can also become a major issue. Elearners who enroll in asynchronous learning courses must have motivation, independent learning skills, and determination to insure completion of their work.

Elearning resource providers such as Click2 Learn claim that online learning has many advantages over traditional classroom learning such as high memory retention and consistency in quality of instruction. As teaching models shift from teacher-centered, "one size fits all" learning to student-centered, individualized life-long learning, web-based Elearning supports new pedagogies. Techniques such as self-paced learning, collaboration, simulation, and exploration may become central to the concept of online instruction.

Elearning in Schools

As is the case with many institutions of higher educations, the number of high school offering online courses in increasing. Elearning in the public schools provides increased access to learning and more learning opportunities for students of all ages in any location; however, educators are facing challenges including economic, networking, and access issues. The integration of Elearning into the curriculum will require careful technology planning so growing needs do not rapidly exceed resources.

Future Trends

Elearning had become a new form of knowledge transfer and a unique and exciting delivery system. Future Elearning trends are expected in the following areas:

- Continued Elearning growth and expansion in Education and Business and Industry
- A greater Elearning role in the public schools (Office of Educational Technology, 2001)
- Improved web technologies to disseminate Elearning over the web
- The development of new Elearning and evaluation standards.

As John Chambers, CEO of Cisco Systems has said, "Education over the Internet is going to be so big, it is going to make e-mail look like a rounding error." (Internet Time Group)

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From a Distance: Distance Learning Interactions

Samuel S. Perkins
sperkins@mail.barry.edu

Victoria A. Giordano
vgiordano@mail.barry.edu

Department of Teaching and Learning
Adrian Dominican School of Education
Barry University
United States

Abstract: This paper is a report on the findings of a study conducted on a dually listed undergraduate and graduate TESOL distance learning course. Data were collected on the students' interactions with the course content and instructor to investigate differences in how graduate and undergraduate teacher preparation students interacted and responded to the distance learning delivery mode. Findings indicate that the graduate level students were more autonomous and confident using the new methods of course delivery than were their undergraduate counterparts. The implication of these findings is that the design of distance learning dually listed teacher preparation courses must provide for adequate support for the less experienced (undergraduate) learners. Suggestions for providing such support are included.

Introduction

Barry University in Miami Shores, Florida is committed to serving the needs of diverse populations. The teacher education programs at Barry University work with the community to provide relevant and accessible preservice and inservice teacher preparation courses. Teachers in the state of Florida are required to be ESOL endorsed; consequently, the teacher education programs at Barry University infuse TESOL courses in their preservice programs and offer TESOL courses at the graduate level enabling practicing teachers who are not yet endorsed to fulfill the state requirements. Large numbers of pre- and in-service teachers across the state enroll in the TESOL courses. To better meet the demands for such courses, Barry University designed one of the required courses, TSL 406/506 – Applied Linguistics, as a distance learning course.

The School of Education instructor who took on the challenge of redesigning TSL 406/506 as a web-based course had taught the course in a traditional manner many times and was, therefore, very comfortable with the content as well as the challenges that may arise from the course and strategies to effectively deliver the course. The instructor worked with the School of Education's distance learning design team to prepare the course for the distance learning format. Several elements had to be considered as the team began the design and development processes: 1) since the course was part of a state certification program, it must adhere to the standards and form that were in place for the traditionally delivered course; 2) the course is dually listed as both undergraduate and graduate courses, and, therefore, any given section of the course may have both novice and veteran teachers enrolled; 3) the course is a methods course and must balance theory and practice. The design team, with content, design, and technology expertise, collaborated to create a course that would serve the intended population.

Technological Implementation

Critical course elements for successful distance learning experiences were built into the course design. These were derived from the American Association for Higher Education's (AAHE) "Seven Principles for Good Practice in Undergraduate Education," principles of adult learning (Knowles, 1998) and various research, studies, and literature reporting on effective distance learning design (e.g., Moore and Kearsley, 1996; Driscoll,1998; and Horton, 2000). Elements incorporated into the course are listed in Table 1 with their corresponding strategies.

Course Element	**Strategy Implemented**
Communicate high expectations and encourage active learning (AAHE, 2001) through course organization	Content is organized into modules Assignments address the content through both the theoretical and practical perspectives
Provide depth and breadth of content to meet diverse interests and talents (AAHE, 2001; Knowles, 1998) of students	Selected readings address content in a variety of styles and present different foci Assignments are presented and completed in diverse formats (responding to classmates' postings, partnership options, case study assignments, field experience assignments, streaming video)
Promote interaction between student and instructor and among students and provide for prompt feedback (AAHE, 2001; Moore & Kearsley, 1996; Driscoll, 1998; Muirhead, 2000)	Technologies provide a means for both synchronous and asynchronous communications (live chat, discussion webs, email, fax, phone, and face-to-face) Option for partnering on some assignments is offered Instructor is available via email
Support students' management of time (Moore & Kearsley, 1996) and time on task (AAHE, 2001)	Modular format of content presentation guides students in managing their time spent on course Imposed deadlines for assignments further guides students
Support students' use of technology (Moore & Kearsley, 1996; Miltiadou, 2000)	Students attend an orientation session to introduce them to the technologies used and the format of the course Students have email & phone number of University technology Help Desk Students may email or phone instructor regarding technology questions
Motivate students to learn (Knowles, 1998; Horton, 2000)	Students earn (or lose) points for assignments Essentials of course (no frills or fillers) are presented Theory and practice are balanced, making learning authentic and relevant
Provide for self-directed learning (Knowles, 1998; Everett, 1998)	Modular format allows students to pace themselves to some degree Variety of supplemental readings allow students to engage in personal interests or areas of special need

Table 1: Critical course elements included and strategies used in their implementation

The Study

The distance learning professional development course was piloted in the fall of 2001and involved 14 students. The course was dually listed as an undergraduate and graduate course. Six of the enrolled students were graduate students, and the other eight were undergraduate. None of these students had previously taken a web-based course.

This study addresses the following research questions:

1. Is there a difference in how a pre-service (typically undergraduate) teacher embraces and applies the technologies in a web-based distance-learning course to the manner in which an in-service (typically graduate) teacher does?
2. What implications might differences in the approaches have for teacher educators who design and deliver distance learning teacher preparation courses at the pre- and in-service levels?

This study is informed by the research and literature base on teacher competence and experienced and expert teachers (Berliner, 1988; Sternberg and Horvath, 1995). Teachers, at various stages in their professional development, exhibit different behaviors in their teaching practices and in how they approach and plan for the teaching and learning experience. Generally, these stages of development are depicted on a continuum from beginning or novice teacher (which includes the pre-service teacher) to the experienced and accomplished (in-service) practitioner. Sternberg and Horvath (1995) propose an Expert Teaching Prototype, using three primary categorizations to distinguish the novice teacher from the expert: Knowledge, Efficiency, and Insight. Berliner (1988) describes Pedagogical Developmental Stages that portray and characterize the teacher in five developmental stages of professional development. These stages of development are not new to understanding how the novice and apprentice level teachers become expert and accomplished with typical classroom practice. This study, however, seeks to determine whether or not the same or similar stages are evident in terms of novice and experienced teachers interacting with distance learning technologies in a professional development course.

The data derived from this study are in the following forms:

1. Assignments submitted by students
2. Frequency of student access to various course resources
3. Student messages to the instructor

Results

Data regarding the submission of assignments in four categories were collected. These data are listed below under the heading "Assignments Submitted."

With regard to the frequency of interaction with course content, the following data were collected. The graduate students recorded a total of 5141 hits to the course, which translates to approximately 857 hits for each of the six students. The undergraduate students recorded a total of 4619 hits, which translates to an average of approximately 577 hits for each of the eight students. The average of 857 hits for the graduate students is significantly different than the mean of 577 hits for the undergraduate students ($p = .05, df = 12$).

For the purposes of this study, the course was divided into three categories of pages: the Homepage that hosts various icons to access components of the course, the Organizer pages that open into other pages, and the Content pages. The Content pages list various components of the instructional modules of the course. Items Read are pages within the other structures. The averages for each group for these categories are reported below under "Average Hits Per Person." The following statistical observations result from an analysis of the data in the "Average Hits Per Person" section of Table 2. In terms of the HomePage, the average figure of 243 hits for the graduate students is not significantly different from the figure of 177 hits for the undergraduate students ($p = .05$, $df = 12$). Regarding the Organizer pages, the mean of 172 hits for the graduate students is not significantly different from the average of 129 hits for the undergraduates ($p = .05$, $df = 12$). In the area of Content pages, the average figure of 303 hits for the graduate students is significantly different from the figure of 144 hits for the undergraduate students ($p = .05$, $df = 12$). With regard to the average number of items read, the figure of 119 for the graduate students is not significantly different from the figure of 113 for the undergraduates ($p = .05$, $df = 12$).

The third category of data regards messages to the instructor, generally in the form of questions regarding various aspects of the course.

	Graduate	**Undergraduate**
Assignments Submitted		
Before due date	32	35
On time	84	92
Late	16	22
Late due to technology challenges	6	25
Average Hits Per Person		
HomePage	243	177
Organizer pages	172	129
Content pages	303	144
Items read	119	113
Messages to Instructor		
Planning ahead	5	14
Technology challenges	9	28
Questions about course content	17	35
Confirmation of assignments received	3	22
Concern about technology challenges affecting grades	2	8

Table 2: Quantitative data collected regarding student interaction in web-based course

Interpretation and Implications

Overall, it is clear that the graduate students interacted more frequently with the course content than did the undergraduate students. Further, it appears that the graduate students expressed less concern about technology challenges and course content than did the undergraduate students. However, since all six of the graduate students were also preservice teachers in this pilot, it is impossible to identify any correlation between the graduate students' interactions in the course and pedagogical stages of development of teachers. One might look, however, to Sternberg and Horvath's (1995) Expert Teaching Prototype to generalize and draw parallels between the graduate students' experiences and "expert teachers." Sternberg and Horvath (1995) suggest an Expert Teaching Prototype that draws on psychological research on expert performance in a variety of domains. The three primary features distinguishing the expert from the novice are: Knowledge, Efficiency, and Insight. Briefly, the prototype suggests that experts bring more knowledge to bear in solving problems and do so more effectively and efficiently than do novices. Further, experts are more likely to arrive at creative solutions to problems than their novice counterparts. The expert, then, is knowledgeable and has extensive accessible knowledge that is organized for use in performance. Finally, the expert is planful and self-aware in approaching problems and is able to derive solutions to problems through selective analysis of information (Sternberg and Horvath, 1995).

Applying this concept to the current study, one could say that graduate students are more "expert students" and therefore perform at higher levels of accomplishment than do their undergraduate counterparts, despite the fact that the content is equally new to both groups. In the present study, the distance learning format was novel to all participants; but the more experienced students, the "adult" learners, appeared to be more capable of adapting to the new situation of adult learning experiences than were the less experienced students.

The implications of this for the design of distance learning (or traditional) courses that are dually listed as both graduate and undergraduate is clear: to make the playing field more level and to nurture the less experienced student, instructional designers must scaffold learning to provide opportunities for learners to better master the knowledge, to become more efficient in the processes of learning the content, and to develop insights that apply to the current learning situation and that are transferable to other learning experiences. The nature of the distance learning course is ideal for such an approach. Since much of the interaction of the course is done asynchronously, the distance learning student may choose which scaffolds to use. Some suggestions for revisions to TSL 406/506 are suggested:

1. *Embed learning/study skills into the course content.* Elements such as highlighted text to focus students' attention on essential concepts; hyper-linked text to examples of the concept in practice or to in-depth explanations; color-coded text to "arrange" course themes; and online tutorials in the use of basic technologies used in the course may assist the learner in developing a schema for learning in a distance learning format.
2. *Expand the course orientation.* A series of streaming video clips that address specific skills or knowledge required in the course, success factors for distance learning, and/or an explanation of the style of the course and its content may help "set the stage" after the initial face-to-face meeting. Including a brief course manual that addresses certain challenging issues or provides additional resources may provide a degree of comfort.
3. *Provide recommendations for time on certain tasks.* Offer suggestions for the amount of time that the learner should spend on certain tasks, helping the student budget his/her time. These suggestions might be written into the module with the assignment. Additionally, provide learners with suggested weekly time demands at the initial orientation session so they might build these into their calendars immediately.
4. *Engage students in more interactions with one another.* Establishing the social climate of the virtual classroom may provide learners with a degree of comfort to communicate and to work with one another. A virtual icebreaker at the start of the course that not only introduces students to one another but also employs some of the technologies that will be used in the course may help to establish a climate for success. Required virtual meetings scheduled one-third and two-thirds of the way through the semester to follow-up to the initial orientation meeting may help students stay on track. Authentic collaboration could be accomplished through group projects, jigsaws (groups of undergraduate and graduate students becoming experts on a topic from the course), and team projects.
5. *Highlight the relevance of the course to its practical application.* Include, at the beginning of each module, the purpose for the module content and its application to practice. Have students publish to the class web their field experience summaries and analyses and invite students to comment on or inquire about one another's remarks.

Conclusion

Although these suggestions may sound like a great deal of hand-holding, indeed, that is what we must do as we introduce the student to a foreign learning approach. As Dewey (1933) suggests, as teachers we must balance the old and the new; "The best thinking occurs when the easy and the difficult are duly proportioned to each other" (p. 290). Assuming the purpose of the course is to teach its content, the delivery system and approach must be made simple. The cognitive dissonance that occurs when the student is confronted with a completely unfamiliar approach to learning is, at first, challenging and stimulating; but if the delivery model continues to be the focus of the learning experience, we cannot expect students to meet our learning expectations with the curricular content.

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Teaming: A Catalyst for Transforming Distance Education Teacher Preparation Programs

Pam Petty
Western Kentucky University
Bowling Green, KY, USA
pam@pampetty.com

Abstract: This paper explains the concept of teaming as a literacy professor, a social studies professor, a teaching and learning strategies professor and distance instructors worked together to provide sound instruction and student support through the semester. Deliberate attempts were made to empower and include all students through the use of telecommunications technologies. A rationale for the field-based model, implementation procedures, and the program's overall impact will be discussed.

Introduction

This paper explores how a "team" approach was used to build community and to establish collaborative relationships in Interactive Television distance learning classes at Western Kentucky University. Distance learning continues to grow in popularity and application in post-secondary education around the world. While providing opportunities for many students, traditional and non-traditional, to achieve their educational goals, distance learning also presents institutions of higher learning, instructors, and students alike with many challenges. The antiquated mode of "transmitting" information via lectures and then holding students responsible for that information is further exacerbated by the lack of face-to-face interactions in most distance learning situations. Feelings of isolation, lack of participation, passive learning, and feelings of anonymity are sometimes characteristic of distance learners. Many times instructors leave the learning situation completely unsure of whether or not they provided effective instruction or if they were able to "reach" students on any level.

Recognizing that these obstacles often add to frustration for students *and* those providing instruction, an attempt was made by three professors and three instructors at distance sites to follow Vygotsky's tenets as they relate to the social aspects of learning, and to the role of teachers as facilitators of learning (Dixon-Krauss 1996). Much of the theoretical foundation that served to guide our decisions was based on Vygotsky's theories of the *social* nature of learning. This was modeled in the way we approached our collaborative meetings with the instructors, in the way we structured the types of learning activities we included in our syllabi, and in the way we interacted via the different modes of communication we employed throughout the semester. We also considered Vygotsky's Zone of Proximal Development as we planned for success – for professors, for instructors, and for students. We considered students active participants in the learning and employed a constructivist model of instruction. We defined the professors' and instructors' positions as mediators of the learning process. Technology served as the bridge between the different teachers and learners.

Structure

Western uses a "block" method for methods courses in its teacher education program. In that block method, three courses are taught as an integrated 9-hour course sequence. Block I includes social studies methods, reading methods, and a course in teaching and learning strategies. In the spring of each year, Block I is taught via Interactive Television to students on the main campus in Bowling Green and at three distance sites, namely Glasgow, Owensboro, and Fort Knox, Kentucky. The concept of *teaming* was incorporated as the university professors and the distance instructors worked together to provide sound instruction and student support through the semester.

Since these courses are "field-based," students meet in traditional lecture classes with professors for a portion of the day and then are in area schools performing practicum experiences for approximately four hours per day, two days a week. Instructors are in place at each distance site to facilitate students, make arrangements at area schools for placements, and to share in the responsibility for student learning of core content.

During the spring of 2001, approximately 85 students were involved in Block I and were located at four different campuses, Bowling Green, Glasgow, Owensboro, and Fort Knox. In preparation for the semester, the three distance Instructors met with the three university professors in four face-to-face meetings and in multiple meeting via Interactive Television to set goals, define responsibilities, and to plan the calendar for the spring semester.

Methods

To accomplish our goals of building community we focused on how this collaborative relationship would "affect student satisfaction, retention, and learning" (Brown 2001). Both in-class and out-of-class tasks focused on students developing learning relationships with the university professors, the distance site instructors, and with other students in all four locations. A kick-off day at the beginning of the semester allowed us to meet, exchange email addresses with students from other sites, and to lay the foundation of what it means to be part of community of learners. Students left the session with four email addresses of students from other sites and instructions on how to begin to make "connections" with others in our Block. All university professors had "interactive" webpages in place to support each of the three courses and one Block webpage provided students a central point of information. Students were asked to complete a template-based webpage in CourseInfo within the first week of class. The information page in CourseInfo had to include items of special interest, favorite websites, hobbies, and other items that would allow students to get to know each other through this medium.

In consideration of the social nature of learning, we targeted *communication* as a component that would be paramount to our success in actively building a team with the instructors and a community of learners with the students. The use of technology in the form of multi-modal telecommunications provided for communication between professors and instructors, professors and students, and student-to-student interactions. Discussion boards, on-line conferencing, and asynchronous chatting capabilities formed the nucleus of our "beyond the classroom" communications. The following is a list of the types of communication modes we employed:

- Interactive Television laboratory – each student has a speaker
- Electronic Mail – all students were required to have an email address
- Telephones
- Fax Machines – in every Interactive classroom
- Face-to-Face Meetings with students at distance sites
- Web Pages – Professors maintained course web pages, each distance site had its own web page, each student developed a seven page web presence
- CourseInfo (Blackboard) – Discussion Boards, Personal Information Pages, Virtual Classroom Chats, Electronic Gradebook
- America On-Line Instant Messenger – Students could have synchronous conversations with professors during days, evenings, weekends, holidays

Results

Our teaming design served to make this an invigorating experience in teaching and learning. We constantly made notes about changes, improvements, and goals for future semesters. We collected valuable feedback from instructors and from students at both the main campus and from the distance sites. Discussion of findings and future challenges provide a basis for sharing our discoveries with others.

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Establishing a Learning Community of Media Design and Art Schools

The European North-South Axis

Maja Pivec,
University of Applied Sciences, Information Design
Graz, Austria
maja.pivec@fh-joanneum.at

Heimo Müller
University of Applied Sciences, Information Design
Graz, Austria
heimo.mueller@fh-joanneum.at

Abstract: The objective of EDULA (European Design Schools and Universities Learning Alliance) is to develop and apply a novel, integrated solution for distributed joint lectures and student e-teamwork by combining technology, methodology and skill development. This approach, based on new innovative learning methods and fostering joint practical e-teamwork in combination with face-to-face and electures that are common in most educational institutions, presents a new organisational form in education.

The EDULA solution will support the paradigm shift from classical lectures to ICT (Information and Communication Technology) - supported collaborative knowledge acquisition. EDULA will provide a collection of solutions, best practices and necessary education for the lecturers.

Preamble

In one of the literature depictions of the synergy of people and computers, the author (Pickover 1992) integrates people into the electronic environments. People began to see with "the eyes of the computer", they began to hear "with the ears of the computer" and they applied computer letters to write. At that point the above described was still a science fiction. Nowadays, in the era of ICT this science fiction vision transformed into the social fiction, as (Fassler, 1999) calls this phenomenon. The ICT makes it possible to communicate and exchange ideas without the physical boundaries. The application of the ICT also spread rapidly. At the beginning the ICT was available only to the smaller group of privileged people working at the governmental research institutions and universities. Nowadays ICT can be found in primary and secondary schools and in the majority of the average households. There is no night and day period in the virtual world, the communication and data exchange is intense and lasts 24 hours / day, seven days per week. One should only moderate and structure the information flows. Therefore we came to the conclusion to extend our teaching / learning process into the virtual world and to build a learning community. At this point we found the theoretical background in the work of Vygotski, who claims that a knowledge building community is a learning environment that supports the continuous social construction of knowledge (Vygotski 1978).

EDULA - The Project

The general idea of the international co-operation of the Media Design and Art Schools is to increase the level of expertise exchange and to foster the skill development. The technology applied will be one of the available web-based learning platforms like (Hyperwave eLS) or (WebCT).

The Project Goals

Within the EDULA project three goals have been defined as follows:

G1: EDULA provides a European resource of ICT lecturing and student e-teamwork, available to all the interested parties, that fosters the introduction and application of ICT for knowledge acquisition. The "knowledge pool" has to be considered as a resource of guidelines and practical examples that can be taken over as a form (model). Based on the model different topics e.g. practical projects and lectures could be carried out.

G2: EDULA will develop and apply an integrated solution for joint lectures and e-teamwork in distributed learning institutions. The solution will be applied and adapted in a series of trials in different learning domains. Joint lectures will be formally acknowledged by several partners.

G3: Workshops will be organised and carried out to educate the educators in the terms of application of the ICT technology for lecturing and student e-teamwork.

Enabling the knowledge exchange without the boundaries makes it possible that the knowledge flows without limitations and that students have the possibility to make decisions about their studies i.e. what, why and how do they prefer to learn. Students can decide to enrol in a course based on their estimation that the knowledge acquired within the chosen course will have the best value for their further professional development.

The experience offered within a knowledge-building community is the experience of the international e-teamwork. Within a chosen course, international student e-teams will be formed to work on a project. Elaborating the project solution, students will be actively involved in cross-cultural communication. This situation is much like the situation in professional life where an international experts team spread worldwide cooperates within a common project. Being part of such an international e-team enables the students to acquire also a certain spectrum of social skills. Students get involved into the active collaborative knowledge acquisition. By means of discussion and opinion exchange among the team members the process of collaborative knowledge building takes place. At the same time the students will gain rich experience in applying ICT at the e-teamwork. Based on these experiences, they will learn how to organise appropriately the work and collaboration supported by the ICT.

The Model of Work

The reported project was designed to apply the ICT to make a pedagogy shift from 'classroom-based-lecture' mode to a 'problem-based-learning', similar as stated in (Ferry and Kiggins 1999).

The pilot project is divided into two major steps.

(I) step: a small pilot project that will be carried out. In the stage of the pilot project only two groups of limited number of students (3-4 per group) from two sites will participate. Other partners will be active observers, meaning their input will be in form of their experiences, suggestions to which ICT to apply, etc.

The pilot project will be concluded with a workshop where all the participants will meet in one place to exchange their experiences and to evaluate as follows: (a) the project product i.e. the problem solution and (b) the methodology of work. Based on the evaluated workshop results a 'best practice' model for an on-line lecture will be made.

(II) step: in the following semester the 'best practice' model based on the pilot project will be translated into various on-line lectures to produce effective student learning. Based on the model defined different contents will be added. There won't be any limitation of student groups.

As shown in the Figure 1, in this phase of the project the 'best practice' model will be verified within various contexts and the evaluation will be again carried out. The proposed model will be refined and extended if and where necessary. Additional list of possible applications of the model in the practice i.e. various contents will be defined and described.

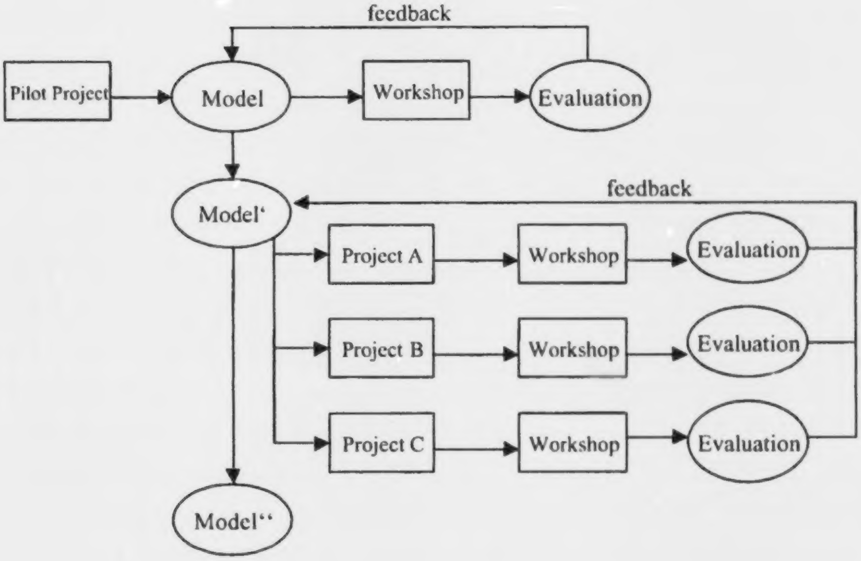

Figure 1: The EDULA model of the work

The Subject

The first project the students with work on will be to define a specification of a content management system (with the functionality of a communication and information distribution platform) and to make the appropriate information pages. The students have different expertise. One group of team members has the expertise from the information design and the other group of team members has the expertise from databases and web programming. The hypothesis is that different expertise background will contribute tremendously to the collaborative knowledge building process and will make it possible to break the project into sub-tasks that has to be solved.

A content management system has to meet various requirements. The system should be a web-based tool and it should support structured communication among team members and among various teams. However, the platform will be used also by the international partners to share the 'best practice' models defined and to exchange the experiences.

Based on a specification a decision will be made if an available platform e.g. eLS or WebCT or similar offers adequate support. In case that additional functionality is required the tools will be extended in the required manner or a hybrid solution will be applied.

The information pages will be designed for the information distribution on various levels. First level (I) is considered to be a general information level, where basic project information and international partner data will be provided with the intention to inform the public about the project and the partner pool. Some information on on-going project in form of a summary could also be posted. Second (II) information level is to be considered as a cover communication and information for the pool partners and should be password protected. On this level the meeting announcements as well as the meeting presentations and minutes will be published. A separate area should be defined on the same level that will contain a list of 'best practice' models along with detailed description, case and evaluation data. On the third (III) information level the communication for the on-going projects should be enabled. The third level should also be password protected and it should make it possible to define exclusive project specific space to simplify the navigation and avoid the possible distraction and confusion.

Evaluation

Evaluation will be carried out sequentially after each joint project is finished i.e. once per semester. Evaluation results will have a direct impact on the best practice model. Based on the results the model defined will be adjusted and extended.

A model, that encourages us to critically question any form of new technology adoption consists of four elements as follows: (I) new pedagogical opportunities, (II) changed work practices, (III) technology (non)neutral and (IV) unintended consequences of new technology adoption. [Fox R: Digital Environments: Monitoring Changes to Teaching]

Various factors will be evaluated. Some evaluation aspects are as follows: does an interdisciplinary and cross-cultural project contribute to the motivation of students, does it raise the involvement of the students, is there an improvement of the knowledge acquisition and knowledge utilisation. The other point of view is the perspective of teacher, how they were able to provide support to the international group, if they sensed any difficulties by coaching the team, explaining the project topic.

Conclusions

The results expected from the EDULA are as follows:

1. To make a collection of best practice models of ICT application for joint lecturing (enclosing the entire project documentation: detailed project specification along with learning objectives, problem description, lecture model applied, technology specification, project results and evaluation results)
2. To provide workshops on the use of the ICT for lecturing with the presentation of practical applications, that will be carried out at least twice per year and organised at various partner locations
3. To organise a knowledge management platform that will be a major source of information related to the innovative application of the ICT for lecturing
4. To define several joint courses / lectures, acknowledged by all partners, that will be carried out by lecturers coming from various educational institutions, based on intensive application of the ICT for e-teamwork

All partners are making active efforts in the direction of international exchange of students. Based on the EDULA, the exchange students could have more options to choose the courses of their personal interest and to participate at the joint courses offered together with other partners within the EDULA.

Students with rich experience and high competence level in applying the ICT for co-operation and team work will project the application models into business environments. The collection of verified "best practice models" and paradigm shifts can be applied for various situations and will therefore be supportive for a wide range of the population.

The whole EDULA concept, including ongoing projects, evaluation results and best practice models of the ICT application for lecturing will be published and presented at the international conferences. Another form of presentation is participation at the exhibitions, where the e-teamwork projects along with the project results can be displayed for the public. Based on the EDULA concept workshops will be organised twice a year by various partners to educate the lecturers and mediate the experiences gained.

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Semi-automated evaluation services in a distance education program

Ken Potter, Virginia Tech, US
David Halpin, Virginia Tech, US

Effective evaluation of student work is an important and time-consuming component of distance learning programs. The authors describe the design and development of a scalable, computer-based approach that permits personal review of student work while automating much of the evaluation process, including the recording, storage and distribution of grades.

Statement of the problem:

As distance education programs expand their course offerings and numbers of students, the impact of the expansion on faculty support issues must be considered. Although the use of on-line course tools has made possible the actual delivery of instruction to growing numbers of students without significantly increasing demands on faculty, the same cannot be said of associated support issues such as viewing student work, assessment of student performance, providing relevant feedback, and recording and distributing grades. Systems are needed to automate as much of the support process as possible while relieving faculty of some responsibilities for student evaluation and preserving the benefits of interaction with students.

Description of project:

Virginia Polytechnic Institute and State University has offered a distance education Master's Degree in Instructional Technology (ITMA) for the past three years. The first iteration of the program was offered to three distinct cohorts; members of these cohorts graduated in May 2001. A second iteration of the program began in the fall of 2000 and a third iteration began in the fall of 2001. The number of students in the additional iterations was more than double the students in the first iteration while the number of faculty members has remained constant. During this same period, the on-campus course loads for Instructional Technology faculty have remained constant.

Without changes in faculty support services, a substantial increase in on-line students without a corresponding decrease in on-campus course load would have been unworkable. As more students were added to the distance education program, additional time was needed to respond to student questions regarding grades, evaluate and provide feedback on student work, and record grades. Without additional faculty or faculty support, the current faculty would have been overwhelmed and the program could not have grown.

Recognizing the need for additional support, program funds were provided for faculty support in the form of two part-time graders for the ITMA program. To achieve optimum utilization of the graders, provide ongoing feedback to the learners, and maintain the quality of the program, a system was required to minimize unnecessary efforts in grading and feedback. The system had to permit graders to easily access student work, provide comments based upon faculty-generated rubrics, assign grades to the work, and record, store and distribute the grades.

Two faculty and three graduate students from the Instructional Technology program explored the means by which the above responsibilities could be shifted from faculty to support personnel without sacrificing quality feedback. The process began with a series of sessions aimed at systematically describing the features and outputs of the ideal support system without reference to any specific technology. After the characteristics and capabilities of the ideal solution were fully specified, they were converted to technology-related terms. Finally, technologies whose outputs matched the requirements were examined and eventually a combination of technologies selected.

The design and development team collaborated to produce a web-based student/grader interface. Using off-the-shelf software (Cold Fusion and Microsoft Access), a semi-automated system was developed and implemented that allowed students to enter assignments, review grading criteria, and examine scores. Assignment information entered by students was made available to graders who, with the click of a button, could automatically retrieve grading rubrics, assign points, and post grades. The system also allowed graders to enter comments that were stored, along with the other grading information, for future reference and analysis. Numerous other options to eliminate unnecessary steps by graders were included as part of the system. For quality control purposes and to identify student problems, additional information was collected automatically by the system. For example, data dealing with elapsed times between submittal and grading were recorded, as was information concerning numbers of failed attempts to submit assignments.

The web-based system was designed and developed to be scalable. Additional courses and cohorts can be added to the system. The system also was created to function for a variety of purposes. For example, the same approach that was used for submittal of course assignments can be used later for submittal, review, and assessment of student portfolios.

Outcome:

The semi-automated, asynchronous, web-based system was implemented in January 2001. Early problems with the system were relatively minor and typically related to inadequate grader training, failure of users to follow instructions or, in a limited number of cases, the absence of error-trapping safeguards in the system. The system allowed two part-time graders to evaluate and record relevant information for over 1000 assignments from a total of 80 students during a 10-week period. Rubrics for additional courses have been developed and added to the system. The system is being eviewed for possible use by other distance learning and on-campus courses. Efforts are currently underway to integrate the grading information with the software used for the delivery of instruction.

Relevance to other institutions:

The faculty support system described in this presentation provides an effective and efficient means to deal with evaluation services resulting from increased numbers of distance education participants and courses. The system is applicable to any discipline and can be adapted to both large and small audiences. The system retains the benefits of personal interactions while automating numerous steps in the evaluation process.

The system may be used in any distance education and on-campus program where evaluation of student work is based on clearly defined rubrics. The system collects and stores faculty-defined data that can be used for evaluation and research purposes. The fact that data are stored in a standard database format simplifies future retrieval and analysis.

Suggested Audience

The audience most likely to benefit from the presentation would include any person involved with designing or developing faculty support systems for distance education programs, including administrators, faculty members, trainers, and instructional designers.

Technology As The Classroom: Successes and Pitfalls of A District's Journey into Cyberspace

Myka Raymond, Englewood Public Schools, US
Tony Raymond, Englewood Public Schools, US

Parents have chosen to home-school their students for many years. Home-schooled students have long been isolated from the school environment. A growing number of students are being removed from the school environment for a myriad of reasons, and many more parents are electing to home-school their children, especially in the wake of school violence. While these students may be outside of the school building, the school is not absolved in their responsibility to educate them, particularly those that are excluded from the classroom environment. In the past, teachers were hired to work extra-duty hours to educate these students separately. However, with the increasing availability of technology, teachers are able to remotely access student's records and teach and communicate with students. An online curriculum is needed to address the already alarming shortage of teachers, the overwhelming cost involved in having an at-home teacher that the district must support, and the often-prohibitive distances involved, particularly in rural areas. In many states, a need for a comprehensive online curriculum arises when both home-schooled students and students who have been removed from the confines of the traditional classroom request or require by law access to the general education curriculum. A public school district is legally responsible for educating all students in that district, and in Colorado, a state of school choice, parents can elect to have their children attend any school in the state. Because of this, students should be able to access the curriculum of any school in the state, and an online curriculum is certainly a viable and exciting answer.

Englewood Public Schools in Englewood, CO, chose to make this leap into online curricula in April of 2001, when we contracted with NCSLearn, formerly the Computer Curriculum Corporation. Funds to pay for this project come directly from the state, as excluded, home-bound and home-schooled students receive a disk and user name and password free of charge. The primary focus for this project was to provide both our excluded students and home-schooled students both inside and outside of district boundaries with the general education curriculum that they needed and deserved to enrich their educational experience. In order to serve these students, two system administrators/curriculum specialists have been added part time to not only manage the system but also manipulate the curriculum to create an appropriate individualized instruction plan that meet the needs and address strengths of each student. The two curricula have a range from pre-K through 8th grade and 2nd grade through post secondary. Both curriculum focus on reading (mechanics, technical reading and reading within the content areas), writing, math, and civic responsibilities and citizenship. Because of technical issues and other barriers, and to achieve our overall goal of a cutting edge district in distance learning, research into other possible curriculum providers continues. In addition, the future holds promise that an online program for teacher inservice courses can be either contracted or created by district personnel. Such a program was part of the initial goal of the program and is becoming one of the next priorities.

Currently, there are 25 students enrolled in two different curricula. So far, the largest hurdle has been keeping students independently motivated to complete the required number of hours, 90 per semester. However, those that are motivated by working with the technology have been very happy with the program, and have been achieving at a much higher rate than is available to most students. This session will address the successes and pitfalls of this program, and give parental and student feedback on both the program as a whole and the curriculum. In addition, plans for the future will be addressed. A handout detailing the program with information about the curricula and web addresses for more information about the district will be provided.

A Rubric to Encourage and Assess Student Engagement in Online Course Conferences

M. D. Roblyer, Adjunct Professor of Educational Technology
University of Maryland University College, College of Education, U.S.A.
(mroblyer@polaris.umuc.edu)

Abstract: Although student interaction and engagement in online discussions or "conferences" is a required component of many online courses, instructors often find it difficult to assess whether or not students are adequately and meaningfully engaged in online discussion activities. Instructors in a web-based education degree program offered by the University of Maryland University College (UMUC) developed a conference participation rubric to serve two roles: (1) to encourage greater student participation in online course conferences and (2) to assess and grade performance in these activities. This paper reports on the instrument developed for this purpose and discusses faculty and student reactions on its usefulness in the program 's online courses.

Introduction

As has been noted in many previous studies of distance courses, (Roblyer & Ekhaml, 2000; Zirkin & Sumler, 1995), interaction is considered one of the most important characteristics of successful distance learning environments. Although the distance instructor has the responsibility for incorporating most interactive qualities of an online course, at least one dimension of this interaction is incumbent on the students themselves: voluntary responses to online discussions or "conferences." However, it is difficult to impress on students the importance of their contributions and involvement to the success of a distance learning enterprise, let alone articulate what is required for them to interact adequately and effectively.

Many strategies have been suggested for how to foster engagement in online conferences (Klemm, 1998). Instructors in the UMUC online programs have been trained to incorporate these strategies in their online course designs, and UMUC students report high degrees of satisfaction with their online learning experiences. Graduate education faculty at UMUC decided that giving students a conference participation rubric might serve several important functions in online learning environments. First, it would act as a benchmark for behaviors expected of them in online discussions. Second, it would act as a strategy to encourage their appropriate interaction in online forums. Finally, since rubrics originally were designed to be assessment tools for complex, problem-based, environments (Jonassen, Peck, & Wilson, 1999), the conference rubric would serve to help online faculty evaluate student performance in an area of online learning that traditionally has been difficult to assess.

Methodology Used to Develop and Revise the Rubric

Initially, three elements of conference participation behavior were identified, and a rubric was developed by creating a 0 – 4 scale (0 = lowest) with descriptions of levels of performance for each element. The draft instrument was posted in an online faculty meeting and faculty members were asked to review it and suggest revisions. Also, it was posted in an online graduate course on web-based pedagogy to solicit student comments. All were asked to evaluate the rubric using criterion measures for rubrics described by Jonassen, Peck, & Wilson (1999, p. 225). These criteria focus primarily on the identification of useful elements and include: comprehensiveness, clarity, and unidimensionality (elements could not be broken down into two or more behaviors). Faculty members also were asked to comment on the rubric's usefulness for their own purposes. Some 15 instructors and students responded with comments and suggestions, and the rubric was revised based on their feedback.

As a result of faculty and student feedback, several revisions were made. One element (Frequency of Posting) was divided into two elements (Frequency of Posting and Timeliness of Posting) and various revisions were made to the wording of the levels. The wording of several levels was revised to make them clearer and to sharpen the focus on desired behaviors. For example, in the original rubric draft, several students cited ambiguity in the wording about timeliness of interaction. Faculty noted that quality of contributions related to two different aspects (relationship to topic and quality of writing). The revised rubric elements are described here; a copy of the revised rubric itself is shown in Figure 1.

Rubric Element #1: Frequency of Posting

Although perhaps not the most important aspect of participation, the number of posted comments is one measure of engagement in the discussion. Also, most discussion conferences have a central theme, but more than one concept or topic is developed in the course of the conference. This element of student engagement focuses on a combination of how frequently the student interacts in the conference and on how many different concepts interaction occurs.

Rubric Element #2: Timeliness of Posting

Although most discussions are asynchronous, they are most useful and meaningful when students join discussions promptly. To encourage prompt participation, UMUC instructors usually set deadlines for joining the conference. This element focuses on joining by deadline, as well as responding in a timely way to concepts under discussion. If students respond very late in a thread, the discussion already may have developed to the point that their reactions are not as meaningful as they might have been if posted earlier.

Rubric Element #3: Type of Posting

Students have the tendency to think of interaction as communication required only between instructor and student (instructor-to-student and student-to-instructor). But, as Moore (1989) emphasized, there is an additional kind of interaction: student-to-student. This element communicates that all three types of interaction are important and expected. This element also addresses reacting to concepts raised in the conference as opposed to initiating new ones. Ideally, students should do both.

Rubric Element #4: Quality of Posting

The quality of student participation in an online conference seems at least as important as the quantity of postings. This element attempts to address three characteristics of meaningful participation. The first, most basic requirement is that comments relate to the discussion. Sometimes students inexplicably post comments that have nothing to do with what is being discussed. (This may illustrate lack of reading of required texts or simply lack of understanding of the concepts involved.) The next important aspect of quality is that comments reflect knowledge of the background reading. Students' opinions should be more than personal views; they should be analyses of the materials they have been reading. Finally, student writing is a measure of quality. Comments should be succinct and well-formulated. Sometimes student comments either are wordy and rambling or too terse; either can limit their contribution to the discussion.

RUBRIC DIRECTIONS: The rubric shown below has four (4) separate elements that reflect aspects of engagement in online discussions (conferences). For each of these four elements, circle a description below it that applies best to the student's participation. After reviewing all elements and circling the appropriate level, add up the points to determine the student's online engagement in the discussion (e.g., low, moderate, or high).

Low engagement	**1 - 6 points**
Moderate engagement	**7 - 11 points**
High engagement	**12 - 16 points**

	Element #1: Frequency of Posting	**Element #2**: Timeliness of Posting	**Element #3**: Type of Posting	**Element #4**: Quality of Posting
Level 1: Basic (0-1 point each dimension)	Does not join discussion at all (0 points) or makes only one comment (1 point)	Does not join the conference at all (0 points) or joins later than deadline (1 point)	Does not react to or initiate discussion with anyone (0 points) or reacts only to the Instructor (1 points)	Offers no comments at all (0 points) or offers comments unrelated to topic (1 points)
Level 2: Low (2 points each dimension)	Contributes only once or twice to discussion; if more than one concept is discussed, contributes on only one of the concepts	Joins the conference by deadline, but either is slow to respond to discussion points posted by the instructor or other students or does not usually respond to them at all	Reacts to Instructor and at least one other student, but never initiates any new concepts or threads to discuss	Gives comments related to topic but are personal opinions only; comments reflect no knowledge of literature covered in course
Level 3: Medium (3 points each dimension)	Contributes to discussion more than twice; if more than one concept is discussed, contributes on more than one concept	Joins discussion by deadline, and usually responds in a timely way to discussion points posted by the instructor or by other students	Reacts to Instructor and at least one other student, and initiates one new concept or thread for others to react to	Comments reflect knowledge of literature covered in course but are wordy & rambling or too terse to be uninformative

Level 4: High (4 points each dimension)	Contributes to discussion several times; if more than one concept is discussed, contributes on all concepts discussed	Joins in a timely way, well before end of required time, and always responds in a timely way to all discussion points posted by the instructor or other students	Reacts to the Instructor and several student postings, and initiates one or more concept or thread for others to react to	Comments reflect knowledge of literature covered in course and are concise, but well-formulated
Total = ____ of 16 of possible point	**Total on Frequency of Interaction = ____ of 4 points**	**Total on Timeliness of Interaction = ____ of 4 points**	**Total on Type of Interaction = ____ of 4 points**	**Total on Quality of Contribution = ____ of 4 points**

Figure 1. Rubric to Measure Student Engagement in Online Course Conferences

Perceptions on Usefulness and Uses of the Conference Rubric

In general, students' comments indicated enthusiastic support for the rubric. Faculty reviewing the instrument had some reservations about how much time it would take to assess each student properly. However, all comments indicated approval for posting such an instrument to set expectations and guide performance. In actual use for assessment purposes, faculty may choose to weight one or more of the elements to reflect their perceptions of the importance of each aspect of online participation. For example, one faculty member felt actual number of postings (Element #1) was a faster and more feasible measure for faculty to emphasize in grading. Other faculty members felt that the number of postings was not as important as the quality. To facilitate its use as a grading tool, faculty also may choose to ignore certain elements or levels of this instrument and focus on only a subset of them. However it is used, a rubric of this kind seems a useful tool to encourage and guide student participation in online conference activities.

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Structuring Distance Education Programs to Enhance Preservice Teacher Preparation

Dina Rosen
Early Childhood and Elementary Education Department
Montclair State University U.S.A.
rosend@mail.montclair.edu

Arlene Bloom
Elementary and Secondary Education Department
New Jersey City University U.S.A.
abloom@njcu.edu

Abstract: The traditional way education programs provide an opportunity for preservice teachers to think about and apply pedagogy has been through onsite field experiences. In this paper we explore the use of distance education as a supplement to the current field experiences. We suggest that distance education is an excellent vehicle for delivering vicarious field experiences and structuring practice with reflection. The concept of virtual field experiences is explored. The impact such experiences can have on the development of essential habits and skills of reflection are considered. Benefits of using supplemental virtual field experiences and six guidelines for them are provided.

Teacher education programs continuously grapple with finding ways to provide instruction and experiences that develop students' teaching expertise. One way in-service teachers develop expertise is through reflecting on, critically thinking about, the instruction they provide. Classrooms provide teachers with opportunities to apply and reflect on the application of pedagogical principles. Currently, the student teaching field experience is the primary time when preservice teachers reflect on the application of pedagogical principles, rules, and terms to classroom settings. Many teacher educators, however, now question the use of field experiences as the primary vehicle for linking theory and practice. How successful the student teaching experience will be is greatly dependent on how effectively the student teachers can reflect, or make connections between their experiences and/or observations in the classroom and larger ideas. Many preservice teachers have not engaged in professional reflection and are unfamiliar with how to reflect on their professional practice. Logically, preservice teachers should develop the essential habits and skills of reflection prior to beginning their field experience.

Technology can be a powerful tool in helping preservice teachers understand and grasp educational concepts that may be difficult to explain in traditional formats (Hasselbring, et al. 2000). As described above, the traditional way to provide opportunities to think about and apply pedagogy to teaching has been during real life field experiences. We suggest that distance education is an excellent vehicle for delivering vicarious field experiences and structuring practice with reflection. During lessons, or virtual field experiences, transmitted via satellite or ISDN videoconferencing preservice teachers can gain access to real life classroom instruction. They can begin to ask questions of children and cooperating teachers. By providing this preparation early in a teacher education program, prior to the student teaching experience, preservice teachers will be better prepared to make the most of their student teaching experience.

In this paper we explore the use of distance education as a supplement to the current field experiences. Below is a discussion of benefits of using virtual field experiences. Six guidelines for structuring the videoconferences are provided.

1) *Make the experience valuable.* Videoconference sessions should provide something that cannot be achieved through other traditional means of education. It should support course content and student learning. Virtual field experiences have been especially beneficial to undergraduate and graduate nontraditional students who commute and work during the day and therefore attend evening classes making extensive real life field experiences difficult. For these students, distance education provides a viable alternative to some of the preservice field experiences and supports their acquisition of professional skills and knowledge. For example, videoconferencing with schools on the west coast of the USA can provide real time virtual field experiences to students who attend school at night in eastern states. An added benefit of virtual field experience is that it can provide exposure to diverse cultures and backgrounds of children living in the southwest, northwest and possibly other countries. Thus exposing preservice teachers to multicultural issues and environments not available to them through other means.

2) *Follow a formula.* Both the college students and the school children need to become accustomed to participating in the videoconference. As students participate in additional videoconferences they will become more comfortable with the technology. Setting up routines that can be counted on will facilitate higher comfort levels. We suggest that the videoconference consist of (1) a teaching segment, (2) time for the grade school children to ask question of the university students, (3) time for the university students to ask questions of the grade school children, (4) time for the university students to ask questions of the cooperating teacher, and (4) time for the cooperating teacher to ask questions of the university students.

3) *Balance distance education with face-to-face discussion.* As described above the discussion with the cooperating teacher and students done online. However, including supporting face-to-face discussion with peers and the university professor prior to and after the videoconference should improve the experience.

4) *Use three key processes.* The following three features are essential to the process of learning how to reflect: modeling, scaffolding, and fading. Modeling is when someone demonstrates an expected and/or appropriate behavior (Bandura, 1989).

Modeling of cognitive behaviors involves verbalizing or writing down the thinking behind the behavior (Eggen & Kauchak, 1997). Scaffolding refers to the instructional support that allows a student to perform a skill (Vygotsky, 1978). Scaffolding applied to teacher education means that the teacher educator initially provides a considerable amount of support through explanation and demonstration. As the teacher candidates demonstrate their ability to carry out more of a task independently, the scaffolding is withdrawn. This is referred to as fading. Fading is essential to individual and shared accountability. The videoconference sessions should including three features at varying intensities, dependent on the stage in the students' developmental process.

5) *Practice makes perfect.* There should be ample opportunity for group and individual reflection about observed instruction. This practice should be provided at earlier stages in the preservice teacher's career as guided and independent practice during methods classes. Preservice students may continue collaborative reflection with each other and the professor asynchronously during student teaching via e-mail and discussion groups instead of attending on-campus seminars.

6) Focus on three kinds of knowledge. The reflection should foster the establishment of connections between student teachers' experiences and pedagogical knowledge (Clark, 1995; Ross, 1989; Shulman, 1992; Siens & Ebmeier, 1996; Sparks-Langer & Colton, 1991), including declarative knowledge (knowledge of terms and facts), procedural knowledge (how to use declarative knowledge), and strategic knowledge (when to use declarative knowledge and procedural knowledge).

Virtual field experiences can prepare preservice teachers to make the most of their student teaching experience. It provides time for preservice teachers to practice asking questions- a skill essential for their continuous life-long professional development. Additional, this distance education project allowed faculty at the university to model exemplary pedagogy that integrated technology in meaningful ways.

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Creating, Implementing and Sustaining Community in a Online Distance Education Course

William A. Sadera, Towson University; Paulette Robinson, Towson University; David Wizer, Towson University

Abstract:

In this presentation we will discuss some of the unique features of an online distance education course: : 1) the online course design was created in such a way to manage the information overload that could occur with 45 students; 2) a team of three faculty from Towson University designed and taught the course; 3) students negotiated all but three of the course topics and selected the topic their small group would present to the class; and 4) the class used and modeled the use of distance technologies (we only physically met as a group three times).

Introduction

This course, **Distance Education Theory and Practice,** was taught to graduate students across the state of Maryland using constructivist teaching strategies and case-based modules designed to bridge theory with applied practice. The course was unique in several ways: 1) the online course design was created in such a way to manage the information overload that could occur with 45 students; 2) a team of three faculty from Towson University designed and taught the course; 3) students negotiated all but three of the course topics and selected the topic their small group would present to the class; and 4) the class used and modeled the use of distance technologies (we only physically met as a group three times).

As a result of completing this course, students were be able to:

- Demonstrate knowledge of the principles of distance education and related delivery technologies.
- Understand how to select, evaluate, and integrate distance education strategies into learning/training environments.
- Use distance education methods and technologies with confidence.
- Critically analyze and reflect on the nature and complexity of on-line learning environments.

Students attained these goals through research and the completion of two major projects. These projects included, the facilitation of class lessons and the evaluation of existing distance-based programs. More importantly each of these two projects were done by the students cooperatively, with peers, via on-line technologies.

Team Teaching

This course was team taught by three faculty members of the College of Education at Towson University. Originally, the course was to be offered on the Towson University campus and at two satellite sites, as three distinctly separate courses. Following some discussion, it was believed that we could make better use of our resources by offering the course on-line and teach the course as a team of three. This decision offered benefits for both the students and the faculty. This benefited the students by giving them a larger group of peers to work with and a resulted in richer and thicker discussions of subject matter, ideas, opinions, and reactions. In addition, it allowed them the opportunity to learn from the strengths and experiences of multiple faculty rather than a single faculty member. The team teaching benefited the instructors by allowing us the opportunity to share ideas and, similarly to the students, learn from each other. The faculty had varied backgrounds and experiences with distance education and teaching in an on-line environment. Teaching as a team gave us the opportunity to focus on teaching the topics we knew best and had the most experience. This provided the students with better instruction with each course topic covered.

Course Design and Structure

Distance education courses are often plagued with student disorientation and alienation which effects course retention and the quality of the experience for the students (Harasim, Hiltz, Teles, & Turoff, 1995; Schwitzer, Ancis, & Brown, 2001). In order to meet this challenge head on, the three faculty in the course purposefully designed a structure that grouped students in small, medium and large groups to build a greater sense of connection for the students.

Online Environment Courseware

The course was taught using WebCT internet-based learning technologies. WebCT is a learning management system that provides an overall structure to create an online learning environment. The instructor can choose from a variety of tools and can customize the look and feel of the course. In order to develop a sense of community within the course communication tools (i.e., email and discussion groups) were critical. Students also made use of synchronous Chat and Whiteboard technologies offered within WebCT. The final component integrated to establish community within the class was the student project space. This area offered file-sharing options for groups while they worked on collaborative projects and a space for the other students to view their work when it was completed.

Grouping Students

In teaching the course, the students were divided amongst the instructors into three groups. A concerted effort was put forth to mix all of the students from the three geographical instruction sites so that they would not have a tendency to work with peers locally and avoid using the distance-based technologies. From these three sections of 15 students each, groups of three and then groups of five were formed with each student belonging to a small and then larger group. Individual learning journal spaces offered the smallest grouping between the instructor and each student. Each group was provided with a project space to share files and present information to the class as well as private group discussion spaces.

Assignment Projects

This grouping strategy offered a way to build social relationships at a variety of levels within the course. The groups were tasked with a project that with individual student roles where each student was assigned a role by the group. The group of three facilitated a two-week discussion in the bulletin board for their section (15 students) on a course topic they selected. Students were required to choose from a list of pedagogical techniques for their facilitation method and a classroom assessment technique (Angelo & Cross, 1994) to formatively evaluate their instruction. The larger group of five's task was to evaluate a distance education program using the American Council on Education's Distance Learning Evaluation Guide (1996).

Developing Community Through Student Interactions

We began the process of building a community with an all-day, face-to-face orientation. In the orientation, students participated in activities that allowed them to become comfortable with WebCT, creating Web pages, navigating Internet. They also participated in team building activities designed to help form create relationships that could withstand a distance.

Students completed learning journals at the end of each week. Within these learning journals the student reflected on their learning and the strategies they were applying within the on-line learning environment. Faculty not only supported them in their learning process on-line, but also posed critical questions for student to reflect upon. The learning journals established a close relationship between instructors and students. This allowed the student to build a stronger connection and sense of support in this foreign environment.

Participating in on-line discussions at multiple hierarchical levels within the projects produced reciprocal relationships and robust interaction (Roblyer & Ekhaml, 2000). These reciprocal relationships began at the small group level and were reinforced within and through the discussions in the larger groups. The design and implementation of the various group structures were integral to the successful interaction and community formation throughout the semester.

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Distance Education: Can the Institute Affect Persistence?

Ellen R. Scalese
School of Computer and Information Science
Nova Southeastern University
scalese@nova.edu

Abstract: Distance Education (DE) is the perfect solution for today's non-traditional learning. However, the attrition rate in DE environments is much higher than in "traditional classrooms". The topic of increasing persistence continues to be a concern among distance institutions. This paper studies methods that administrators and instructors can institute to increase persistence.

Introduction

Many institutions are making substantial investments in new technologies for teaching. Colleges are evolving in response to the pressure of student diversity, technological change and economic restructuring. Pressures to change will continue, if not accelerate. This change will have significant impact on colleges. If colleges and universities are going to respond to the pressures and educational needs of the adult learner, they must offer distinct, comprehensive, and pedagogically meaningful learning environments. There have been innumerable studies done on improving the quality of distance education (DE). There is one exceedingly important area that continues to be a concern, the subject of student attrition. DE programs throughout the world are characterized by having higher attrition rates than their campus-based counterparts. It is imperative that colleges identify what leads DE students to drop out and then to take appropriate preventative measures (Morgan & Tam, 1999).

Persistence and Retention Strategies

Until now, much of the research has been limited to studying a single variable as it affects attrition. The combining of multiple variables as possible predictors of attrition has generally been overlooked. It is more appropriate to use an approach that can help to identify the interrelated facets of the experience. Recent research has regarded student persistence as a multivariate problem involving complex interactions over the period of the course (Kember, 2001). Primarily, most students will give reasons such as the "lack of time" as an easy explanation for drop out. It is not contested that time constraints are indeed a factor in student non-persistence, but the importance attributed to them may be misleading. The second is that both non-persisting and persisting students experienced situational, institutional, dispositional and epistemological problems that posed barriers to completion. Yet, some students persisted while others did not (Garland, 1993). It should be noted that of these four characteristics, situational and dispositional barriers to persistence are beyond the control of the college or university. However, research indicates students list at least one institutional or epistemological barrier during their participation in a distance-learning program. Since these indicators are within the control of the institution, it is both the challenge and the responsibility of the educational institution, instructional faculty and support staff to address the issues that are under the college's control and thus strengthen the positive experience for the students. To improve retention in DE, institution retention strategies must address epistemological and institutional problems related to the improvement of the educational environment of the distance learner in the hope of tipping the balance toward retention (Morgan & Tam, 1999).

Distance Learning needs to have the best technology infrastructure. Hardware and software required for the course should be prominently listed on the site to ensure that a minimum of problems occurs. There should be a downloadable technology manual. The institute should require a one time face-to-face orientation that trains students in the needed technology skills and provides familiarity with the course delivery tool. Some institutions have been able to reduce attrition by assisting the student with a self-perception inventory. In order to provide the locus of control and just-in-time support necessary to DL, technical support should be provided via e-mail, phone and fax.

The creation and operation of a DE support infrastructure requires the collaboration of all departments whose activities deal with students and faculty. Distance students are often faced with the challenges of tracking down the appropriate contact person for questions. Staff specific to the DL program should be added to existing staff to ensure students have access to the range of students' services appropriate to support their learning. The admissions process gives an early impression of the institution.

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The web site should provide a page that clearly describes the admissions process and requirements, and should provide an online application form. Applications may be submitted online, faxed or mailed. There should be a staff person designated to process DL admissions. Financial aid information should be easily found, accurate and straightforward. Registration is an important online administrative service. An effective online registration system should be provided. Academic advising is a core student service. There should be a staff person designated to provide counseling to the DL students concerning course selection, concerns and requests. A distance library should be provided with remote access to databases, electronic resources and journals. A distance reference librarian can be contacted via e-mail, fax or phone (Dringus, 2000).

This ever-evolving landscape of distance education requires the distance educator to develop new skills. From an institutional perspective, as distance education programs are implemented, decisions must be made regarding hiring and training of instructors. There is currently no expert to answer the inevitable questions as to training DE teachers. What competencies or skill set will be needed? What competencies are more important, technical, interpersonal, instructional or management?

The teacher must view the instruction in an entirely different manner. The educator will need to change thinking and teaching styles into an effective educational environment that focuses on the needs of the learner. Many teachers are not adequately prepared to teach online. They are not ready for the difference between teaching and management of an online course and a face-to-face environment. They absolutely must not learn how to teach online as they proceed, but they should be trained and confident before they enter the online classroom. The instructor's role in a Web-based environment demands newfound skills and pedagogical philosophies (Sims, 1998). Instructors must understand that teaching in an online environment is not just about delivering content it is about communicating. Students in DL are separated from the other learners and the instructor. Communication and interaction among the students and the instructor can help to decrease the feeling of isolation by forming a sense of community. Studying at a distance requires a high degree of motivation. A primary goal of communication in DL is to motivate students rather than just provide information to them (Abramson, 1998). Having teachers complete a self-assessment survey before teaching in a DE program helps to ensure that he realizes guided conversation must be understood as a fluid role, and one in which conversation is multi-directional and inharmonious. As the instructor transitions from the classroom to DE vast changes occur in their functions. It is critical to provide skill training, and it needs to focus not just on the technology, but to focus on the learning environment. Faculty should partake in a training program to: 1) develop an understanding of issues associated with teaching and learning when instructors and students are separated by distance and/or time, 2) acquire the skills needed to design effective instruction, facilitate DL, and integrate DL resources, techniques and instruction, 3) stress the need for timely feedback and developing a sense of community, and 4) understand the differences in teaching adults who bring a wealth of experiences to the "virtual classroom" (Bond & Finney, 2000). Instructors also need to experience being students in a distance environment; one way to do this is to do part of their training through DE. It is also beneficial to institute a mentoring program where experienced instructors mentor new instructors.

Conclusions

By carefully identifying and dealing with the institutional and epistemological barriers that are within the distance-learning institute's ability to improve, DL institutions may well find that more students are persisting. The more enlightened the administrators become in the study of attrition, the sooner the scales that measure and compare attrition rates in distance courses and traditional courses, may come to a balance.

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The Significant Challenge That Distance Learning Represents to Educators

Abstract

Distance education, e-learning, Web-based courses, etc. represent opportunities for educational institutions, faculty, and students. There is no doubt about that, assuming that these myriad initiatives are appropriately orchestrated.

What educators must realize is that conducting courses within these delivery modes is a tremendous amount of work, plain and simple. They will be challenged at every turn and in ways that they likely did not anticipate.

The success of their course(s) ultimately depends upon how they apply themselves as educators to the task before them or at hand. If they approach these efforts with anything less than the utmost in preparation, comprehensiveness, dedication, and positive attitude they will be risking failure and term-long struggles and disappointment. They and their students will likely have a negative learning experience. This is, of course, just the opposite of what we all want to achieve, every time we enter a classroom, regardless of what form today's classroom might take.

They are dedicated to learning, determined to do an exemplary job of delivering and facilitating outstanding educational quality. They best be prepared for the associated amount of time, effort, and care that must go into both developing online courses and delivering them with the requisite amount of associated academic rigor.

This short paper and presentation will include but not necessarily be limited to the following:

1.developing the online course
2.producing a comprehensive syllabus
3.setting learner expectations
4.detailing educator expectations
5.taking advantage of all of the available features and resources in a given platform
6.synchronous course components
7.asynchronous course components
8.educator availability issues
9.what can go wrong will go wrong
10.framing the best possible course and learning experience.

This could also be done as an interactive discussion, enabling participants to share, respond to, and offer recommendations for the significant challenges that they face as educators conducting courses at a distance.

Short paper will follow.

Skills, Modifications, and Obstacles: Teaching Online Courses at the High School Level

Rachel Sellers Bordelon, Louisiana State University, US
Janice Hinson, Louisiana State University, US

The Internet is redesigning the way courses can be delivered to students, with the result that time and space no longer constrain teachers or students. Harrison and Bergen (2000) state that "internet access is becoming more widespread and its capabilities for delivering multimedia lessons are improving daily; the Internet is becoming the vehicle of choice for distributing learning across distances" (p. 57).

Delivering coursework online is a relatively new concept in education; however, it is has become a valuable tool for increasing educational opportunities for high school students, especially those living in rural areas. For example, some rural high schools in Louisiana are not able to offer advanced courses because they lack qualified teachers. Because of this, capable students at these schools have not been able to meet the requirements to qualify for the Tuition Opportunity Program for Students (TOPS), Louisiana's comprehensive college scholarship program. In order to provide equal opportunities for all high school students, the Louisiana Center for Educational Technology implemented the Louisiana Virtual Classroom Project during the 2000-2001 school year. Now, all students can participate in web-based classes taught by certified teachers while completing the requirements for a TOPS scholarship.

Purpose of study

The purpose of the study was to examine the implementation of the Louisiana Virtual Classroom Project to determine the skills that teachers needed to teach Internet-based courses, the modifications teachers made to their teaching practices as a result of teaching in virtual environments, and the obstacles they faced.

Methodology

Participants

Eleven teachers were chosen to teach the first online courses. Each had five to ten years of teaching experience in their field, and all had taught in the same subject areas in which they designed their web-based courses. They received a $6000 stipend to design and teach a course for one year. Five of the eleven teachers participated in an in-depth study. These five were chosen based upon subject area and their willingness to participate. Jeanne taught Algebra I; Claire, Fine Arts Survey; Edith, World History; Blanche, Exploration and Analysis of Environmental Issues, and Paul taught Survey of American Literature. The project began in August 2000, and approximately 140 high school public and private high school students enrolled.

Data Collection and Analysis

In-depth case studies of five teachers were developed. Data collection included observations, interviews, pre- and post-surveys, the Profiler instrument, and responses that had been posted on a discussion board. Because the purpose of this study was to examine the experiences of teachers, student data were not collected. Data were analyzed using the constant comparative method to examine emerging theme and patterns across cases.

Discussion

Essential Skills

Organizational skills. Teachers discovered that they needed to be more organized when teaching in an online environment and noted that students appeared to be more comfortable when course materials were organized systematically. The teachers also found that they needed good organizational skills to manage the curriculum. As a result, some of them had to eliminate a portion of their teaching materials, because the time lapse between the assignment distribution and assignment return was too lengthy. Often, several days passed before the assignments were returned from students. Edith, Paul, and Claire stated that they reduced the number of assignments due to the lack of time. Harrison and Bergen (2000) found that in reality, teaching in an online format requires teachers to be more organized than in a regular classroom environment. In turn, the students are then able to post their materials and assignments online in an orderly fashion.

Technical Skills. The teachers in this study also indicated that prior technical skills are extremely important when teaching a virtual course. Although the participants possessed technical skills as teachers, they felt they should not be responsible for any internal server problems and online glitches that intermittently prevented students and teachers from working on the course. Even though the teachers knew how to correct a locked-up computer, they could not configure a computer to connect with network or troubleshoot connection problems in actual practice. Wang (2000) noted that before teachers can move on to the integration stage of technology, they must first possess basic computer skills.

Teaching modifications

Course format. To manage instructional materials in an online format, the teachers divided their courses into blocks, units, modules, or components. This method prevented the students from feeling overwhelmed. Within each section, a theme or a specific topic was addressed and online resources were included. Three of the teachers stated that they had revamped their traditional lessons to include online resources. In addition, the teachers found that in the beginning, students had problems adjusting to an online learning format. As a result, the students turned in assignments late or not at all. As the semester progressed, the majority of the students submitted their work on time.

Cooperative learning. All of the teachers integrated cooperative learning strategies into their online courses and used e-mail, live chat, and the discussion board to promote collaboration and interaction. Teachers explained that student participation in project-based learning enabled them to assess students' levels of participation and whether individual students were actually achieving the goals established for the course. Students also benefited from cooperative learning through peer feedback and review their work.

Obstacles

Technical problems. All of the participants had expected technical problems to be resolved before their courses began. However, in August, Edith and Blanche both remarked that e-mail was not working at the Blackboard site; in October the Blackboard e-mail still was not working, so the teachers decided to use the students' personal e-mail addresses to send information. Students also experienced frequent technical problems while taking online quizzes. To remedy this, Blanche and Claire taught the other teachers to reset the quizzes. Jeanne stated that the chat rooms tended to freeze most of the time; so Blanche suggested alternative forms of communication for students, such as NetMeeting or Tapped In. Teachers also reported that the Blackboard server malfunctioned frequently -- either at night when they were trying to post assignments or on weekends when the students were attempting to complete assigned activities. The teachers stated that they often were frustrated with the situation because they were unable to work on their own courses or assist students when the server was down. Teachers also noted that students needed procedures for getting help when they were unable to access their courses. There was no full-time technician available at the Louisiana Center for Educational Technology to provide technical assistance to the teachers and students in this project. Research conducted by Grenier-Winterh (1999) indicates that technical issues for an online course need to be addressed before the implementation stage begins.

Lack of support and a sense of isolation. Teachers felt that more communication would have been beneficial and recommended that an online discussion forum be established at the beginning of the school year so that teachers can share ideas and solve problems. Teachers also wanted additional support from their principals and thought it would be helpful to require principals and staff members who serve as contact personnel at the schools to attend an orientation explaining their roles. Teachers commented that students also needed additional support. Most of the students were unaware of the contact person at their particular schools, and the teachers thought that regular meetings with the contact teachers and students at each school through Compressed Video would be helpful.

Summary

The Louisiana Virtual Classroom teachers began the school year with little knowledge of how to develop or implement online courses. Although they had studied how to do it and attended an orientation, they had not participated in an online course themselves. Consequently, the teachers were basically on their own instructionally and technically as they organized their courses' content, adjusted the format, and reconsidered the amount of time for assignments. They also realized that they had to include more cooperative learning activities to promote interaction between students. The teachers felt that they needed more support from the state technology center and from their principals. Teachers also thought that students needed additional support at the school level. Finally, tech support is crucial if online course delivery is to be effective. The Louisiana Center for Educational Technology used the findings from this study to improve the Louisiana Virtual Classroom Project for the 2001-2002 school year. Because online delivery, especially at the high school level, is relatively new, the findings from these case studies should be helpful to high school teachers or college professors who are interested in developing and implementing online courses.

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Collaborative University Teamwork in Designing a Distance Education Course for the Government

Submitted by Penelope Semrau, Ph.D. and Barbara A. Boyer, Ph.D.

This presentation describes a project to educate a team of college students in designing and developing an online course for the National Security Agency (NSA) utilizing constructivist methods of teaching.

This project involved converting a face-to-face National Security Agency (NSA) course to a multimedia web-based course. The conversion involved a team of undergraduate and graduate students from Instructional Technology, Art Education, Computer Science, Special Education, and Graphic Design. Representation of various cultures was taken into consideration when selecting the students. In addition, two students were already teachers in the public schools and had experience in curriculum development. Two professors directed the project – one from Instructional Technology and the other from Art Education. The focus of the team was on collaborative group work and a constructivist approach to learning. Constructivist approaches served as the basic foundation for organizing and developing the project "...where students develop their knowledge through team collaboration, discuss different interpretations of a problem, and negotiate and synthesize ideas drawing from various disciplines" (Boyer & Semrau, 1995, 14).

The students were trained in new skills and how to research and work collaboratively.
Training was provided on html, Photoshop, Premiere, MediaCleaner, Pagemill and the designing of web pages. WebCT was used for managing the website, communication and collaboration, and uploading pages.

A major focus was to keep the web course interactive emphasizing learner control. Useful tools for designing constructivist approaches to learning are hypertext and hypermedia because they allow for a branched instructional design rather than a linear top-down approach. It was also important in the distance education course that there be a balance between the text and the use of graphics, diagrams, video and audio to reinforce the learning.

Through this project the students became constructively involved in their own learning and acquired in-depth experiences in collaborative learning and team approaches. The students became empowered as creators of their own curricular materials and web pages instead of being passive viewers of others'. All of Bloom's higher level taxonomics were implemented: Students analyzed websites, synthesized criteria they had researched, applied their book readings, compared and contrasted criteria, designed and produced their own web pages, and focused on sound educational practices. As Gibson (1998) noted "...we, as distance educators, need to be learner-centered reflective practitioners" (p. 143).

This presentation identifies the five stages involved in creating a distance education course. With every stage, specific strategies are detailed and actual solutions are illustrated.

1. Planning and Development of the Content

2. Layout and Design of the Website

3. Implementation

4. Editing the Content

5. Assessing Learning and Evaluation

Establishment and Improvement of the Distance Learning Project at Inter American University of Puerto Rico, Bayamón Campus

Yolanda Serrano, Inter American Universtiy of Puerto Rico, PR
José Guillermo Santiago, Inter American University of Puerto Rico, PR

The Inter American University is the largest private university in Puerto Rico with nine campuses and two specialized schools, and a total of 46,000 students. The Distance Learning Project of the Bayamón Campus was developed during 1999 by faculty members, students, administrators and technicians. The project started on January 2000 with 11 courses, 13 faculty members and 250 students. During this academic year, 19 courses, 25 faculty members and 460 students are participating in this project.

Nevertheless, some difficulties have been observed: first year students don't have the computer skills necessary to participate in online courses; the first group of online courses created didn't have uniformity in design; the process of involving faculty members in the development and design of online courses has been slow; and some technical problems with the university net and the online course platform ("Learning Space) has been observed.

However to improve this project, the following determinations have been adopted: a questionnaire was created to make students aware of their abilities, aptitudes and computer skills necessary to complete an online course. Also, a previous interview by the professors with the student is recommended. Guidelines have been created for the development of the new online courses, with emphasis on the use of a diversity of tools. Continuous workshops are given to faculty members interested in the creation of new online courses and technical support is provided to those who are already offering the courses. Technical problems of students and professors with online courses are channeled through the Faculty Support Center and the Coordinator of the Project.

MOTIVATIONAL STRATEGIES FOR THE WEB-BASED INSTRUCTION

Dogan Tozoglu
Florida State University, United States
dtt0212@garnet.acns.fsu.edu

Muhammet Demirbilek
University of Florida, United States
demirbilek@hotmail.com

Abstract: Motivation is generally defined as the magnitude and direction of behavior, the choices people make as to what experiences or goals they will approach or avoid, and the degree of effort they will exert in that respect (Keller, 1983). Web-based instruction offers various bonuses to promote and develop intrinsic motivation in learners. Intrinsically motivated learners are learners who are not only interested in completing the requirements for a course but who also have a personal awareness in grasping the content. There are several instructional motivation theories that provide helpful perspectives. In this paper, based on the ARCS (Attention, Relevance, Confidence, Satisfaction) model some instructional strategies will be presented for Web-based instruction.

Introduction

Motivation is generally defined as the magnitude and direction of behavior, the choices people make as to what experiences or goals they will approach or avoid, and the degree of effort they will exert in that respect (Keller, 1983). There have been several motivational theories and models in educational psychology such as Expectancy-Value theory (mainly represented by Atkinson's theory of achievement motivation and Rotter's social learning theory), Theory of Achievement Motivation, Social Learning Theory, Attribution Theory, etc. Most of these theories could be beneficial for instructional designers to be aware of motivation in various ways. However, they do not provide systematic guidelines for instructional design. On the other hand ARCS model provides integration of numerous strategies for increasing motivation. In addition, this model integrates motivation theory and motivational strategies with instructional design theory (Keller, 1983).

ARCS Model

The ARCS (Attention, Relevance, Confidence, Satisfaction) model is useful for instructional designers because it helps understand the construct of motivation in terms of four distinct categories, provides the systematic motivational design process, and motivational strategies (Song & Keller, 2001). The ARCS model gives a rich descriptive synthesis of concepts and theories of motivation combining systematic approach to motivational design. It also offers motivational strategies and tactics.

Components of ARCS Model

Attention generally refers to establishing and maintaining curiosity and learner arousal. Relevance is related to linking the learning situation to the needs and motives of the learner. Confidence refers to the learner attributing positive learning experiences to their individual behavior. Satisfaction deals with developing the desire to continue the pursuit of similar goals (Keller, 1992).

Web and Motivation

Web-based instruction offers various bonuses to promote and develop intrinsic motivation in learners. Intrinsically motivated learners are learners who are not only interested in completing the requirements for a course but who also have a personal interest in understanding the content. Web-based instruction offers many ways to develop intrinsic motivation in learners. With its information-rich environment in multimedia forms, the Web can help to generate curiosity and interest in students. This visually appealing and information-rich space can easily arouse and sustain attention in the content. The Web can also provide equal and non-judgmental environments, in which everyone can participate, each with an equal voice. These kinds of environments provide critical thinking; enhance confidence, and that lead to feelings of satisfaction that are intrinsically reinforcing.

Suggested Strategies for the Design of Motivating Web-based Instruction

Based on the ARCS model there are several strategies that can be offered. Some of the commonly used strategies for each components of the model as follows (Visser, 1998; Cote, 1998);
To *gain and sustain Attention*:

- Use novel, surprising, incongruous or uncertain events.
- Stimulate information seeking behavior inquiry.
- Maintain interest by varying elements of instruction.
- Provoke mental reasoning and problem solving by sending students to Web pages with differing opinions.
- Use good screen design to capture the interest and attention of the learner.
- Use relevant multi-media elements to help keep students on task.
- Build interactivity into the instruction.
- Do not send all of the materials at the same time; only send the next part of the course when the learner is about to finish the first delivery.
  - If this is not an option, an additional text or paper could be used to help the learner focus.

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- Use a variety of media.
- Send occasional encouraging letters (e-mail) which focus on the material, or on the part already done (satisfaction).
- Send a challenging or provocative message to the student.
    - The mere arrival of an unexpected message will stimulate attention of the learner.
- Provide speedy feedback on assignments.
- Use frequent short questions.
- Include challenging statements that help the learner to reflect on the course content.
- Show real (and not fake) interest in how the learners progress through the course.

To *provide relevance*:

- Use concentrate language and use examples and concepts related to the learner's experience and values
- Use strategies that match the motive profiles of learners
- Show how instruction relates to the student's future goals.
- Try to apply instruction to real world scenarios.
- Demonstrate why the material is important to the student.
- Adapt course requirements to the learning style of the students.
- Inform learner of what is expected (state objectives).
- Give feedback to relate the course content to the learner's goal.
- Help learners to understand on how the instruction they are doing can contribute to solving the (professional) problems they are facing or can enrich their performance.
- Help learners to define priorities and to manage time.
- Provide samples of assignments.
- Stress relevance by giving examples, especially in the feedback on assignments, that relate to the learners' daily circumstances
- Explain in detail why a learner has to do certain things.

To *built a confidence*:

- Provide performance requirements and evaluative criteria
- Provide multiple achievement levels, personal standards, and opportunities for learners to experience success
- Build in frequent summaries and reviews.
- Provide opportunities for the students to interact with the instructor, other students, and the instructional materials.
- Inform learners in detail about what is expected of them, not only by describing the objectives of the course/lesson, but also by defining the standards of performance as to, among others, the organization of their assignments and the marking key.
- Clearly define standards for measuring performance and grading the learners' work
- Help learners feel that they have control over the outcomes of their work
- Require learners to submit their first assignment early in the course. (Lack of confidence is often the reason for delays)
- Introduce feedback loops that allow students to catch up or to improve.
- Stress that learners will succeed if they work hard
- Give credit for even minor improvements and if possible give learners positive feedback.
- Provide variety of opportunities for students to be successful. Letting students know they themselves are, or have been, responsible for their success through their personal ability and effort also increases and builds confidence.

To *develop a satisfaction*:

- Provide opportunities to use newly acquired knowledge in real or simulated settings
- Provide feedback and reinforcement that will sustain the desired performance
- Share work done on the Web with others, especially at other institutions.
- Utilize fair rewards that are based on the quality of work produced.
- Encourage collaboration among students as they develop Web-based assignments.
- Provide frequent, timely and adequate, encouraging feedback
- Use remarks like "This is really an interesting piece of work."
- Keep learners informed about their progress through the course

Conclusion

Teachers with a profusion of experience are designing classroom instruction. However, those teachers have limited experience in designing web-based learning. This paper presented an introductory instructional design model for incorporating motivation into course design. It is believed that specific strategies and ideas for using ARCS model to design motivating web based instruction can be beneficial to designers. A clear and understood goal of most education is mainly to motivate learners to desire to learn and to find satisfaction in learning rather than just completing the assignments to get a grade. It is not easy to encourage this kind of motivation. But it is obvious that Web-based instruction may offer some advantages and extra help.

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Camp Internet Distance Education Program

Timothy Tyndall, Camp Internet, US

Camp Internet is a K-12 distance education program currently providing daily classroom curriculum and programming for over 9,000 students in Southern California. Over the next year, through a new USDA RUS grant the program will include an additional 300 classrooms in Arizona, New Mexico, Colorado and Nevada. Sponsored by the California Department of Education and the USDA Rural Utilities Service as well as through private subscriptions by school districts such as Los Angeles Unified School District. The Camp Internet program, now in it's 10th year, provides project based learning as well as a strong mentorship component bringing students online daily for math, science, history and reading studies. Using advanced technologies such as GIS (we give GPS units along with a variety of other learning tools to each classroom at the beginning of each year), video chatrooms and personal electronic student portfolios Camp Internet provides an environment for both teachers and students to learn and develop technology skills essential for the 21st Century. Subject experts from universities, federal and state agencies as well as well as authors, musicians and artists come online weekly as "trail-guides" to give the students direct contact with the sources of their information. Chatrooms are used to teach students skills in "dialog", learning to listen, ask good questions and then report on the question and answers. Current programs include "Exploring the California Channel Islands", "Exploring the California BackCountry", Exploring the Ancient Southwest" and "Exploring the Global-Garden". Camp Internet is also responsible for ongoing Teacher Technology training for all of our school districts, providing 4 day intensive training sessions during the summer at our Technology Center in Santa Barbara , California and ongoing teacher training at school district labs throughout the year. (we train around 400 teachers each summer). Our paper will review recent activities and results in teacher training and methods used as well as a review of current classroom activities and results from the past year. Camp Internet was just awarded its 5th USDA Rural Utilities Service distance learning grant to take the program into the southwest opening the program to schools in Arizona, New Mexico, Colorado and Nevada. Working with the California State University system Camp Internet also provides credit to teachers taking part for a full year as well as a $1,000 stipend. Participating classrooms receive cd-roms each month with new GIS, math and video units to encourage participation by schools which may have limited bandwidth. The Camp Program also works with the CYFAR program setting up programs for youth, family and children at risk projects and provides an excellent study in the application of new technologies to parts of our communities with limited literacy or limited English language skills. Our paper will provide current updates on both Teacher Technology Skills training methdologies and classroom programs.

The virtual library. A new approach to knowledge through Internet

Ricardo A. Viglianco, Graciela P. Rodriguez
Virtual Library, Faculty of Biochemical and Pharmaceutical Sciences, University of Rosario. Institute of Experimental Physiology (IFISE) CONICET. Rosario Argentina Email: rviglian@citynet.net.ar

Objective: Opening of a new space to pedagogical development in order to facilitate the interaction among teachers, students and knowledge.

Methods: The mentioned objective was accomplished by means of a new space which allows the access to Internet free without restriction by means of an optical fiber connection. Such a space is called a Virtual Library. In this space students and teacher from the Faculty of Biochemical and Pharmaceutical Sciences including future Biotechnology Licentiates, may use ten personal computers, which maintain a permanent connection to Internet. All users search for information regarding different topics which are in the field of their respective interest including for example the access to international databases related to specific topics as protein sequences, which were not possible to perform formerly in this Faculty. In addition, the users can establish contact with people from other World universities by mean of e-mail or chat; they can get access to web pages or archives as well as to other service which are offered through Internet. Advanced students from System Analyst career that belongs to J.J. de Urquiza Institute of Rosario supports and brings information to the users. Such a multidisciplinary interaction not only increases web use by people from the Faculty but also improves teaching experience and knowledge appliance of future System Analyst. A cooperation agreement was signed between the Faculty and the Institute to provide necessary lawful support. This project started in March 2000. Actually about 48 teachers and 682 students are registered as users of the Virtual Library. It was statistically calculated that users are web navigation during two thousands hours a month. This project is at present of regular use by teachers that provide also a Virtual Class to the students. Next November will start the first postgraduate course through distance by e-mail, which is offered through the Graduated School of the faculty of Biochemical and Pharmaceutical Sciences. Such a course has the purpose to provide an intelligent use of new technologies to new graduates in Biochemistry and Pharmacy.

Conclusions: This experience considerably increases fields of knowledge not only to students but also to teachers within an academic environment that allowing both professional and personal enrichment. This model should be adopted by other academic institutions as a regular offer.

Multiplicity & Flexibility as Web-Based Collaborative Learning Course Design and Implementation Considerations – A Case Study

C. Y. Janey Wang
Learning Technology Center
The University of Texas at Austin, U.S.A.
janeywon@mail.utexas.edu

Abstract: This presentation examines how multiplicity and flexibility were essential considerations in the design and implementation of an award-winning Web-based collaborative learning course. Design features supportive of multiplicity and flexibility are examined, as are implementation and assessment processes employed in meeting these goals. Future online collaborative learning course design and research implications are discussed.

Introduction

The Internet has created opportunities for widespread electronic delivery of news, information, and curriculum that have altered the ways we communicate, share knowledge, deliver education, and conduct business. It also provides unique opportunities to prepare learners for "future responsibilities" and "success in life," as well as tailoring instruction to meet individual learner's needs and interests while drawing strengths from students' diverse backgrounds (Dewey, 1938, p. 17).

A case study of a Web-based course that integrated computer-supported collaborative learning is used to illustrate the importance of multiplicity and flexibility as key elements in designing collaborative and interactive online learning environments. This study describes the course context, objectives, and structure of an award-winning Web-based collaborative-learning course, Instructional Technology Planning and Management (ITPM), offered in the spring of 2001 at the University of Texas at Austin. This course received the "National Distance Learning Course Award" from the University Continuing Education Association, and the instructor received the "2001 Excellence in Distance Learning Teaching Award for Higher Education" from the U.S. Distance Learning Association.

Multiplicity refers to the multiple ways of presenting and delivering course material and providing multiple channels of communication, interactive activities, and learning strategies. Flexibility refers to the provision of choices to learners in designing a learning environment more responsive to their needs and interests. Such an environment characteristically invites questions and suggestions, provides timely support and options for learning tasks, rich readings and interactive assignments, while providing ongoing individualized feedback.

This paper examined multiplicity and flexibility in the design, implementation, and assessment of an online course that emphasized collaborative learning. Essential features of multiplicity and flexibility discussed include: multiple course representations, tools, communication types and channels, support, interactions, flexible course structure, personalized communication and feedback system, and cultural-sensitivity to better meet the needs of learners from diverse backgrounds.

Study Summary

Based on the researcher's experience in course design and implementation, multiplicity and flexibility emerged as important factors in meeting the needs of learners from diverse backgrounds. This study examined an online course, ITPM, offered to both on-campus and distance learning students. This course was situated in a virtual environment where students met through both asynchronous and synchronous online interactions. The major intellectual product developed by the students was a strategic technology plan collaboratively produced as students learned the basic concepts and tools of strategic planning. The course was comprised of eight modules, each representing a major component of the planning process. Modules progressed from simple to complex tasks.

Four aspects discussed in this paper include: course content and structure; course delivery; social interactions and support; and course evaluations. Multiplicity was represented in the course content and structure by providing rich information, resource links, reading selections, activities, and assignments. The course emphasized cognitive, social, and technical aspects of learning. Most assignments and activities were group-oriented where interaction was essential. A dedicated group discussion site provided students a platform for social interactions. Although most communication occurred asynchronously, the planning teams also made significant use of synchronous communications. Collaborators chatted, asked support staff for assistance, discussed tasks, and socialized with peers in real-time.

Multiple tools were employed for various task purposes, while multiple media were employed for course presentations (text, graphics, streaming video, video-conference, audio-conference) and for group interactions (e-mail, phone, voice mail, synchronous chat line, audio and video-conference, and face-to-face interaction for on-campus students). In considering technical failures, the course content was available at multiple Web sites. In considering accessibility, a CD-ROM of streaming video segments was made available free of charge at the beginning of the semester. This enabled students with low-bandwidth connections to easily access all video and audio elements of the course. The multiple ways of presenting course material and the multiple platforms for providing course content not only increased learners' interest options but also provided flexibility in the event of technical glitches. The multiple channels available for learners to approach the instructor, support staff, and other students provided options and alternatives for flexible communication.

Course design was the result of a collaborative effort among a team of diverse backgrounds. Likewise, student support was organized around a collaborative group effort. Learners were able to obtain assistance from an array of sources, including the instructor, the teaching assistant, a technical staff, an administrative coordinator, a network administrator, and two subject-area consultants. Multiple sources of support were available via an online weekly newsletter, handbook, and announcements, technical support, and consultants' areas. The teaching assistant monitored group activities daily and provided timely instructional and technical feedback to learners.

Multiple types of assessment were employed to maintain student accountability in achieving individual and group learning goals. These included the instructor's evaluation, learners' self-evaluation, peer evaluations,, and group product evaluations, as standardized by evaluation rubrics provided in the course content. Learners evaluated themselves and their teammates by two methods: rubric-based ratings and qualitative comments based on individual judgments.

Evaluation of individual student's progress was based on cumulative monitoring, analysis, and feedback of students' online participation (self, peer, and product evaluation results), as well as their frequency of communication and quality of their contributions. To keep learners abreast of their progress, descriptive written or voice feedback on learners' performance and future assignment deadline reminders were provided at the end of every module.

Conclusion and Future Implications

Multiplicity and flexibility were incorporated as design features in order to approximate the complexity of real world contexts where multiple solutions collaboratively arrived at are the norm. Incorporating multiplicity and flexibility into the design involved providing multiple ways of presenting and structuring content, providing multiple communication channels, providing choice of readings, learning resources, assignments and task, and providing flexibility for learners in working collaboratively to accomplish learning projects and solve problems. There were also constraints in the application of multiplicity and flexibility. For example, the course start and end dates were fixed by the university calendar while the intensive time constraints required fixed deadlines for completion of specific learning projects and tasks. Given the pressing need for online instruction that is responsive to the needs of individual learners, further research into the use of multiplicity and flexibility as design features of the distant-learning environment is warranted.

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Lessons Learned from Facilitating a Web-Based Professional Development Course for In-Service Teachers

Lisa A. Washington
Rockman Et Al
USA
lisa@rockman.com

Lisa A. Heaton
Marshal University Graduate College
USA
heaton@marshall.edu

Abstract: The purpose of this paper is to share the lessons learned from facilitating a Web-based professional development course for K-12 educators. Offered in Spring 2001, *Using the WWW in the K-12 Classroom* was the pilot course of a newly developed Professional Development Series offered by a university located in the Appalachian region. The course facilitators were an assistant professor at the host university and a part-time faculty member who lives in California. The shared experience of facilitating a course at a distance brought up many issues about the role of the instructor and communication between instructor and student. The instructors intend to share their reflective study of these issues and other lessons learned to provide further insight into successful facilitation of Web-based distance education courses.

Overview of the Course

A total of 153 in-service teachers were enrolled in the 10-week, self-paced course titled *Using the WWW in the K-12 Classroom*. The four main objectives of the course were for teachers to improve their Web searching skills, collect Web resources relevant to their grade level and content area needs, explore methods for integrating Web resources into their planning and instruction, and develop a basic Web page.

The course was developed using WebCT and included email and bulletin board communication tools. Course content was presented in six modules, each with accompanying assignments such as participating in bulletin board discussions, responding to reading and reflection questions, and creating a Web page. The course was graded on a Satisfactory/Unsatisfactory basis, with 80% required on each assignment to receive a passing grade.

Lessons Learned

Instructors

One of the most notable aspects of teaching a Web-based distance education course is the communication between the instructors and course participants. The instructors noticed rather early in the course that their written responses to students were more formal than those they would typically make in a face-to-face course. For example, instructors noted that in providing feedback on assignments, they often began by writing "Thank you for submitting your assignment." The instructors constantly reflected on the heightened sensitivity they used in communicating with participants. A concern about loss of inflection and tone in written communication meant that instructors spent a lot longer composing written messages than they would composing a verbal response to a student in a face-to-face course.

Instructors also faced the unique challenge of using the technology to teach about technology. To facilitate the nature of a self-paced course, the instructors were restricted to using asynchronous communication tools to help participants troubleshoot Internet-related problems. Because part of the course was focused on developing Web design skills, instructors found that often communicating at a distance posed a challenge for effectively communicating how to use the technology.

Other lessons learned were related to course development and the role of the instructor in a Web-based distance education course. Some of the issues that arose during the course are discussed below.

Initially, the instructors planned to divide the teaching load by alternating weeks for which they would be responsible for facilitating class discussion, grading assignments and responding to questions. Recognizing that participation was slow in the early weeks of the course, the decision was made to divide responsibilities by module so that one instructor was responsible for monitoring discussion, assignments, and questions for some of the modules and the other instructor was responsible for the remaining modules. This also allowed for greater consistency in grading individual assignments and made things less confusing for students who needed to submit corrections.

Instructors found that including an orientation module that served as an overview of the course and an introduction to the WebCT environment facilitated participants' comfort level with communicating by bulletin board and private mail, both of which are skills required for successful participation in the course.

While all course participants received feedback on their work, the instructors noticed that participants who submitted assignments early in the semester were more likely to receive in-depth feedback.

Instructors were challenged to find ways to make essential components of assignments more prominent for learners who did not read assignments carefully.

Keeping track of participants' assignments and revised assignments was a challenge. Midway through the course instructors asked participants to send a private mail message indicating that they had completed an assignment or were submitting a revision. This facilitated the tracking of assignments.

Participants

The types of questions participants asked and the general quality of their assignments suggested that more specific guidelines and examples were needed to support them in completing assignments successfully.

Participants had a desire to be connected by grade level and/or content area. Some participants "found" each other by reading introductions posted to the bulletin board. Others wanted the instructors to make the connections for them.

Some participants required more personal interaction with the instructors and called the university to ask for specific help over the telephone. The number of calls increased toward the end of the semester.

It became apparent when reviewing assignments that all participants did not thoroughly read the course content and directions. Informing students that an assignment was incomplete or unsatisfactory accounted for a large number of the private mail messages instructors sent. Looking for a pro-active way to address this situation, the instructors developed eight tips for successful participation in an online course, which is now included with participants' registration packet.

When posting assignments to the bulletin board, participants tended to follow the pattern of the first posting. Subsequently, the first posting set the stage for the quality of the discussion. If the first posting was well constructed and thorough, those that followed tended to be of high quality as well. On the other hand if the first posting was incomplete or poorly constructed, subsequent responses tended to follow that pattern. In the first case, the instructor was less involved in facilitating the discussion, as it tended to be participant-led, in the latter case, the instructor was more involved in order to increase the quality of the discussion.

Although the course syllabus indicated that instructors would respond to private mail and bulletin board postings within 48 hours, participants had a need for immediate feedback. Self-grading components that were automatically scored by WebCT seemed to make participants impatient for feedback on other assignments.

Conclusion

Facilitating an online course is both challenging and rewarding. What the instructors of this course discovered is that the challenges have as much to do with the technology and course design as they do with the interaction between instructor and participant. This reflective study of two online course facilitators is important because the lessons learned are instructive to other online facilitators. It is also important because the lessons learned were used to make revisions to this and subsequent professional development course offerings.

COPYRIGHT AND FAIR USE:
BLIND MEN DESCRIBING THE ELEPHANT

Leo Wells
Barat Program for Learning With Technology
Barat College of DePaul University
Lake Forest, IL
gwells1@barat.edu

Abstract: The "fair use" of documents secured from the Internet for educational use has historical precedents dating back centuries. Indeed, the concepts of ownership of intellectual property have been sharply debated since the invention of movable print. Fair use can be defined based on the purpose, nature, and amount of material accessed, and on the economic impact of the use of the material. Various scholastic organizations have implemented policies to define fair use and to make the Internet useful to scholars, but fair to the authors of documents. New technologies are now available to ensure copyright compliance.

Much is written on the various laws and regulations concerning the educational "fair use" of copyrighted material from libraries, the Internet, and a host of other sources. From issues of historical precedents, to ownership of the source material, to recent statutes, to myth and innuendo, fair use is defused through different filters to be different things to different practitioners. Authors describing "fair use" will emphasize isolated aspects of this doctrine, similar to the poem of blind men describing different parts of an elephant (i.e., the tail is like a rope, the ear is like a fan, etc.). We notice what seems most obvious and visible from our limited perspectives.

The problem of copying the work of another author goes back a few hundred years. Goehner (1997) suggests that the very invention of the Gutenberg printing press created the opportunity to steal the written word, what with the newly-found ability to mass-produce documents.

McLaughlin (1999) suggests that recently enacted regulations are nothing new at all, but rather they are more in keeping with eighteenth century Germanic states that enacted laws to protect the author and publisher of a work. Apparently, the typical book or pamphlet would be copied again and again despite the author's wishes. McLaughlin cites eighteenth century philosopher Immanuel Kant who said, "....The counterfeiter undertakes the author's business, not only without any permission from the owner, but even contrary to it" (Kant, 1795).

The very act of accessing an Internet website causes a copy of the web page accessed to be placed on an end user's system (Lipinski, 1999; McLaughlin, 1999). This aspect of "fair use" allows for "browsing" in the digital environment, even with a copy in the computer's RAM (Lipinski, p. 13).

After describing the extent of the Copyright Act of 1976 and what constituted a copyrightable work, MacKnight (2000) defines four factors within the law which are " . . . not specific on what is or isn't 'fair use' " (p. 110). The *purpose* of the extracted work, e. g. research, teaching, scholarship, has to be considered. The *nature* of the copyrighted work, whether it is creative, or factual, or whether it has been previously published determines its fair use. Unpublished materials and creative works are more likely to be denied fair use. The *amount* of the work extracted varies with the work. The *effect* on the potential market must not harm the author's opportunities for sale of the work.

A major state flagship university system has developed easily readable "rules of thumb" for not only determining the "fair use" of an Internet document, but also making "course packs," images, music, multimedia, distance learning, research copies of articles, and holding materials on "reserve" status in the library (University of Texas System, 2001).

Templeton (1998) lists his "top ten" myths about copyright on the Internet. Templeton's discussion about those "myths" indicates that even our e-mail is copyrightable. The inference is that although some works are copyrightable, the marketability of those works is virtually zero. What could we charge folks for reading our email or Usenet postings? The "myth" of educators being immune from copyright is gone. The ideas that "they can't sue ME," and "I have rights" vanish when the reality is that litigation stemming from a copyright violation is CIVIL, rather than criminal, and the rules are startlingly different.

Financial issues dominate other authors' concerns over copyright and ownership of Internet products. Smith, Eddy, Richards, and Dixon (2000) insist that copyright law and litigation over intellectual property rights will be arenas of significant risk as educational institutions become providers of Internet education. They suggest that anti-trust regulations could be construed to include educational institutions "if they acted with commercial motive" (p. 6). Smith, et al. suggest that universities might be somewhat behind in the establishment of policies to address possible anti-trust litigation. (p. 11)

Admitted Luddite David Noble decries the proliferation of Internet courses for profit by universities (Noble, 2000). Noble insists that the professors (authors) who create courses (works) have a right to own their course material and that the university has no right to profit from the creative work of professors. Simpson and Turner (2001) report on methods one university has implemented on assigning ownership of intellectual material based on a professor's usage of university time, university resources, the professor's job description, and the number of students involved (University of North Texas, 2000).

Lipinski (1999) argues that "fair use" is also a key factor in distance education. He maintains that current laws be augmented to allow for the various problems related to distance education, e. g. access to materials. Moreover, the current laws correctly indemnify libraries, etc. from liability if they have taken some array of safeguards to prevent document piracy. Lipinski suggests that new technologies, such as watermarking documents, printing denial, and tracking be employed for copyright management.

The motivation for this present research stems from discussions among peers on just what "fair use" is, how it works, how it is implemented, and how much we can demand from both faculty and students as to compliance. Hopefully, this present paper will be expanded for greater depth. How we as practitioners, and our students, who will in turn influence even more students, deal with this will make the difference as we implement technologies and delivery systems yet to be conceived.

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The Role the New Opportunities Fund 'ICT for Teachers' Initiative has Played in the UK, Drawing on the Experiences of SIfT, an Approved Training Provider to the Scheme

C. M. Whitehouse*, C. S. Durbin and H. U. Shah***

*School of Computing
Staffordshire University
The Octagon, Stafford
Staffordshire, UK
C.Whitehouse@staffs.ac.uk
H.Shah@staffs.ac.uk

**Quality Learning Services
Staffordshire LEA
The Kingston Centre, Stafford
Staffordshire, UK
Chris.Durbin@staffordshire.gov.uk

Abstract
This paper outlines the role played by the New Opportunities Fund (NOF), 'ICT for Teachers' initiative in the UK. This Government scheme, which commenced in April 1999 (TTA 1998), provided a sum of money for every serving teacher in the UK, to 'buy' professional development training in ICT (Information and Communications Technology), from Government Approved Training Providers. SIfT (1999) as a provider to the scheme, has developed pedagogically sound learning materials (TTA 2001a), addressing the needs of individual teachers, delivered through a Virtual Learning Environment. We believe that the results, issues, experiences and questions arising from our research have implications for researchers all over the world. Indeed with the SIfT training in the main delivered via the Internet, the international aspects of delivering training for teachers by this medium is continuing. SIfT materials are currently being used by in excess of 1000 teachers, in England and Jersey, have been trialled in Norway and are being used in Germany.

Introduction

The *Stevenson report*, published in the UK in 1997, identified that "*The Government must launch a long term strategy to increase the effective usage of ICT in schools*". With respect to teacher support, it identified "*The overall aim should be radically to improve and accelerate the skills, experience and confidence of teachers so that they can use ICT to facilitate learning*" (Stevenson 1997).

In response to this report, the Government established one of the largest training schemes for 'serving' teachers in the UK - the New Opportunities Fund (NOF) *ICT for Teachers'* initiative (TTA 1998), which it supported with £230 million from the national Lottery. The aim of this current scheme is to facilitate the national targets set by the Government, for all teachers to be ICT (Information and Communications Technology) confident and competent to teach using ICT, by the year 2002 (DfEE 1997). The focus of the training is to help teachers to use the technology within their *subject area* of the curriculum, rather than teaching purely how to use the technology.

Staffordshire ICT for Teachers (SIfT), a collaboration between Staffordshire University and Staffordshire Local Education Authority (LEA), in the U.K. became a Government Approved Training Provider in February 1999, following the competitive tendering process (Whitehouse *et al.* 1998). SIfT was approved as a national provider for England (one of fifty approved providers) to deliver ICT training to secondary teachers (of students aged 11-18), within the subjects of Geography and Design and Technology (SIfT 1999).

SIfT planned to deliver the majority of their training to teachers, using a web-based Virtual Learning Environment (VLE), in this instance Lotus Learning Space. A Virtual Learning Environment is defined as "*an integrated software system, which combines within a package facilities for the delivery of learning materials, communication (synchronous or asynchronous), assessment and student feedback*" (LTSN/THES 2001).

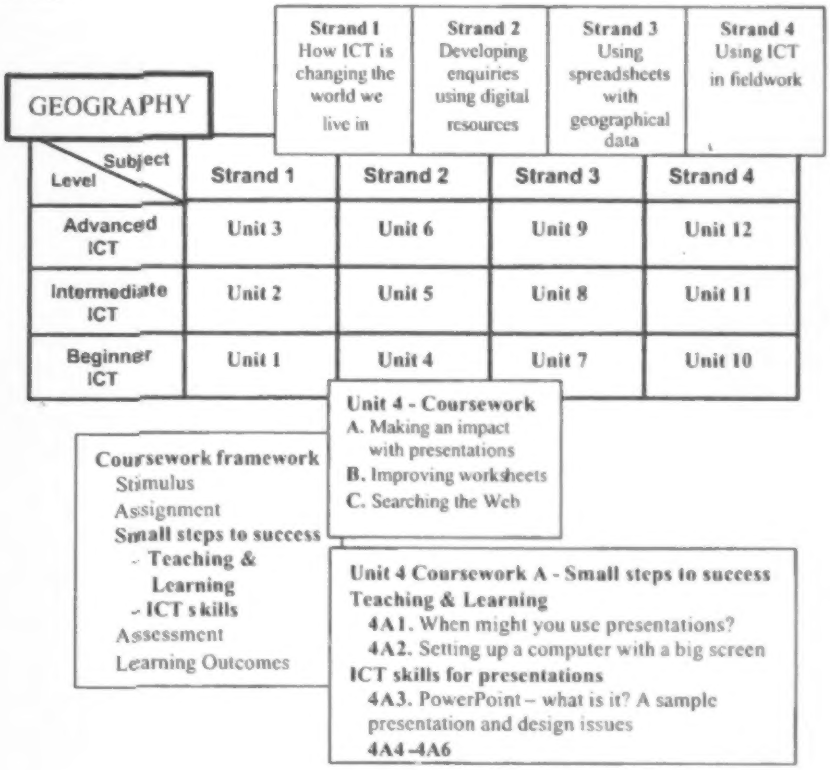
The SIfT aim was to create a 'virtual' learning solution, which:

- utilised technology to support the strengths of human contact;
- made the technology available so that teachers had the opportunity to learn with interesting and lively experiences of ICT, in a subject context which was familiar to them;
- offered the opportunity to learn mainly within the teachers own physical environment, enabling the 'learning on demand - any time, any place, at your own pace' style of learning.

This paper gives a high level view of the SIfT model, covering: materials and delivery; the relevance of the tasks set; support given; the sharing nature of the resource base; and the networking and discussion opportunities. It explains the design of the SIfT 12 Unit grid and the issues of pedagogy that were addressed, reflecting on how timeframes drove the development and how feedback, both from teachers and the Teacher Training Agency quality assurance process, improved the model. Finally the paper evaluates the SIfT provision, drawing on evaluation evidence published on both the NOF *'ICT for Teachers'* scheme and the SIfT training, commenting on the impact of SIfT and the current on-going research.

Development of the SIfT 12 Unit Grid

The design adopted by SIfT was to create a highly structured model, subject focused to the perceived needs of the users (Milligan 1999). The SIfT training was developed as a 12 Unit grid, consisting of four subject strands, each with three levels of ICT capability - beginner, intermediate and advanced. This grid was then implemented for teachers at secondary level (with students aged 11-18 years) for the subjects of Geography and for Design and Technology.



GEOGRAPHY

	Strand 1	Strand 2	Strand 3	Strand 4
	How ICT is changing the world we live in	Developing enquiries using digital resources	Using spreadsheets with geographical data	Using ICT in fieldwork

Level \ Subject	Strand 1	Strand 2	Strand 3	Strand 4
Advanced ICT	Unit 3	Unit 6	Unit 9	Unit 12
Intermediate ICT	Unit 2	Unit 5	Unit 8	Unit 11
Beginner ICT	Unit 1	Unit 4	Unit 7	Unit 10

Unit 4 - Coursework
A. Making an impact with presentations
B. Improving worksheets
C. Searching the Web

Coursework framework
Stimulus
Assignment
Small steps to success
- Teaching & Learning
- ICT skills
Assessment
Learning Outcomes

Unit 4 Coursework A - Small steps to success
Teaching & Learning
4A1. When might you use presentations?
4A2. Setting up a computer with a big screen
ICT skills for presentations
4A3. PowerPoint – what is it? A sample presentation and design issues
4A4-4A6

Figure 1: the SIfT model, illustrated for Geography © SIfT 1999

Figure 1 shows the implementation of the SIfT design for Geography. The four subject strands are: 'How ICT is changing the world we live in', 'Developing enquiries using digital resources', 'Using spreadsheets with geographical data' and 'Using ICT in fieldwork'. Each of these strands is offered at 'Beginner', 'Intermediate' and 'Advanced' level of ICT competence, resulting in twelve units in all, numbered from 1 to 12. The Unit is broken down into two or three Courseworks, identified as 'Coursework A', 'B' or 'C', each with a common framework of 'Stimulus', 'Assignment', 'Small steps to success', 'Assessment' and 'Learning Outcomes'. The 'Small steps to success' are the learning tutorials within the Coursework, which provide the materials for the learner to develop the knowledge and skills to be able to carry out the 'Assignment'.

Under the *ICT for Teachers'* scheme, funding is available for teachers to 'buy' four units from a possible twelve, thus providing flexibility for teachers to choose the SIfT units, which most closely reflect their ICT competence level and subject need. A teacher selecting Unit 4 and commencing on Coursework A 'Making an impact with presentations', would thus follow the 'Small steps to success' tutorials, identified consecutively as 4A1-4A6, to cover materials in the areas of 'Teaching and Learning' and 'ICT skills for presentations'.

The SIfT 12 Unit grid and framework were particularly suited to the 'Content Centred' Virtual Learning Environment (Milligan 1999), of Lotus Learning Space (LLS) Version 2.5, which was used for this development. LLS had been acquired by Staffordshire University in December 1997 and had been used by local students from September 1998. Within LLS, the student encounters four main areas - the 'Schedule', 'MediaCenter', 'CourseRoom' and 'Profiles'. The Schedule holds the *outline of the virtual course*, whilst the MediaCenter holds the *course-related material*. The SIfT Units and Coursework framework would thus be accommodated within the Schedule area of LLS (Stimulus, Assignment, hyperlink headings to the Small steps to success, Assessment and Learning Outcomes), whilst the SIfT Small steps to success tutorials would reside within the MediaCenter. Of the remaining LLS areas, the CourseRoom would permit on-line discussion, collaboration, assignment creation, submission and feedback, whilst the Profiles area would enable participants to submit their own personal information, relating to their education, experience and interests.

In creating the SIfT learning content within the VLE, the aim was not only to produce 'bite-sized' pieces of learning (taking no more than 30 minutes elapse time), but also to provide material which was pedagogically sound, incorporating qualities of the 'virtual tutor'. The objective was to create material, which was motivational and friendly, innovative, lively, interactive and dynamic, and to place special emphasis on understanding and accommodating the many requirements of the teachers' daily needs.

SIfT Pedagogy

Gagné (1985) identifies nine events of instruction for any desired learning, (see Table 1). These instructional events provide the external conditions that are necessary for learning to take place; the events usually occur in the order listed. Within the SIfT Coursework materials, Gagné's nine events of instruction are developed within the Stimulus, Assignment, Small steps to success, Assessment and Learning Outcomes, and are explained here in the context of the SIfT Geography materials.

1. Gaining attention.
2. Informing the learner of the lesson objective.
3. Stimulating the recall of prior learning.
4. Presenting the stimulus material with distinctive features.
5. Providing learning guidance.
6. Eliciting performance.
7. Providing information feedback.
8. Assessing performance.
9. Enhancing retention and learning transfer.

Table 1: Gagné's nine events of instruction

Stimulus

The aim of the Stimulus is to *gain the teacher's attention* (Gagné's instructional event 1). The SIfT Stimulus uses a goal-based scenario, to set the scene of the learning and to motivate the user. Within the subject of Geography, the stimulus may be delivered through a scenario, which could be surprising, emotional, a mystery, a conundrum or paradox, something confusing, fun, dramatic or moving. Geography, Unit 4, Coursework A – 'Making an impact with presentations', begins with the use of presentational slides containing images of the Colombian Earthquake, February 1999 and makes the statements "Imagine you lived here" and "Think about how these people feel".

Assignment

The Assignment *informs the teacher of the lesson objective* (Gagné's instructional event 2) "Your task will be to follow the instructions carefully to create a presentation to start a lesson with a whole class or a small group...."

Small steps to success

The Small steps to success are the tutorials. In *stimulating the recall of prior learning* (Gagné's instructional event 3), the SIfT materials provide a selection of geography lesson scenarios and the question is asked "Which of these are genuinely enhanced by using a presentation?" The teacher may call on the tutor's opinion or knowledge base (revealed through a hyperlink), to *provide learning guidance* (Gagné's instructional event 5). This guidance uses images to further illustrate the impact of slides to deliver the required message, thus *presenting the stimulus material with distinctive features* (Gagné's instructional event 4).

The SIfT Small step tutorials provide content which may be re-used, immediately by teachers themselves, within a classroom situation. The steps include humour and focus directly on the teachers' needs, their problems and environment. Step 4A2 'Setting up a computer with a big screen' commences with the words "This tutorial may be NO USE AT ALL". If the school does not have the projection facilities, it pre-empts any negative teacher response, which may have been directed at the SIfT materials, creating instead an empathy with the SIfT team who understands their circumstances. Whilst working through the tutorials, if the teacher experiences difficulty or requires clarification, access can be made to an on-line mentor through the LLS CourseRoom, for further learning guidance (Gagné's instructional event 5). In providing support, SIfT are responsive to teachers' questions, encouraging the teachers, sharing thoughts and returning a little more information than requested – using our own awareness of new ideas.

Assessment

Whilst the Assignment informs the learner of the lesson objective (Gagné's instructional event 2), the teacher implements their new ICT knowledge and ideas, in a way that is relevant to them within their school – usually in planning an appropriate piece of teaching and learning. This can be semi-negotiated with a SIfT tutor (Gagné's instructional event 5) if the teacher wishes, via the on-line CourseRoom. The opportunity for the teacher to 'Request for Review' work which is in progress, enables the tutor to *elicit performance* (Gagné's instructional event 6) and to *provide information feedback* (Gagné's instructional event 7) on how to improve their lesson assignment.

The assessment is further developed by the application, of the ICT materials created, within the teachers' own educational context and the completion of the Plan, Teach and Review pro-forma within the Assessment area. The teacher is asked to reflect upon the context of the teaching and learning in which the ICT was utilised, the actuality of their delivery, its success and opportunities for improvement. The teacher then 'Submits for Grading' their ICT materials and their Plan, Teach and Review pro-forma, via the CourseRoom of the Lotus Learning Space software, to receive further feedback (Gagné's instructional event 7), and to receive *assessment of performance* (Gagné's instructional event 8). This application of the teachers' learning within their working environment and their reflection upon it, serve to *enhance retention and learning transfer* (Gagné's instructional event 9).

Learning Outcomes

The Learning Outcomes provide the user with a clear identification of the stage that their learning has reached at the end of the current piece of Coursework. "On completion of Unit 4 Coursework A you will be able to: Critically appraise the potential uses of presentations in teaching geography.....".

All of Gagné's nine instructional events are thus developed within the SIfT materials, providing a strong pedagogical design, implemented through the SIfT 'virtual tutor' model.

Evaluation of SIfT and the NOF *'ICT for Teachers'* initiative

With the launch of the SIfT training in January 2000, the NOF initiative did not permit time for research of best materials. SIfT adopted an iterative practise to development, prototyping the materials and subsequently reacting to feedback from teachers, integrating suggestions and new ideas within the content. Further development occurred in 2001, following quality assurance by the Teacher Training Agency, of the SIfT model and materials.

A day of face to face training introduces teachers to the VLE and SIfT materials. The central focus of SIfT is then on classroom practice, the training materials illustrate a range of classroom approaches with critical evaluation, developed through various learning styles. The product of the teachers' work is created within the VLE CourseRoom, building the resource base for others, with individuals able to download and use other teachers' endeavours. SIfT believes that as the system grows and more and more teachers add assignments to the system – teachers will consolidate their experience by using the products of other people's work, further enhancing retention and learning transfer. It is the opinion of the SIfT team that a flexible delivery strategy for a Virtual Learning Environment has been created, developed, and tailored to individual needs and which is scaleable (Milligan 1999). Currently in excess of 1000 teachers are registered users of the SIfT secondary Geography and Design and Technology materials in England, Jersey, Germany and Norway.

The Teacher Training Agency (TTA 2001a) said of SIfT: "*The model is actively chosen by schools, mainly because of it's subject specific nature and networking potential. The programme is well constructed and connected, with all the required elements covered. ......The elements of each unit within the modules are well constructed to form a complete whole that provides for a diversity of initial ICT ability and teaching experience...*This strong subject provision focus, adopted by SIfT, has not always been present in training offered by some providers (TTA 2001b) and as a result led the Office for Standards in Education (OfSTED 2001) to identify that such training was less effective in raising teachers' *confidence to use ICT*.

The training has increased teachers' *use of ICT resources* to enhance subject teaching, aid communication and share good practice (TTA 2001b). Whilst OfSTED (2001) also found that the NOF training programme had contributed to an increase in the use of computers, they said it had rarely contributed to the pedagogic expertise to help teachers make the most effective use of ICT in their lessons. This is in contrast to the SIfT delivery, where the TTA (2001a) found: "*The delivery of the programme places emphasis on the development of pedagogical related issues. The material and structure of the training can facilitate the development of significantly advanced pedagogical thinking and extend the use of ICT within the school.*"

Although the TTA acknowledges that the SIfT materials are broad and comprehensive, appropriately supportive and generally accessible, they identify that "*there is evidence that teachers with minimal or no experience of the Internet will not make the maximum use of the materials ...it leaves a number of teachers feeling overwhelmed and disempowered in taking responsibility for their own learning.*" The SIfT team are aware of the many difficulties that teachers face and through their research are endeavouring to create further support mechanisms.

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Anchored Collaborative Inquiry

Susan M. Williams
Department of Curriculum and Instruction
University of Texas at Austin
United States
susan.williams@mail.utexas.edu

Abstract: This paper describes Anchored Collaborative Inquiry, a model for in-service professional development that combines a traditional face-to-face workshop with online discussions in which teachers compare simultaneous implementations of the same reform-oriented curriculum. Tests of the model indicate that although the shared context encouraged teachers to participate much more than was required for course credit, they often failed to engage in a sustained dialog or to provide descriptions of their classroom implementations that would allow facilitators and peers to respond to their reports.

Recent discussions of in-service teacher education call for ongoing experiences that take part in the context of teachers' own practice (Cochran-Smith & Lytle, 1999; Franke et al., 1998). These experiences are expected to take the place of the often-maligned in-service workshop and lead to learning that is flexible, self-sustaining, and generative (Franke et al, 1998). The call for situated teacher learning occurs at the same time that the Internet and World Wide Web are making possible numerous opportunities for online professional development (Goldman, 2001). Little is known about how teachers use these opportunities and the effects they have on teachers' practice. This paper presents an example of extending the impact of traditional professional development through the use of ongoing computer conferencing to promote teachers' reflection on their practice.

Our model for professional development is called *Anchored Collaborative Inquiry (ACI)*. *ACI* is based on anchored instruction, an approach developed over the last decade by the Cognition and Technology Group at Vanderbilt (CTGV, 1997). The enduring idea behind anchored instruction is that sustained exploration of realistic, meaningful problems leads to learning that is highly valued and likely to be used when needed. In the *ACI* workshop teachers explore ways of teaching a reform-oriented curriculum (CTGV, 1997). Then each teacher implements the curriculum in his/her classroom simultaneously and discusses the results of the implementation online. As they engage in this dialog with peers, teachers attempt to make sense of what is occurring in their implementation and to enhance their understanding of how students learn to solve complex problems. In our model, professional development includes 1) Face-to-face meetings to learn about a reform and collaboratively plan for implementation, 2) individual implementation in each teacher's classroom, and 3) shared reflection via an online conferencing system during the implementation.

Previous research on professional development that takes place completely online indicates that a sense of community forms slowly and face-to-face meetings can be helpful in overcoming a sense of isolation (Goldman, 2001). Face-to-face meetings can also contribute to a sense of trust among participants essential for those engaging in challenging, long-term tasks. Participants without a sense of trust are more likely to be guarded in their responses and less likely to engage in a critical examination of their assumptions. On the other hand, participants who know other participants are more likely to be interested in what their colleagues have to say and to feel an obligation to continue the discussion.

While traditional face-to-face workshops may lead to development of a sense of community, they lack the ongoing interactions with colleagues and coaching in teachers' classrooms thought to be necessary for effective professional development (Putnam & Borko, 1997). This type of long-term support is time intensive and difficult to implement on a large scale; however, it may be facilitated by online interaction. The *ACI* model combines facilitated face-to face and online discussions to enhance teachers' understanding of reform-oriented teaching. In the following paragraphs, we summarize the results of tests of the *ACI* model.

Findings

Teachers need personally relevant activities to encourage interaction in online learning communities. Tests of the *ACI* model suggest that teachers' sustained and active participation in the online conference was related to the shared context established by the workshop experiences and the simultaneous implementation of the reform curriculum. Teachers were very goal-oriented in their use of the online conference. They did not use the forum to initiate social conversations or to engage in professional discussions that were unrelated to the implementation; however, the number of postings was over twice what was required for course credit. Likewise the number of replies to these posting was approximately twice the requirements. Thus in the *ACI* conference, it appears that teachers were responding to a specific learning goal rather than an opportunity to discuss general issues.

Access to descriptions of events in participating teachers' classrooms are critical for facilitators and teachers to carry out collaborative inquiry online. Typically researchers and teacher educators regularly observe in the classrooms of collaborating teachers. In our project, all participants were completely dependent on the descriptions of the dassrooms provided by the teachers themselves. Adequate information was difficult to obtain from our teachers for several reasons: First, they were unaccustomed to articulating how they knew students were learning and what they were learning. Second, they lacked experience in implementing the reform and may have failed to notice and report important events. Third, text descriptions of classrooms are difficult to create and time-consuming to type. Teachers may have lacked the time and writing skills necessary to create rich descriptions.

Participants in online collaborative inquiry need to be able to carry on a sustained dialogue in order to discuss ideas and integrate information from others into an understanding that grows and develops. Only one-third of teachers' postings during the implementation phase of our conference were replies to a previous posted message. The others were disconnected reports of various aspects of the implementation. It is possible that teachers (and learners in general) are not accustomed to carrying out an extended dialog about a single idea, i.e., following an idea from its initial statement to some kind of conclusion (Wilson & Berne, 1998). This kind of interaction was more likely to occur during the face-to-face part of the *ACI* model than online. Developing this type of interaction is likely to be a difficult learning goal and is likely to significantly extend the amount of time required to establish a productive learning community.

Professional development that attempts to change teachers' beliefs and practice requires a fundamentally different kind of interaction than researching resources, communicating with parents or colleagues, or other ways that teachers use online communication. Online discussion was successful in extending support to teachers separated by distance from professional development personnel and in encouraging teachers to reflect on their practice in the context of this reform. However, online professional development rooted in teachers' own practice requires some means of sharing what is happening in the classroom with those online. Significant preparation and experience will be necessary to enable teachers or other participants in online learning communities to develop the skills to describe the settings in which they are learning and working and to develop a culture where this type of sharing is the norm.

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THE GUIDING ASSUMPTIONS OF SUCCESSFUL DISTANCE EDUCATION PROGRAMS

Barry Willis, Professor
Associate Provost
University of Idaho
Moscow, Idaho USA

bwillis@uidaho.edu
(208) 885-6373

At its core, distance education is a change process, not a delivery system and historically higher education culture has proven resistance to change. Perhaps the greatest benefit of distance education is its potential role as a catalyst for adapting the way educational institutions do business. In a relatively short span of years, the proliferation of programs and services available at a distance have resulted in a heightened sense of competitiveness unheard of in higher education. For institutions that are up to the challenge, the current interest and growth in distance learning presents a new opportunity.

In a few short years, distance education and its off-spring (e.g., web-supported instruction, videoconferencing, etc.) have been transformed from a quaint irrelevancy to a lightening rod for change on many university campuses.

Sherron and Boettcher (1997) suggest that the current rush to implement distance learning programs by colleges and universities is occurring for three major reasons:

- The convergence of communication and computing technologies,
- The need for information age workers to acquire new skills without interrupting their working lives for extended periods of time, and
- The need to reduce the cost of education.

These reasons and others have attracted hopeful politicians and others with minimal background and little previous interest to distance education. Others who view distance education as the "Trojan Horse" signaling "the commodification of higher education" have been equally moved by distance education for quite different reasons (see Noble, 1997, 1998, 1999). It is ironic that the politicians who trumpet the benefits of distance education the loudest know relatively little about it, while those who see a dark side to the use of educational technology feel quite comfortable using the Web and related media to espouse their views. Irony aside, the accompanying claims of what distance education can and can't, should and shouldn't do, have resulted in an ever-widening gap between the rhetoric and reality of distance education. Closing this gap can be accelerated by thoughtfully considering a number of key assumptions shared by many successful distance education programs:

1. **Distance education is about increasing access, not making money.** Those who look to distance education as a revenue-generating machine resulting in financial windfalls for their programs or departments are typically disappointed when they factor in the true costs of this endeavor (see Oppenheimer, 1997). These costs include hardware/software, system maintenance/upgrading, telecommunication/transmission charges, technical support, faculty/program development and evaluation, student support…and a myriad of personnel and infrastructure costs associated with these vital components and services. The importance of these critical and continuing costs and constant technological change usually necessitate the reinvestment of virtually all income generated by the enterprise. Those who take profits typically do so at the expense of needed upgrades with the potential risk of losing whatever market share they fought to win in the first place.

This is not to say that distance education is without its financial benefits. Many Land Grant institutions, for example, provide statewide educational programs and services. A few years ago, this could entail chartering aircraft to fly faculty to remote outreach or extension centers in various locations served by the Land Grant Institution. Even today, it is not unusual for faculty to drive 200-300 miles a week to meet with students located far from campus. The costs of such enterprises in terms of time, energy, and faculty goodwill are excessive.

In contrast, the appropriate use of distance education can be cost effective…even if the end result isn't a financial windfall. What does result from the appropriate use of technology may be even more beneficial: the ability to maintain and even grow the market for institutional programs and services. Given the rural and cloistered nature of many of our best Land Grant institutions, the ability to reach out to students wherever they reside is a huge competitive advantage and a potential determining factor in enhancing or even maintaining institutional viability.

2. **There is no technological "silver bullet"...not even the Web.** Every new technology is accompanied by its share of advocates proclaiming it to be the ultimate delivery tool promising to solve all instructional problems, even those that are yet to be fully understood. In reality, a poorly defined problem has an infinite number of solutions...we just never know which one is the most appropriate. Until instructional needs are understood in detail, any technology could be appropriate...or inappropriate.

Even those at the forefront of technological innovation, including Bill Gates of Microsoft and Andrew Grove of Intel, candidly admit they are unsure where the future of technology will lead their companies (Grove, 1999). As a result, they invest heavily in marketing, research, and development in efforts to maintain their technological preeminence wherever the future might lead them.

For institutions without the research and development funding to invest in every potentially beneficial instructional delivery innovation, the best advice is to avoid technological solutions in search of instructional problems. Instead, focus on the requirements of the content to be delivered, the needs of the learners being served, tangible instructional opportunities (e.g., the need to train a computer literate cadre of highly motivated professionals), and potential obstacles (e.g., limited bandwidth to the locations you serve). Attend to these requirements and the most appropriate technological solutions will make themselves apparent. In this context, the primary benefit of the Web is not as a delivery system in and of itself, but as a standardized platform from which various technological solutions can be launched.

Nevertheless, those who think the Web is the ultimate solution to all instructional problems should review the research literature of the 50s stating the same thing...about the overhead projector.

3. **The only constant in the world of instructional technology is change.** Anticipating change and technological directions is always challenging and filled with uncertainty. Move too fast and your technological upgrade will be obsolete before it is fully implemented. Move too slowly and your programmatic market share could slip before you can catch up. Just as damaging, failure to innovate will signal your competition and potential markets that your program is no longer viable.

In a world of technological change, timing is everything. Those who learn to embrace technological innovation when the timing is right will be the big winners. The rest will be left to fight over the crumbs.

4. **Lasting technological change is typically the result of evolution than revolution...**Over the past thirty years technological innovation has evolved in a fairly consistent manner. This process could be referred to as technological birth, death, and resurrection. In the "birth" stage, new technologies emerge, unrealistic expectations are set, and the potential impact of the new tool is over-hyped. In the "death" stage, the original outspoken advocates move on to the next innovation, general enthusiasm gradually fades, and interest wanes as the realities of what the new technology can and can't do emerge. Finally, in the "resurrection" stage, thoughtful reflection occurs as the new technology is tested in various, often random, instructional settings. While the technological innovation is found inadequate in most applications, it proves beneficial in addressing a limited number of very specific needs.

Over time, the once proclaimed technological cure-all takes its place among other teaching tools and fades from the forefront of technological innovation...into the hands of those who can put the benefits of the technology to best use.

It is for this reason that few effective instructional experiences are anchored to a specific technology. More often than not, a variety of technologies, each filling a specific and well defined role, are woven together by a skilled educator into instructionally sound and technologically transparent academic experiences.

5. **The emphasis of distance education should be in the quality of the academic program, not in the use of technology.** Selecting technology is easy compared to the focused attention and subtle insights needed to design, develop, and implement a truly effective academic program. This is why the skilled teacher will continue to play the preeminent role in successful academic encounters, regardless of the sophisticated technology being used.

Similarly, instructional delivery experiences that rely almost solely on technology (e.g., first generation web-based courses) with little apparent influence and day-to-day involvement by a thoughtful and skilled teacher, may generate initial student interest. Without adequate course design, there may be little lasting enthusiasm for the overall instructional program, or the motivation to complete the course that originally offered so much promise.

Finally, successful program administrators will spend adequate time and resources to nurture and support those creative and concerned faculty who are willing to take the leap of faith required to be successful in the distance education enterprise.

6. **There is no glory in managing instructional technology.** You'd think there would be, but there isn't. Keeping up with technology is a never ending battle filled with unmet expectations, too few resources, and the need to constantly plan ahead realizing that the technology that you are implementing today is likely already dated and on the road to obsolescence.

The best that can be said about the management of technology is that someone has to do it...and do it right. Without exceptional management skills and a thick skin, the implementation of technology is an impossible task that gives those involved the illusion that they are in control, when in reality they are at the mercy of technological innovations that don't exist today, but will be demanded tomorrow.

7. Learning is enhanced when technology is used to directly link students to other students. The lack of effective and personalized student-student interaction and feedback is the potential "Achilles heel" of distance education. Conversely, the need for effective distant student-student interaction provides a great opportunity to creatively use technology. In fact, whether it is teacher-to-student or student-to-student interaction, learning is enhanced when technology is used to improve communication (see Flottemesch, 1999).

In my experience, effective instruction almost always requires that a fully engaged teacher establish the learning framework, even when the target audience consists of highly motivated adults. Also of critical importance is the learning that takes place when students are linked to other students...without any teacher present. Given the inherent separation that is evident in most distant learning environments, it is difficult for many students to maintain any continuing connection to the instructional context, let alone the content being presented in any given course. By creating learning spaces and technological linkages that bring distant students together as groups and as individuals, the gaps between what is being taught and what is being learned can often be bridged (see Wallace & Weiner, 1998).

8. Face-to-face instruction is still a valid delivery method in support of distance delivered courses...when possible. Many assume that there is no need for face-to-face instruction in distance delivered courses. After all, that is why many get involved with distance education in the first place...to avoid the "real time" constraints of face-to-face contact. In fact, some of the best distance delivered courses have well integrated components in which teachers meet directly with students, either individually, in small groups, or with the entire class. If personal interaction among the teacher and students is deemed an important course component, it is critical to meet as a group as early in the semester as possible. Experienced distance faculty report that the student comfort level in using technology increases significantly if the students and instructor meet early in the course and develop a personal working relationship.

The ideal scenario is to bring students from all sites together for an intensive day or two early in the course and incorporate group process techniques to foster cohesion and unity of purpose among participants. Ending the semester with another intensive face-to-face session at which time final projects are presented and course objectives are summarized is a beneficial capstone experience. If time and budget permit, meeting an additional time or two during the semester will likely prove both academically useful and personally rewarding.

Undoubtedly, incorporating "real time" interaction increases the logistical challenges of any distant course and requires faculty and student sacrifices as they struggle to match schedules. In some cases, however, the sacrifices are worthwhile and often essential. In the case of technical courses, for example, where laboratory experiences are critical to successful course completion, the question isn't "if" face-to-face communication can be incorporated, but "how" it will be accomplished. The challenge is then to maximize the time of faculty, facilitators, students, while scheduling the technical facilities needed to accomplish it.

Despite the potential benefits derived by focused personal contact, many educators (and even more administrators) feel that incorporating face-to-face communication in distant courses is expensive and defeats the inherent flexibility and perceived lower costs that initially attracted them to distance education.

Depending on where the course is being delivered, it may be physically impossible to bring the teacher and students together. Nevertheless, it is better to rule out personal contact as impractical or instructionally irrelevant than it is to fail considering it in the first place. When the logistics can be successfully navigated, teachers and students alike are rewarded by well-planned and highly interactive face-to-face contact.

9. Many faculty are comfortable when distant students from other institutions take their classes, but don't like their students taking classes from faculty at other institutions. This is a major stumbling block to cooperative distance education ventures and has limited the success of strategic partnerships relying on the sharing of faculty expertise. The best partnerships are forged when specific academic needs are identified *and* on-campus expertise is absent. In these cases, competition is not a factor and both sending and receiving institutions benefit. Despite being a major institutional and political motivator for the initial start-up of distance education efforts, true academic alliances have proven elusive and are the exception, not the rule.

Until the culture of course "ownership" moderates and the "not invented here" syndrome fades, wide scale institutional cooperation will be more a goal than a reality.

10. At its core, distance education is a change process, not a delivery system. Historically, higher education culture has proven resistant to change. Perhaps the greatest benefit of distance education is its potential role as a catalyst for change in the way educational institutions do business. In a relatively short span of years, the proliferation of programs and services available at a distance have resulted in a heightened sense of competitiveness unheard of in higher education. For institutions that are up to the challenge, the current interest and growth in distance learning presents a new opportunity. While the dangers of competing and failing in this new world of educational access may pose significant problems, the refusal to aggressively move forward may be the greatest risk of all.

By any standard, distance education has proven to be a useful tool for educators and administrators who have taken the time to adequately assess its strengths and weaknesses. Continued success will require the careful planning, implementation, and tracking of distance education successes and failures.

This discussion keeps leading back to one incontrovertible conclusion: Distance education is one piece of the educational delivery puzzle, but not the "answer" to all program delivery challenges facing educators today.

There is little doubt that distance education has the potential to positively impact higher education. The greatest gains will only occur, however, after the opportunities and limitations of technology-supported delivery are critically reviewed and realistically analyzed. The sooner this happens, the better…for teachers, administrators, and most of all, the students who stand to gain the most through innovative solutions to the myriad delivery issues educators and society face today.

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Faculty Use of Blackboard For Course Instruction At Two Mid-Western Universities: A Multiple Case Study

Chunzhen Xu
Center for Curriculum and Instruction
University of Nebraska-Lincoln
United States
cxu@unlserve.unl.edu

Judy Sloan
Department of Health and Human Performance
University of Nebraska-Lincoln
jsloan@unlserve.unl.edu

Anastasia Novikova
Center for Curriculum and Instruction
University of Nebraska-Lincoln
asnovikova@hotmail.com

Abstract: The Blackboard course management system is an example of the technological advancement being used by instructors at some higher institutions. Our research is an in-depth qualitative case study exploring the perception of six instructors' use of Blackboard for course instruction. Data was collected through observations, semi-structured interviews, and a review of relevant documents with participants at two Mid-western universities. Five major themes were found to emerge from this study. The themes were: a) accessibility and flexibility, b) challenges and problems, c) training and support, d) assessment and evaluation of students' work, and e) communication and student participation. The findings demonstrate that Blackboard makes education accessible to students who are unable to attend college, and it provides flexible learning for students who are on campus. The challenges and problems of using Blackboard include a large amount of time involvement and technical problems.

Introduction

Technology is progressing rapidly and is having a direct impact on educational instruction methods. The Blackboard software platform is an example of the technological advancement being used by some instructors at institutions of higher learning. This study was limited to six instructors who use Blackboard at two Mid-western universities for course instruction.

The purpose of this case study was to explore the perception of six instructors' use of blackboard for course instruction. Data was collected through observations, semi-structured interviews, and a review of relevant documents with participants at two Mid-western universities. Blackboard is defined as a server software platform that provides a powerful environment for online teaching and learning, internet-enabled communities, and advanced integration with multiple administrative systems.

The over-arching quest was to discover how six instructors in two Mid-western Universities describe their experience of using Blackboard for course instruction. Four research questions guiding this inquiry were:

1. What is the instructor's perspective of Blackboard?
2. What are the amounts and types of technical problems?
3. To what extent does the instructor believe the learner is meeting the goals and objectives of the class?
4. What is the role of the instructor who uses Blackboard?

The significance of this study was to gain a deeper understanding of how Blackboard is being used as an instructional tool for distance courses, as a supplement to on-campus courses, and to better understand how faculty use the program for course instruction. Gaining knowledge about instructors' use of Blackboard could help determine its usefulness as an instructional tool.

Method

We used the qualitative case study tradition. A case study is an exploration of a "bounded system" or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context (Creswell, 1998). Several features mark our project as a case study: We identify the "cases" for the study, the six instructors who are using the on-line instruction system, Blackboard; the cases are bounded by time (3-month data collection) and program (Blackboard); we situate the cases within two campuses in two Mid-western cities; and we use extensive, multiple sources of information in data collection such as direct observations, interviews, and online course documents.

The instructors participating in this study were purposefully chosen. Six instructors from two Mid-western universities were selected. A background information protocol was developed so that the participants would be able to describe their online teaching background. The participants should meet the following criteria in order to be included in our study: the participants should be from higher education institutes; the participants taught at least one course using Blackboard as an online teaching tool; and the participants used Blackboard as either a completely on-line course or as a supplementary tool.

The data were collected through six semi-structured interviews. "Interviews provide ideas filtered through the perceptions of interviewees" (Stake, 1995). All the interviews took place in the instructors' offices and were approximately 30 – 90 minutes long. Each interview was audio taped and then transcribed. We also gathered field notes by conducting observations. "Observations provide the most complete natural setting for qualitative research and they also give the researchers a first-hand experience with the informants, and the researcher can record information as it occurs" (Lincoln & Guba, 1985). Two observations were conducted in instructors' offices with the instructor and the observer as participants. One observation lasted 30 minutes; the second observation was 1 hour 45 minutes in length. The third observation was conducted in the "virtual classroom" with the instructor, two students and the observer as participants. We also collected data through a background pre-interview form that was sent to the participants by e-mail a week prior to interviews. Furthermore, the documents about the features of Blackboard and the instructors' course documents were downloaded and printed out for review and analysis.

Findings

Theme One: Accessibility and Flexibility

Can the online instruction make learning more accessible? Can online instruction provide for flexible learning? Listen to the participants as they describe their experiences.

When course content and activities are provided online, students no longer need to worry about accessing course materials. Busy students can choose to download readings or take practice exams whenever it is most convenient. Dr. Cat indicated, "With Blackboard I have all of the information for the course available in the electronic format, and available 24 hours a day, 7 days a week. That to me is an advantage." Mr. Gorilla also pointed out, "Anywhere they can get online, whether it's here on campus, downstairs in one of the computer center. I had students take the quizzes three quarter miles away across Nebraska. They have the ability to do the quizzes at midnight. Anytime they want, anywhere they want, and they can take that. That is a plus for them." Mr. Lion suggested that one of the advantages of online instruction is "the anytime, anyplace aspect that allows you to teach students whom you ordinarily would not be connect with."

On-line instruction also removes reliance on physical attendance. In traditional education, students must attend class at a predetermined time and place. Online instructions enable students to access learning without the constraints of attending class or meeting together at a certain date, time, and location. Dr. Cat posited, "What Blackboard does is to make possible for students who can't come and take traditional classes to be able to get a degree." Dr. Squirrel added, " It makes my class available to someone who would not otherwise be able to take the class, like the student in Japan who could not take time to come to Lincoln for my class." Dr. Panther concluded, "The Internet is a good way of reaching learners who would have great difficulty in connecting with our institution through the usual on-campus learning events."

Theme Two: Challenges and Problems

Mr. Lion said, "I spend a lot of time in order to do what I want to do, trying to figure out ways to use Real Presenter and also figuring out ways to use the Internet directly into the Blackboard presentation." Time was also a major factor for Dr. Panther: "I spent my Christmas putting the course on-line… The up-front investment is important." In addition, he mentioned, "In working with eleven students, I spend a significant amount of time teaching them how to navigate on the site, how to get them logged on, talking with them on the phone, etc."

Dr. Squirrel, who has taught the same course on-campus and on-line, points out that a task such as a class presentation requires "more preparation to do that on Blackboard" than in a classroom. Dr. Cat, who was instrumental in getting Blackboard at Love University makes a strong statement about time requirements for Blackboard: "I can tell you that it took tremendous amount of time to prepare all of the information that I now make available to the students that are taking the class at the distance. For example, in the class that I teach, the statistics classes, I had to prepare approximately 27 or 28 hours of video, then edited and put on CDs, and that's a very time consuming task."

Student problems discussed by the participants include: students not being able to access Blackboard, not being able to receive attachments, unable to sign on and navigate around or get synchronous chat, and not having the necessary computer requirements to obtain the information. Mr. Lion stated, "One of the main problems was signing on" and "there were several students who had trouble getting on synchronous chat." Dr. Panther also experienced difficulty with synchronous chat and found the solution "was to go to e-mail."

Dr. Cat discussed the difficulties of taking quizzes on-line in that "if they [students] took too long working on the problem, they will be disconnected by the Internet service provider." The instructor would then have to log on and reset the quiz in order to allow the student to retake the quiz. This brought about another problem for the student: "All of the questions were lost, so they have to completely start over again. Which is real bad enough for the students and for the instructor too."

Theme Three: Training and Support

Mr. Lion stated that his first experience with Blackboard was "by searching the Internet and then I attended continuing education workshops." Mr. Lion believes his "chief challenge is to learn to use the program more effectively to make me a better instructor. We need to invest more money and time in learning to use the program by offering more workshops."

Dr. Cat believes "Blackboard is user friendly, it doesn't require a lot of support. If students have problems with Blackboard, they call the help desk. I have not really had any students that complain about the support that's been available for Blackboard." Overall, Dr. Cat finds the support for Blackboard as very good.

Mr. Gorilla has used Blackboard support when putting things on-line. When he faced problems, "the help desk has been very helpful to help me out." He has solved most of his problems through the help desk where he has found "the people that I talked to had the knowledge able to solve the problem." Although he has not gone to any meetings, Mr. Gorilla said, "I know they also have at least one once a month get together where people that have problems can go and talk and find solutions to their problems using the Blackboard."

Theme Four: Assessment and Evaluation

Learner assessments are essential in education. Effective instructors use a variety of means, some formal and others informal, to determine how much and how well their students are learning (Ridley & Husband, 1998). I will let the six instructors describe how they assess their students' performance in their own words.

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Online quizzes and tests can increase motivation and provide concept reinforcement. Mr. Gorilla used quizzes as a motivation: "I use the quizzes as a motivation to have them read the chapter so that they participate." Dr. Cat used quizzes as reinforcement. He stated, " I have banks of questions which are related to the three units for the class. Students can generate a random sample of questions that were in the question bank and find out what their understanding happens to be for the content. They can do this as many times as they want. Get some practice and preparation for the exams... All these are supposed to work together so that it reinforces learning process, and it's all related to the content for the class."

The immediate feedback feature of the Blackboard assessment tools also impressed Mr. Gorilla. He remarked favorably, "Students take entire quiz online, The Blackboard grades it, and gives them a score immediately."

The two instructors who used online quizzes and exams also told us how they managed the assessment. Dr. Cat required a proctor for the exam. He stated, "They have to have a proctor who is acceptable to me and also to the division for continuing education. This person could be a school official, and not a family member. Uncles, aunts, spouses, brothers or sisters don't work." On the contrary, a proctor was not used in Mr. Gorilla's online tests. He declared, "They are not supervised. I do not use any proctor. It's not a concern of mine.... I guess I am not much concerned as long as they know the material."

The two instructors had the same style of online tests such as open-book, open- notes, and no time limit. Dr. Cat described, "The students take the exams that are open-book and open-notes. They are usually almost timed two and half-hours. They are not designed for that length of time, but I try not to have a time limit, or to speed. So they have a very comfortable amount of time to finish things." Similarly, Mr. Gorilla indicated that it was an open-book quiz and there was no time limit involved.

To evaluate performance informally, instructors also use a variety of techniques. For example, they pose questions on the Blackboard and encourage students to participate in the discussion. Dr. Panther described, "I assess student performance through the questions and discussion in the synchronous discussion... I use a lot of questions from the text that we use. I do not use tests." Mr. Lion suggested how he assessed the quality of the discussion: "I always observe the number of postings of students." Dr. Squirrel added, "I read their responses then I see how much in depth they are and I see how many times they participated.... I said to my students not only do you have to post your own idea or opinion you have to interact with other students via Blackboard."

Theme Five: Communication and Student Participation

The final theme in our research project was communication and student participation in Blackboard. The focus of this theme was to compare the quality of student communication between traditional classes and on-line classes.

Much research has been conducted to identify the benefits of the computer-assisted training and many researchers agree with the fact that "the main advantage of computer-based discussions is that all students can and usually do participate due to a low-anxiety atmosphere" (Hadley, 2001). Two of the participants, Mrs. Kangaroo and Dr. Cat indicated that Blackboard discussions help to facilitate students' participation because the system provided a low-anxiety and impersonal communication atmosphere. Mrs. Kangaroo, who used Blackboard as a supplementary device in her traditional class, said that she decided to start using it because she wanted to give shy students and students who are afraid to express their opinions in the classroom a chance to participate in classroom discussions.

According to Dr. Cat, "One of the strengths of Blackboard is the ability to be able to facilitate communication…it's somewhat impersonal because it's electronic." Dr. Panther pointed out that "on-line discussions are a fine tool to facilitate communication either in face-to-face or on-line courses."

The instructors mentioned a problem with effectively using Blackboard to communicate emotions between students and the instructor. Dr. Squirrel pointed out that she can only get "written cues from my students." She thinks that sometimes it's better to communicate emotions when you see a student face-to face: "I can't see them yawn or their facial expressions…I don't have those kinds of cues I use in my face-to-face teaching." She also noticed that she was more comfortable in person-to-person communication than in writing communication.

Dr. Cat in his interview gave advice on how to facilitate communication. He said that "one way to increase participation is to increase the amount of participation and make it part of the grade…and to grade the number of participations, or to grade the quality of way they participate."

Conclusions

We identified three groups of people that may benefit from the information provided in this study: university administrators, instructors of on-line courses, and students who take on-line courses.

University Administrators that choose to adopt a distance learning system such as Blackboard must be willing to go beyond the purchasing of the system. Financing an on-line course instruction system needs to include hiring or training qualified personnel who can provide a support network where instructors and students can call and get answers to their questions. Workshops should be offered frequently and range from basic levels of Blackboard instruction to advanced levels. Additional workshops should be provided in regard to changes and up-dates in the system.

Faculty who want to provide on-line instruction for a distance-learning course or add on-line instruction as a supplement to an on-campus course need to attend at minimum a basic workshop on Blackboard. Additional levels of Blackboard workshops are greatly encouraged, as well as attending workshops dealing with changes and up-dates in the Blackboard system. Faculty members desiring to use Blackboard must understand the time commitment involved, the up-front time of putting the materials on-line and the continuous time demand throughout the semester in working with the students. According to the majority of the participants interviewed here, the time commitment is greater for on-line courses than that of on-campus courses. Online instructors can evaluate student performance by providing assessment opportunities. You can add assessment activities to a course management system like Blackboard by incorporating practice tests, quizzes, and examinations. However, you should not rely only on online testing for grading purposes. You should have at least two other methods of evaluation, such as discussion participation and group projects.

Students who are interested in taking distance-learning courses need to find out the computer requirements, the software and hardware, as well as the desired Internet access they will need in order to participate successfully. Students should also be provided information by the university support system on how to access and maneuver throughout Blackboard courses. Online students should report to the instructor if the pace and material developed is satisfactory or indicate areas where course content needs revision or further explanation. Students' feedback can help instructors identify which teaching methods are most effective and may help instructors improve the course.

Future research needs to include information gained from at least three areas not addressed in this study: a) the students who are using Blackboard for distance learning and as a supplement to on-campus instruction, b) the staff involved with teaching Blackboard workshops and providing support to instructors and students, and c) the administrators who are involved with making decisions in regard to the Blackboard platform for course instruction at the university. Additional research needs to be conducted to look deeper into the needs of the university instructors who are teaching on-line courses. In addition, future research is needed to assess the online instruction in terms of teacher effectiveness.

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Asynchronous On-Line Discussions: Facilitating Critical Thinking Skills Within Traditional Classrooms

Ya-Ting Carolyn Yang
Department of Curriculum and Instruction
Purdue University
United States
yangyc@purdue.edu

Abstract: In a traditional classroom, discussions are often hindered due to limited class time and unequal access of interaction. It is difficult for instructors to monitor collaborative discussions and critical thinking. An asynchronous online forum is a promising tool to cope with this problem. This paper reports an ongoing project that examines the effects of asynchronous online forums on critical thinking and overall learning performance, and also probes students' overall perspectives toward the effect and function of using asynchronous discussion forums in the context of university courses. The research design, participants, instruments, and data analysis of this project are described.

Problem Statement and Research Objective

A primary function of education is to teach and develop critical thinking skills. In many cases this occurs through class discussions (Bloom, 1956; Newmann & Wehlage, 1993). Yet, in a traditional classroom, critical thinking usually occurs through both instructor-student interaction and peer discussion (Klinger & Connet, 1992). However, discussions may become difficult to facilitate in the following situations: 1) in classes where students have no opportunity to express their opinions because of limited class time or class size; 2) when a small number of students, such as extroverted or more eloquent students, dominate the discussion; 3) when the classroom environment is not conductive for a discussion (e.g. if the chairs or desks in the room cannot be moved); 4) if the topic is one where the students are reluctant or uncomfortable to express their views face to face. Although instructors can assign collaborative inquiry tasks to be completed outside of class time (or even during class time), it is difficult in the classroom, and impossible outside of the classroom, to monitor collaborative discussion and critical thinking. As a result, instructors can neither coach nor assess the inquiry. It is only the final product of inquiry that can be reviewed (Duffy, Dueber, & Hawley, 1998).

Asynchronous online forums (i.e., text-based computer-mediated communication tools) are promising tools that offer an opportunity for interactive discussions outside the classroom and at the same time provide an opportunity for the instructor to moderate such discussions. Some studies have compared the effectiveness of online forums to face-to-face forums; however, verbally based face-to-face forums and textually based asynchronous forums make direct comparisons difficult (Anderson & Kanuka, 1997). In essence, the core issue should be whether asynchronous discussions supplement instruction to foster critical thinking, and/or enhance overall student learning performance. In addition, while a majority of the data used for comparisons between online forums and face-to-face forums has been based on learner attitude surveys or surveys used to gain descriptive information, little data has been gathered to ascertain the differences of effectiveness on critical thinking and overall learning between the experimental groups who utilize asynchronous online forums and the control groups who do not. The question, "Are asynchronous online forums effective in higher education?" still remains largely unanswered.

The purpose of this research project is to examine the effects of asynchronous online forums on critical thinking and overall learning performance and, in addition, to probe students' overall reactions and perspectives toward the effect and function of using asynchronous discussion forums in the context of university courses.

Research Design

The research design is a pre- and post-test quasi-experimental design. The independent variable is the use of the structured asynchronous online forum. Students in the control group will only use in-class discussion mode. In addition to in-class discussion, students in the experimental group will use a structured asynchronous online forum (threaded discussion bulletin board) as a supplement to their on-campus class where a series of discussion topics will be posted on the class Web site and facilitated by the instructor. The students taking BMS 241, an undergraduate course at Purdue University, in fall 2002 and spring 2003 will be the subjects in control group and experimental group, respectively. There are two dependent variables examined in the study: students' learning achievement and student attitude. The first dependent variable is the learning achievement of the students that is measured at two levels—acquisition of declarative knowledge and critical thinking skills. Declarative knowledge refers to the concepts, principles, issues, and facts presented in a learning situation. It is measured as the scores on the four quizzes and two exams on course content. Learning in terms of critical thinking is measured via California Critical Thinking Skills Test, class discussions on asynchronous online forums, and essay questions that go beyond declarative knowledge acquisition and involve analysis, synthesis, reasoning, interpretation, and induction. The second dependent variable is student attitude with three categories: attitudes towards asynchronous online forums, class discussion, and the course in general. Student attitude has been defined as scores on the attitude pre-and post-course Likert-type surveys developed by the researcher. The interview questionnaire will also be administered to probe student's attitude toward the study.

ANOVA will be performed to justify whether there is a difference among the subjects in terms of age, educational backgrounds, attitudes toward asynchronous forums and the course, and knowledge of content at the beginning of the class. The dependent variables, including students' learning achievement and attitudes toward the course and the asynchronous online forum, will be analyzed by using a one-way ANOVA at the end of the class. In addition, the qualitatively analytic procedure that organizes the data, generates categories, themes, and patterns, and searches for alternative explanations for the data, is adopted to analyze the data from the interview questionnaire to generalize themes regarding students' perspectives about the study. In order to pilot test the efficacy and reliability of the proposed research design, BMS 241 class in summer 2002 will be used as a pilot study for the experimental group.

Implications of Results

The importance of class discussion has been highlighted by a host of research studies; to move students beyond assimilating inert facts into generating better mental models, teachers must structure leaning experiences that highlight how new ideas can provide insights in intriguing, challenging situations (Dede, 1996). This research speculates about how an increasing important tool—asynchronous online forum, can afford educators enormous pedagogical opportunities, opportunities that could not be realized in the classroom and that may reshape traditional face-to-face education. It is our anticipation that asynchronous online forums are the means that afford students the time for thoughtful analysis, reflection, and composition as their discussion of an issue evolves and that allow instructors to mentor and evaluate the critical thinking skills exhibited during out-of-class discussions. It is this potential of asynchronous online forums that we find so exciting. However, the actual impact and effectiveness of the asynchronous forumas a supplement to on-campus instruction is still insufficiently researched. Thus, this research project will identify and experimentally examine asynchronous online forums in a constructivist paradigm, and provide useful information as to the overall reactions and perspectives of students toward the effect and function of using asynchronous discussion forums in university course delivery.

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The Evolution of Distance Learning: Distance Education, Virtual Classrooms, and Web-Based Instruction

Ya-Ting Carolyn Yang
Curriculum and Instruction
Purdue University
United States
yangyc@purdue.edu

Abstract: Distance learning is a great tool for educators to reach traditional and non-traditional learners. Yet, like any tool, it is only useful in the hands of someone who clearly knows what it is, and how to use it. Nowadays there is considerable confusion in the use of terminology for distance education, virtual classrooms, and Web-based instruction. Two questions are frequently raised: a) what exactly are these distance learning methods, and b) is there any difference among them? This paper aims at providing answers to these questions by describing the origins, growth, technology used, as well as definitions and characteristics of each of these three instructional methods. Additionally, the similarities and differences among these teaching methods are addressed by a thorough discussion. The discussion darifies distance education and its varieties and comprehensively explains the meaning of the terminology that distance education technologies have conveyed.

Introduction

New technologies for distance education are the most rapidly changing of all technologies we deal with in our school settings. In the relatively short period of the past two decades, distance learning courses have been delivered via broadcast television, satellite distribution, and compressed video over telephone lines. Most recently, the resources and capabilities of the Internet and World Wide Web (WWW) have been utilized to support distance instruction. Accompanied with these new technologies, new terminology, such as virtual classrooms and Web-based instruction, regularly appears in the distance learning landscape. Today many educators use the same technologies, such as computers, the Internet and WWW, to deliver their distance learning courses, and interchangeably use the terms—distance education, virtual classrooms, and Web-based instruction. However, what actually are distance education, virtual classrooms, and Web-based instruction? Are the concepts of these instructional methods the same? Or are they distinctly different in some aspects? In order to answer these questions, the definitions of these three terms, as well as their origins, growth, and technology used were first examined at the outset of this paper.

Definitions of Distance Education, Virtual Classrooms and Web-Based Instruction

Distance education is now often defined as "institution-based, formal education where the learning group is separated geographically, and where interactive telecommunications systems are used to connect learners, resources, and instructors" (Simonson, Smaldino, Albright, & Zvacek, 2000, p. 20).

A virtual classroom is "a teaching and learning environment located within a mediated communication system" (Hiltz, 1994, p. 3). It is a classroom that does not exist as physical or concrete places, but exists virtually by way of the activity and the medium(a) used. For example, a virtual classroom is created when learners and instructors simultaneously see and hear each other and spontaneously interact by two-way interactive television (I-TV), a technology enabling simultaneous, two-way audio and video connections across multiple sites. However, a virtual classroom is not restricted to a synchronous learning environment. It is also created when two or more learners log into an on-line forum and discuss the course content asynchronously.

Web-based instruction is defined as "a hypermedia-based instructional program that utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported" (Khan, 1997, p. 6).

Origins, Growth and Technology Used

Distance Education and Virtual Classrooms

From the above definitions, it is not hard to see that technology and distance education, virtual classrooms, as well as Web-based instruction are intrinsically linked. Within the field of distance education research, there have been a number of attempts in the literature (Bates, 1993, 1995; Garrison, 1985; Keegan, 1995) to classify the relationship of technology to distance education and an effort to divide the development into what are called "three generations". According to Bates (1993, 1995), the first generation of distance education is characterized by the predominant use of a single technology, and lack of direct learner interaction with the instructor originating the instruction. Correspondence education is a typical form of first generation distance education. The second generation is characterized by a deliberate integrated multiple-media approach, with learning materials specifically designed for study at a distance, but with two-way communication still mediated by a third person (a tutor, rather than the originator of the teaching materials). Autonomous distance teaching universities are examples of second-generation distance education. The third generation of distance education is based on two-way communications media that allow for direct interaction between the instructor who originates the instruction and the remote student—and often between remote students, either individually or as groups. Third generation technologies result in a much more equal distribution of communication between student and teacher and also between students.

According to Garrison's (1985) classification, the above three generations are labeled (a) correspondence, (b) teleconferencing, and (c) computer-based. However, Garrison's attempts are not clear about why the "correspondence generation" and the "teleconferencing generation" are supposed to have ended before the "computer-based generation" begins. Keegan (1995) suggested that it be better to regard the developments in the use of technology in education as a cumulative process in which the benefits of distance education are added to conventional face-to-face provision to bring the enhancement that technology can provide. Keegan attempted to analyze educational provision from the point of view of distance education by identifying three differing structures:

> ***Conventional education*** is the normal offering of education in schools, colleges and universities today. Its characteristic structures are the dialogue, the lecture developed by the medieval universities, the tutorial and seminar, the laboratory practical the field trip and the periods of study in the library or resource center. Its characteristic technologies today are the overhead projector and the white (or black) board. With the developments of technology of the Industrial Revolution, the conventional face-to-face interpersonal provision continues, grows more widespread with the growing involvement of almost the whole population in sequential schooling for a substantial number of years (Vertecchi, 1993) and is itself enhanced by technology.
>
> ***Teaching at a distance*** can be tracked back to 150 years ago. In 1840, Sir Issac Pitman, the English inventor of shorthand, came up with an ingenious idea for delivering instruction to a potentially limitless audience: correspondence courses by mail (Matthews, 1999). However, it was not possible for instructor and learners to teach and learn in different places without the developments of technology, especially in transportation and communication, associated with the Industrial Revolution. Teaching at a distance is characterized by the separation of instructor and learner and of the learner from the learning group, with the interpersonal face-to-face communication of conventional education being replaced by an apersonal mode of communication mediated by technology. Teaching at a distance brings great benefits to the people who cannot or choose not to attend the schools, colleges or universities. However, an emotional dimension of the interaction, such as the eye-to-eye contact and interpersonal interaction, of the instructor and learners is lacking in traditional distance education.
>
> ***Teaching face-to-face at a distance*** was achieved with the telecommunications revolution of the 1980s, which associated with the deregulation of the telecommunications, the increased speed of chips and the introduction of broadband technologies. The introduction of cable and satellite technologies that can be now linked to virtual classrooms brought undreamed of new dimensions to distance education. Within the virtual classroom, the lecturer can see and hear the learners present in the class

and also all the other learners at the other sites hundreds or thousands of kilometers away. The interaction of face-to-face education has been recreated electronically and complemented the limits of apersonal interaction that traditional distance education has.

In this present phase, conventional face-to-face education in schools, colleges and universities continues and is further enhanced by the influence of the new communications techniques. In addition, many researchers consider virtual systems based on (electronically) teaching face-to-face at a distance as a new and cognate field of study to distance education.

Web-Based Instruction

As the Internet emerged since 1969 and the Web was first released onto the Internet in 1991, extraordinary growth has taken place and WWW is becoming an increasingly powerful, global, interactive, and dynamic medium for delivering instruction. Thus, the nature of the relationship between the instructor and learners continues to change as developments in technology allow them not only to communicate in various ways, but also to access and generate a wide range of resources.

The WWW, a worldwide connection of computers which enables users to easily view text, graphics, sound, and video from any computer with Internet access, allows information to be distributed worldwide, using a generic interface that can be obtained by running programs that work on various computer platforms. These characteristics empower Web-based instruction, delivered in whole or in part on the Web, to be an additional valuable tool for distance education. Like correspondence and extension courses delivered at a distance, Web-based instruction allows learners to use self-directed techniques to learn new knowledge at their own rate, and at convenient times and places. Additionally, it provides learners and instructors previously inaccessible information resources at the fingertips of them.

Web-based instruction takes many forms, from environments where only text and supporting graphics are transmitted between educator and learner, to situations where live two-way, real-time text or video interaction can take place between the educator and learner or between learners. Questions and answers must freely flow between all participants. By using interactive TV, virtual classrooms achieved the dream of teaching face-to-face at a distance to allow learner interaction that traditional distance education, such as correspondence, can't achieve. Furthermore, web-based instruction could fulfill the dream of a totally interactive virtual classroom, where questions and answers flow freely, yet the learners have immediate access to Web-based reference material to support their arguments. In addition, because WWW uses a generic interface that can be obtained by running programs that work on all learners' computer platforms, Web-based instruction does not need to require learners to travel to virtual classrooms at fixed times on fixed days to join the learning group as the virtual classrooms might need.

Because of the development of the WWW and computer-mediated communication systems (CMCS) in the 1990s, many features of virtual classroom through interactive TVs in 1980s, such as face-to-face interaction of a instructor and learners, can be fulfilled by using WWW and CMCS in this new decade. Thus, a broader definition of virtual classrooms has been redefined in 1990s by many researchers as follows:

> ***A virtual classroom*** is a computer accessible, on-line learning environment intended to fulfill many of the learning facilitation roles of a physical classroom (Clarke, 1997).
>
> ***A virtual classroom*** is usually based on computer groupware, or can be operated over the Internet (Matthews, 1999, p. 58).

Due to the ubiquity and popularity of the Internet—particular the WWW—most virtual classroom implementations are Web-based (Hsu, Marques, Hamza, & Alhalabi, 1999). The concept of virtual classrooms has been refocused on on-line learning environment created by computer-mediated communication systems rather than by interactive television. It does not emphasize the synchronous face-to-face interaction through I-TV; instead, it focuses more on the asynchronous on-line discussion and instruction for a instructor and learners to collaborate on the advancement of learning through technology. It seems that the new concept of virtual classroom in recent years refers to "a virtual classroom for Web-based learning" and does not have much difference from the concept of "Web-based instruction." Thus, many people use these two terms interchangeable while addressing the issues of the on-line instruction or distance education.

Discussion

New terminology, such as correspondence education, virtual classrooms, computer-based instruction, and Web-based instruction, has been created along with the Industrial Revolution, the telecommunications revolution of the 1980s, and the creation of the WWW in the 1990s. It is clear that distance education would not have been possible without the developments of technology, especially in transportation and telecommunications. The technology is ever evolving and will continue this way into the future. As the technology evolves, new terminology of distance learning will also be created.

When reflecting on whether there is a difference among distance education, virtual classrooms and Web-based instruction, our response is "Yes, there is a difference among these three teaching methods in terms of the specific technology that creates these varieties of distance education." For example, because of the telecommunications revolution in the 1980s, the instructor and learners at separate places can see and talk to each other face to face by interactive TV. The new term "virtual classroom" was thus created. Because of the creation of WWW in the 1990s that allows instructors and learners to access a wider range of resources, the term "Web-based instruction" was then created to explicate the meaning of this new instructional method for distance learning. Obviously, new terminology will continuously be coined to convey the meaning behind new teaching and learning methods that technologies have fostered. In addition, there is a strong possibility that the traditional definitions of instructional methods, such as the definition of virtual classrooms in the 1980s, will be continuously redefined to explicate the new technology. These redefined definitions might be somewhat confusing (or be used interchangeably) with the newly created ones, such as the revised definition of virtual classrooms in the 1990s vs. the definition of Web-based instruction (an example that will be explained in the discussion). However, most importantly, the purpose of these teaching methods—distance education, virtual classroom, and Web-based instruction—is undeniably the same: to improve teaching and learning at a distance by using technology.

Although new delivery technologies may provide more alternatives, greater cost savings, and increased flexibility in delivering instruction to distant learners, we should frequently remind ourselves to remain focused on instructional outcomes, not the technology of delivery. As Keegan (1995) recommended, it is better for us to regard the developments in the use of technology in education as a cumulative process in which the instructional media of distance education are continuously incorporated to the previous ones to bring the enhancement that technology can provide. With in-depth knowledge of what distance education and its varieties actually are—their characteristics, similarities and differences, we can now utilize these valuable teaching methods to provide more convenient, more accessible and better instruction for our distant learners.

Conclusion

The development of new technologies has continuously reinvigorated distance education that offers magnificent opportunities for the teaching and learning process beyond the physical limits of the traditional classroom's walls. However, in today's distance learning field there is substantial confusion in the use of terminology among distance education, virtual classrooms, and Web-based instruction. The reasons that cause this confusion are twofold: a) there is a great portion of overlapping among these teaching methods in terms of the educational technology and delivery methods used, and b) the concept of redefined traditional teaching methods, such as redefined virtual classrooms in the 1990s, might be similar to the concept of the newly created methods, such as Web-based instruction. However, it is very clear that these terms are all describing the same situation—teaching and learning at a distance using a mediated technology to facilitate the communications between the instructor, learners and resources. As distant educators, our goals are also clear—no matter which teaching methods and technologies we select, our purpose is to make improvements in both access to and the quality of distance education and to bridge the gaps between distance learning and traditional face-to-face learning environments.

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A Strategy for Analyzing On-line Communication

Timothy Youngman
University of Houston
Houston, Texas, USA

Abstract: Creating equitable learning opportunities is a goal of many educators, but this is often confounded by preexisting power structures that favor some students over others. Computer-mediated communication has been hailed as a mechanism to improve education. It has been argued that participation in virtual communities can give students greater opportunities for expression of ideas. In order to fully understand this potential, on-line chat rooms can be analyzed for their capacity to create an ideal speech situation. This paper examines the theoretical basis for using virtual communication, discusses the requirements for ideal speech to occur, and examines the interactions from a virtual community.

Introduction

Technology can transform educational policy and practice, and ultimately society, when coupled with a pedagogy focusing on collaboration (Sernak & Wolfe, 1998). In recent years, the availability of technology has increased significantly, making on-line collaboration a viable option for many students. Through tools and strategies such as file exchange, electronic libraries, whiteboards, on-line debates, role-taking activities, and student dialogues, there is ample opportunity for learners to communicate with others on-line (Bonk & Cunningham, 1998). Technology, such as the chat room, offers students a level playing field where there is no immediate bias based on a person's physical attributes or traditional power roles; the essence of their thought is allowed to come through.

Understanding Dialogue

According to Habermas (1984) when people enter into a dialogue they make statements based on their objective, subjective, and normative/evaluative ideas about reality. Objective statements are based on multiple points of access whereby more one than one person has the ability to make an observation. Subjective statements are made to indicate an internal state of affairs in which the only person who has access is the person making the statement. Normative/evaluative statements are those that reflect standards agreed upon by a group of people. When making a statement, a person tacitly understands that someone else may question the validity expressed in the speech act. Should this situation arise, the speaker may need to provide reasons to support the claim. This provides a context for argumentation to take place until both parties are satisfied. All forms of communication rely on this basic framework, but in order for it to succeed, several conditions must be satisfied.

In discussing the conditions for a meaning-making event to occur, Habermas (1984) proposed the ideal speech situation. This is a theoretical standard that can be used as a basis for judging the context for communication. Ideal speech, according to Habermas, occurs in a communicative setting in which reasons can be given, discussed, and argued without the use of force. Accordingly, four conditions must be met to achieve an ideal speech situation:

- The participants have equal social status.
- All participants are equal in their autonomy and responsibility.
- The participants are willing to discuss ideas openly and are willing to receive criticism.
- There is no force or coercion, allowing the reasons to stand on their own merit.

Although this is a theoretical standard that can never be fully achieved, some situations are closer to the ideal than others.

Ideal Speech and the Classroom

Research indicates there is inequality in the classroom favoring some students over others based on attributes such as gender, class, ethnic background, race, cultural background, and sexual orientation (Banks & Banks, 1993). Given this differentiation, it is apparent that many classrooms do not approach the ideal speech situation and will be unable to transform power relations within schools to achieve a more postmodern approach to education (Aronowitz & Giroux, 1991). However, technology offers some promise in helping to level the playing field.

The ability to communicate with people electronically in chat rooms may offer students some unique opportunities to more closely approximate the ideal speech situation. Students have the opportunity to expand their identity by exploring different aspects of the self and work through problems that could not be dealt with in the "real world," (Turkle, 1995) provided they have the opportunity to come forth as individuals rather a member of a particular group.

Ideal Speech and the Chat Room

In light of Habermas's articulation of the ideal speech situation, chat rooms can be analyzed for their ability to give everyone equal status, autonomy, and responsibility. With this in place, does the force of reason carry more weight than the coercion of a more powerful person? Is the chat room a better place to discuss ideas openly and receive feedback?

In addressing these questions, excerpts from chat sessions were analyzed. The sessions were conducted as part of on-line discussions in a graduate class at a large, urban university in the southern United States. All of the participants were given pseudonyms to hide their identity. No one had any knowledge of the other participants' gender, ethnicity, or social status. Based on the analysis of the text, key areas were identified where the setting changes or controversial statements were made. The researcher identified a range of possible meanings for each of the statements and identified the validity for each. A process of pragmatic horizon analysis was used to break the meanings into those that are foregrounded and backgrounded. Meanings in the foreground are those the speaker is attempting to consciously communicate to the audience, while those that are backgrounded are not intentionally communicated but may serve as a driving force for what a person actually says (Carspecken, 1996).

In many of examples the participants were able to openly express their ideas, and the weight of their respective arguments came from their internal perspectives of the situation. Because none of the participants was aware of anything about the person other than what was revealed through their dialogue, none of them had any power over the other in the traditional sense. Many of the exchanges demonstrated a willingness to discuss reasons and ideas, rather than simply assert dogmas.

Although technology is not a panacea for all issues facing educators, it offers a new approach. Computer mediated communication has the potential to provide learners with an opportunity to grow in a community where they are judged on their ideas rather than their physical characteristics.

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SECTION EDITOR:

Madeline Justice, Texas A&M - Commerce

Educating a diverse population for the future through technology is the major theme of this section. Technology is the tool used for increasing diversity in the teaching / learning experience. Proponents of multicultural education feel that mutual respect and harmony among ethnic and racial groups is essential for the future. Local school districts and teacher preparation programs have made strides in opening the world to diverse populations. Thoughtful and creative technology use in the classroom has brought the world into the classroom for many students and adults.

So many good articles grace this section that only a few are highlighted to demonstrate the theme of educating the future through successful school projects, the revamping of teacher preparation programs and accessibility laws and issues. Examples of successful school projects could be seen through the articles written by Litton and Beckett. Edmundo Litton in his article " Bridging the Digital Divide: A School's Success Story" documents the progress of ethnic minority females from a low socioeconomic background. He describes what the school is doing correctly, to bridge the digital divide by interviewing and observing students and teachers in a technology setting. He presents the qualities that can make all high schools a success. In the article "Integration for ESL Success: TESOL Standards, Multiple Intelligences and Technology" Carol Beckett focuses on how a school can build upon the strengths of English language students by acknowledging their differences while developing their English language proficiency. She discusses how developing computer literacy and the information technology skills prepare these students for the increasing technological job market. She concludes with demonstrating how the integration of technology TESOL standards for Pre-K - 12 students and the theory of Multiple Intelligences can support learning differences and develop English language skills across the curriculum.

The progress of teacher preparation programs and technology is phenomenal. A sample of five articles among many shows the keen efforts being made in this area. In an article by C.Y Janey Wang " Bridging the Differences on the Web Through Effective Communication and Collaboration" explores how effective communication and collaboration among online learners of diverse backgrounds are encouraged by design. In addition, communication techniques utilized by members in the Web-based learning community in bridging differences, achieving group goals, and optimizing individual learning are explored. The researcher suggests that the ideal curriculum bridges diversities by encouraging, inspiring, and inviting multiple perspectives within a highly flexible environment of multiple communication methods, learning styles and approaches. Shadow W.J. Armfield and Marilyn Durocher in " Modeling and Developing Technology Integration with Pre-Service Indigenous Teachers " discuss how a site-based traditional elementary and special education programs are taken to a reservation so that aides can continue their employment in schools while earning their degree and certificate. The authors discuss how the courses were interwoven to help students have a clear understanding of elementary education curriculum while simultaneously gaining an understanding and an ability to effectively integrate technology for learning and teaching. Also in "Gender and CS1: An Approach that Benefits Males and Females" by Thad Crews, Jeff Butterfield and Ray Blankenship, the project goal was to teach novice teachers to write computer programs through a series of short design activities focused on fundamental logic structures that transcend hardware and specific languages. Then "Integrating Diversity in Children's Literature in the Elementary School Curriculum through the Use of the Internet Technology for Preservice Educators" by Joyce Armstorng focuses on assisting preservice teachers in learning about current diverse literature through the Internet. The Internet, what an invaluable tool!

On the other hand, as we celebrate the success, we also realize that we still need to continue stepping toward progress through Chloe Rose's "Expertise and Access: Teachers Accounts of Technology Dis/use." She explores the pressing concerns of teachers who are faced with recent and ongoing demands made by provincial policy-makers, administrators, and parents to implement and integrate computer technology in k-12 schools in Canada. She focuses on the ways in which these concerns are complicated and shaped by gender inequalities among teachers, within the school system, and in society, especially in relation to their competence with and usage of computers. In a diverse world *her* concerns become *our* concerns.

Finally, there are articles that teach us about web accessibility for diverse learners.

"Web Accessibility for Diverse Learners" by Laurie Ayre addresses educators' concern for making Internet materials available to all students, including those who are physically challenged or hearing impaired. Standards for web design, and implementation strategies are discussed, and a list of Internet sources that provide support, information, and free testing of existing materials are presented. Also in the article "Distance Learning: Eliminating the Digital Divide" by Sheryl Burgstahler, access, legal and policy issues are presented. An overview of design considerations for assuring that a distance learning course is accessible to potential instructors and students with a wide range of abilities and disabilities are presented. She leaves readers with information that can be used to help develop policies, guidelines, and procedures for distance learning programs. A course accessible to everyone is what diversity means.

Diversity and technology are the future. The articles above are only a few of many interesting projects in this section that show *progress in motion.*

Modeling and Developing Technology Integration with Pre-Service Indigenous Teachers

Shadow W. J. Armfield
Center for Excellence in Education
Northern Arizona University
United States of America
shadow.armfield@nau.edu

Marilyn durocher
Center for Excellence in Education
Northern Arizona University
United States of America
marilyn.durocher@nau.edu

Abstract: This paper discusses how two pre-service teacher education courses were interwoven to help students have a clear understanding of elementary education curriculum while simultaneously gaining an understanding and an ability to effectively integrate technology for learning and teaching. Furthermore, the paper will detail the successes and challenges of combining these courses for a site-based teacher-training program in a rural, indigenous community where various levels of expertise and access to technology were prevalent. The paper will also describe how the students constructed knowledge through the creation of meaningful and germane artifacts.

Introduction

"In a community of learners, teachers and students are role models, not 'owners' of some aspect of knowledge. They are acquirers, users, and extenders of knowledge in a sustained, ongoing process of understanding" (Norton and Wiburg, 1998).

Northern Arizona University (NAU) is located in Flagstaff, Arizona, only 50 miles from the Navajo Reservation and 75 miles from the Hopi Reservation. Because of it proximity to these two cultures, NAU has put great focus on working with the members of both tribes to help them attain college degrees regardless of their location. Through site-based programs, the Center for Excellence in Education has focused on providing face-to-face instruction to indigenous people who wish to become certified teachers. One such site-based program occurred in Tuba City, Arizona during the fall semester of 2001. The twenty-five students enrolled in this program represent the Navajo, Hopi, Anglo, Apache, and Acoma cultures. All of the students are non-traditional in the fact that they have returned to school as mature adults and three have already obtained bachelor's degrees in areas outside of education. Because of the diversity of the population, it was important to create a community of learners from which the students could take a sense of connection with other educators while at the same time maintain their individual cultural identities.

In accordance with Piaget's theory of situated learning, "knowledge is not a commodity to be transmitted. Nor is it information to be delivered from one end, encoded, stored and reapplied at the other end. Instead, knowledge is experience in the sense that it is actively constructed and reconstructed through direct interaction with the environment" Ackerman (1996). This site-based program takes the traditional elementary and special education degree and certification program to the rural areas so that students can continue their employment in schools while earning their degrees and certificates. In this way, students are learning about teaching, while working in classrooms, actively constructing and reconstructing knowledge as they participate in the program.

The Dilemma

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Rural communities throughout Arizona are at an educational disadvantage due to their distances from the three university campuses in the state. The program in which these students are involved provides face-to-face instruction, but has not provided on-site support resources such as the physical availability of instructors, peers, and reference materials usually found on university campuses. As a result of this inequity, it is paramount that students in these communities have technological access and skills in order to utilize the same resources as students on the university campuses. Upon examination of the program components, it was found that two courses could be combined in order to help the students acquire skills necessary to access resources for their learning, while transferring their new abilities into methods for curriculumimplementation.

The two courses used in this project were Technology in the Classroom, and Elementary School Curriculum. The Technology in the Classroom curriculum is based on the idea that "When learners actively construct knowledge, it is more meaningful, applicable, and memorable." (Jonassen, 1996); students in this class participate in and create technology-integrated activities, which they can use with their future students. Elementary Curriculum is a course in which students learn various methods of teaching and then create lesson plans to model what those methods would look like in the classroom. Traditionally these two courses have been taught independent of one another. The goals of the two courses lent themselves to a natural integration (See Table 1, Goals 1 through 3). In the fall of 2001 the traditional system was set aside and the two courses were combined so that students would have the opportunity to enhance their skills in technology for both teaching and learning through practice and modeling.

ETC 447	ECI 321
Students will	Students will
1. Have an understanding of the use of technology and how to integrate technology as a tool in the learning environment.	1. Examine methods of teaching and their relation to curriculum.
2. Have knowledge of the difference between teaching about technology and teaching with technology.	2. Examine various classroom models that reflect and impact curriculum.
3. Have an understanding of the impacts of technology on changing teacher roles, changing student/teacher relations, and changing learning environments and values.	3. Examine characteristics of teachers that interact with curriculum implementation.
4. Have some knowledge of theory and research as it applies to educational technology.	4. Examine the impact that parents and community has upon elementary school curriculum.
5. Have knowledge of the impact technology has on society.	5. Examine different models of schools, including magnet, Comer, private, charter, special purpose, Montessori, and BIA, analyzing the interaction of curriculum and school model.
	6. Examine child development theories, student diversity, and student learning styles, analyzing the impact of these areas upon elementary curriculum.

Table 1: Course goals.

The Process

The program was set up so that each course would be taught in a three-week period, four nights a week, and four hours a night. Elementary Curriculum was scheduled to be taught the first three weeks of the semester and Technology in the Classroom was scheduled for the final three weeks of the semester. As a combined course, the time allowed remained the same, but the content was interwoven and taught by both instructors.

The Foundation - the first three weeks

Because a strong sense of community was culturally appropriate and educationally desirable, the students and instructors participated in classroom experiences and assignments designed to connect students with one another, the instructors, elementary curricular content, and the technology. Activities progressed from face-to-face sharing of beliefs, experiences, and values to creating an online community of learners and practitioners. During icebreaker activities, students and instructors shared elementary school experiences. Internet research was introduced and e-mail accounts were created to facilitate communication between and among students and instructors. Then students used a computer to create a metaphorical image of themselves. These images were shared on a class web page. At this stage, the students were ready to do further research about elementary learning and teaching, and to be able to share this information electronically with each other and the wider educational community. Assignments included finding and sharing information about characteristics of elementary schools, children, and teaching methodologies, including the integration of technology into both learning and teaching. They created PowerPoint presentations to share the information they had found in their Internet research. Students were then asked to incorporate the information into an electronically produced parent newsletter in which they described their educational philosophy, and classroom procedures and expectations.

At the end of the first three-week period, the students were prepared with the research, communication, and technological abilities they would need for the subsequent courses of the semester. Over the next twelve weeks the students completed four more of the required courses for the program. These courses covered assessment, special education, and educational psychology.

Putting It All Together - the final three weeks

When the students returned to the Elementary Curriculum and Technology in the Classroom combined courses, they had been exposed to the information they would need to complete the culminating assignments. The theory of Constructionism purports that learners are more likely to internalize and utilize information and skills gained through the construction of meaningful artifacts (Kafai and Resnick 1996). In alignment with this theory, the students were asked to create a web portfolio and an integrated thematic unit.

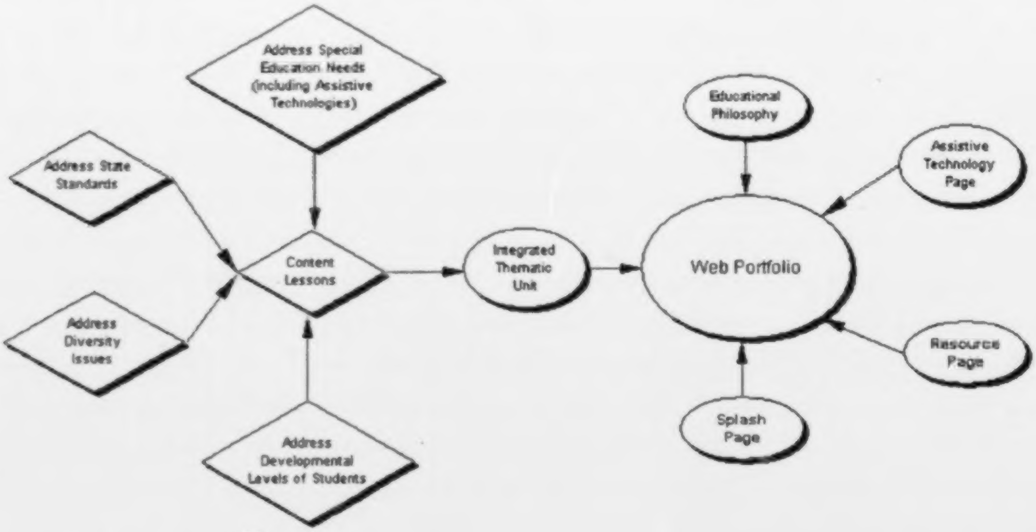
Address Special Education Needs (including Assistive Technologies)
Address State Standards
Content Lessons
Address Diversity Issues
Address Developmental Levels of Students
Integrated Thematic Unit
Web Portfolio
Educational Philosophy
Assistive Technology Page
Resource Page
Splash Page

Figure 1: Graphic representation of the culminating assignments.

The web portfolio that the students were creating had a number of components including the integrated thematic unit (see figure 1). Below are the descriptions of each of these components.

- Splash Page –Serves as an introduction to the website and includes a graphic, contact information, and links to the other pages.

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- Integrated Thematic Unit –The students demonstrated their knowledge of developmental levels, diversity issues in the classroom, and use of state standards in lesson planning, and the ability to adapt and accommodate lessons for students with special needs.
- Educational Philosophy –The students were to reflect upon the educational philosophy created in the first three weeks of class and use their new understandings to expand and clarify their educational values and beliefs.
- Assistive Technology Page – This page is a summary of research about assistive technology and a description of specific assistive technologies used when creating the integrated thematic unit.
- Resource Page – During the semester the students had gathered various Internet resources about educational topics. On this page, each student included at least five of the most useful resources they had found, along with a brief description of the contents of the site.

Conclusion

This paper has two conclusions, that of the students, and that of the instructors. At the end of the semester, students were asked to write to the instructors their perceptions of the things that worked and didn't work for them individually. Quotes from these responses are included in the student section.

Students: what didn't work

- "My suggestions are that if you plan to put two classes together, they need to be all at once, not spread out the way we did."
- "The only change I would recommend is to allow more time for each class."
- "The class was not very effective-very stressing especially for those of us who do not have computers."
- "Saving the thematic unit plus others until the end."
- "When classes are combined it's very hard for us and the instructor. It should be separated. We could have learned more about technology."

Students: what worked

- " I can honestly say I have learned and grown beyond my expectations. Although we started off slow, we ended pushing ourselves harder than we ever have before."
- "In the integration we were allowed to make technology useful in our prospective teaching careers."
- "Even though it seems like there were some parts untaught in the texts, it integrates and fits in with other courses taught in the semester. I do believe I learned quite a bit and increased my knowledge in an educational environment."
- "I really enjoyed having the two classes together because it really showed me what integration of two subjects as one unit is really like."
- "I thought this was tough, but it taught me how we as teachers intend to push our kids to do something new."

Instructors: what didn't work

One problem with the course design was communicating with students the interrelatedness of content for the two courses. The students came to the first class with expectations of a traditional separation of content matter. Their educational experiences had not prepared them for a course in which multiple subjects were being taught simultaneously. As the instructors, we failed to provide the students with the necessary scaffolding to be prepared for what lay ahead of them. This lead to frustration, and confusion about specific content expectations

As many of the students responded, time was a stressor for both instructors and students. By dividing the courses between the first and final three weeks of the semester, the issue with time was magnified. Without this configuration, though, the students would have not have had the benefit of the instruction in technology at the first of the semester, and would not have been able to use all of the courses' information in the culminating assignments. Along with the issue of time is the availability of technology to rural communities. A number of students had to travel long distances on unimproved roads to use technology for creating assignments and communicating with instructors and peers. Not only did students have problems finding available technology, but also had to contend with the capricious nature of rural Internet service both inside and outside the classroom.

Instructors: what worked

Upon reflection, we realize that many of our initial goals have been achieved. The students were able to experience class activities both as learners and as educators; translating the things that they were feeling and doing into what their student would also feel and do. They immediately used new knowledge to create artifacts that can be used in their own classrooms. The students became a community of learners, sharing resources and ideas. As some students mastered ideas and skills, they shared their expertise by teaching their peers. In the culminating activities, they left the traditional isolationism of teaching to work together in creating units that integrated content material in a realistic, culturally specific manner.

All things considered, we feel that this is an effective model for helping pre-service teachers understand how content specific curriculum, individual student needs, technology, cultural diversity and a sense of community can be interwoven to construct dynamic classrooms of their own

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INTERGRATING DIVERSITY IN CHILDREN'S LITERATURE INTO THE ELEMENTARY SCHOOL CURRICULUM UTILIZING INTERNET TECHNOLOGY

Joyce C. Armstrong, Ph.D.
Education Division
King's College
United States
jcarmstr@kings.edu

Martha M. Hanlon, Ed.D.
Education Division
King's College
United States
mmhanlon@kings.edu

Abstract: Teacher training in most colleges and universities include training in current genres of children's literature. These courses typically allocate much time in demonstrating how to locate appropriate literature and in presenting teaching ideas to preservice teachers. However, diversity within the different genres is often overlooked. This paper presents pedagogy for the preservice teacher in the development of current diverse literature in the elementary curriculum utilizing numerous Internet sites.

Children's Literature classes are very popular courses in elementary teacher training programs. Course descriptions include objectives such as reviewing relevant literature for preschool and elementary students, examination of different genres to compliment the elementary school curriculum, and the development of an appreciation of the literature created for children. Time is devoted not only to the evaluation of children's literature but also to the teaching techniques employed to involve the elementary students in the literature. There are also numerous courses offered at colleges and universities on internet technology. However, future teachers need to incorporate their internet knowledge into their own teaching. (SITE, 1998) This integration should not be restricted to a single college course about technology but integrated into all methods courses in elementary education.

In the past, Children's Literature courses focused on a canon of exemplary 20th century children's books. (Goldstone, 2002). Hearne (1998) compiled a list of 35 books to act as examples of the historical pattern for quality children's literature. This pattern details the relationship between text and art. Today's authors do not always adhere to this pattern. There is not always a clear, traditional, linear story structure or a sugary happy ending to the story. Along with this newer type of story, diversity has become a theme in children's literature. Moll and Greenberg (1990) infer that everyone lives in families and communities that draw on cultural diversity. If we view all children's literature from this point of view then our task is to create a collection of children's literature that is a balance of many different cultures.

Galda and Cullinan (2002) present the statistics that, "approximately one-third of the students entering schools are of African-American, Asian-American, or Latino backgrounds." (pg.277). As educators we need to expose children to quality literature about many ethnic groups and the diverse cultures. Literature and the internet are the means that many people learn about the uniqueness of each group of persons and the universal experience of being human. (Huck, Hepler, Hickman, Kiefer, 2001) Preservice teachers need the skills to evaluate culturally diverse literature and to include this literature within the curriculum.

To assist preservice teachers in learning about current diverse literature, the internet becomes an invaluable tool. Search directories and engines that are useful include Yahoo, Looksmart, and AskJeeves for Kids. Utilizing Banks' (1998) four-step model of integrating diversity content into the curriculum a teaching pedagogy can be developed for the preservice teacher. Banks' lowest level for integrating diversity into the curriculum is the "contribution approach". At this level preservice teachers can explore the web sites of The Children's Literature Web Guide (www.acs.ucalgary.cal/~dkbrown/) or Vandergrift's Children's Literature Page (www.scils.rutgers.edu/special/kay/childlit.html). Preservice teachers should focus on literature that describes the contributions made by various ethnic groups to culture.

The second level of Banks hierarchy for integration of diversity is the "add on" approach. At this level content, concepts, and themes are added into the curriculum (Banks, 1998). Web sites to locate literature include New Years Around the World (www.coe.wayne.edu/~mpettap/lesson/newyr.htm) and Religious Holidays (www.adl.org/ctboh/old/holidayactivitiesguidelines.html). These sites describe ideas and children's literature that adds extra information to the elementary curriculum.

The third level of Banks' model is that of the "transformation approach". At this level the curriculum is actually changed, not more added. This third level enables students to develop an understanding of problems, concepts, and concerns of an entire culture, not just from the majority point of view. Web sites to explore for literature includes Connecting Students to the World (www.guilford.k12.nc.us/webquests/) and A Celebration of Diversity: Immigration and Citizenship (www.libsci.sc.edu/miller/diversity.htm).

The "social action approach" is the highest level of Banks' model. (Banks, 1998) At this level students identify problems and develop solutions to these problems. Web sites include Racial Profiling (www.horizonmag.org/6/racial-profiling.asp) or Yahooligans/Around the World/Activision and Volunteering/Peace Corps. (www.ourdays.com/old/tour).

The above mentioned sites are only a very small sample of the possibilities of the internet. When introducing the various genres to preservice teachers it is important that cultural diversity is not a separate unit. It should be include in all aspects of the curriculum and the internet is a tool to inform teachers of children's literature that can be used in all aspects of the curriculum. Lesson plans, award-winning books, pen-pal sites, sharing of children's writing, and reviews of new books are only a sampling of what is available for the preservice teacher.

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Web Accessibility for Diverse Learners

Laurie Ayre
Education Department
King's College
United States
lmayre@kings.edu

Marian W. Boscia
McGowan School of Business
King's College
United States
mwboscia@kings.edu

Abstract: This paper addresses educators' concern for ensuring that Internet materials are available to all students, including those who are physically challenged or visually or hearing impaired. One salient example is the controversy that arose related to the inaccessibility of the Sydney Olympic Games Website for visually impaired persons (Carter, 2000). Teacher educators should not produce, distribute, or support Internet materials that are in violation of the 1990 Americans with Disabilities Act (Public Law 101-336). Only through making sure that online materials adhere to a set of standards for web development, such as those established by the World Wide Web Consortium (W3C), can educators ensure accessibility for students with disabilities.

Introduction

There are 20.9 million Americans aged 15 and over with work disabilities. Although over 2.1 million people with disabilities make use of the Internet either at home or in another environment, they are less than half as likely as non-disabled individuals to have access to a computer at home and three times less likely to have the ability to connect to the Internet at home (Kaye, 2000). The Americans with Disabilities Act (ADA), which celebrated its eleventh anniversary in 2001, has prompted an enormous amount of litigation in schools and the workplace. On November 4, 1999, the National Federation of the Blind filed suit against America Online in the Federal District Court under the ADA (Wingfield, 1999). The National Federation of the Blind, a nonprofit organization of 50,000 members nationwide, took the position that America Online and the Internet must provide public accommodation for persons with disabilities. This was the first legal action taken against an Internet company. The suit was settled on July 26, 2000, when the National Federation of the Blind and America Online reached an agreement to work closely together to ensure continued progress on accessibility for individuals with disabilities. In addition, America Online reinforced this commitment to accessibility by posting an accessibility policy on its Web site. This anecdote serves as a cautionary tale for Internet and Web site developers. Furthermore, teacher educators must become familiar with issues of accessibility, striving to support compliance with standards that promote universal access to online materials and to educating future teachers about them. This paper will describe standards for web design under *Section 508—Web Accessibility* of the Workforce Investment Act of 1998 (Public Law 105-220), and implementation strategies for computer accessibility and web content. It will also provide an annotated list of Internet sources offering support, information, and free testing of existing materials.

Legal Requirements for Internet Accessibility

Some of the important accessibility issues pertaining to Web page design relate to the way in which individuals interact with computer technology and to the accessibility of the information itself. For instance, certain individuals with disabilities might find it impossible to use a keyboard or mouse. Some users may require appliances that have a text-only screen, a small screen, an older browser, or a slow

Internet connection. Others might have difficulty reading or comprehending text or may not be fluent in the language of the document.

Limitations to Internet accessibility have been addressed through two major pieces of legislation, The Americans with Disabilities Act (PL 101-336), and the Workforce Investment Act of 1998 (PL 105-220). The Americans with Disabilities Act (ADA) provides that institutions subject to the act must furnish appropriate aids and services to ensure effective communication with individuals with disabilities, unless doing so would result in a fundamental alteration to or in an undue burden on a program or service. Examples of aids include audiotapes of texts, Braille materials, large print materials, and captioning and text readers. Furthermore, on September 9, 1996, the U.S. Department of Justice issued a policy ruling extending ADA requirements to include communication through the Internet.

Two years later, the Workforce Investment Act of 1998 (Public Law 105-220), based on the ADA, significantly fortified the technology access requirements of Section 508 of the Rehabilitation Act of 1973. Effective August 7, 2000, Section 508 requires that when Federal agencies use electronic and information technology, they must ensure access to people with disabilities, unless it would pose an undue burden to do so. The level of access must be comparable to the same available to non-disabled Federal employees and members of the public. States receiving Federal funding under the Assistive Technology Act of 1998 are also subject to Section 508 provisions. [See Waddell and Urban (2000) for an in-depth discussion and links to government publications related to this legislation.]

Implementation Strategies for Computer Accessibility

Three major organizations provide extensive resources for ensuring computer accessibility to individuals with disabilities. These include IMS Global Learning Consortium, specifically Specifications for Accessible Learning Technologies (SALT) Project, Microsoft, and Apple Computers Worldwide Disability Solutions Groups (WDSG).

Specifications for Accessible Learning Technologies (SALT) Project, a joint venture among the IMS Global Learning Consortium members, has as its goal to make online learning resources accessible to people with disabilities. One half of the project's funding is provided by the U.S. Department of Education, with the other half coming from contributions from project partners, Blackboard, Educational Testing Service, and WebCT. These project goals are to:

- Promote awareness of accessibility issues, especially within the e-learning community
- Create development guidelines and best practices for inclusive design of software applications for learning, education, and training
- Advocate for the development of e-learning software applications that meet or exceed accessibility legislation requirements
- Contribute to IMA specification development, with a focus on accessibility extensions to existing IMS specifications. (SALT Detailed Overview, 2000, p. 1)

The IMS Accessibility Working Group published IMS Guidelines for Developing Accessible Learning Applications, Version 0.6 in October 2001. This white paper discusses current accessibility solutions that are available for implementation as well as unresolved access issues that affect educational technologies. This document will continue to be expanded, updated and revised.

Microsoft provides resource guides for ensuring computer accessibility based on the nature of specific disabilities, including vision, hearing, mobility, and cognitive and language impairments. These guides are made available to educators and the public at http://www.microsoft.com/enable/default.htm Microsoft lists assistive technology products for each impairment. Organizations should consider which of these products should be provided to its members or constituents. Furthermore, Microsoft supplies an impressive set of links to papers covering access issues, which are organized by impairment type. Another important feature of Microsoft's Web site are the step-by-step tutorials for enhancing the accessibility of each of its products. A designated member of an organization can use these tutorials to make certain that impairments will not bar users from having access to Microsoft products.

Apple Computer's Worldwide Disability Solutions Group (WDSG) supports the development and distribution of Apple's *Macintosh Human Interface Guidelines*, which is freely available at http://developer.apple.com/techpubs/mac/pdf/HIGuidelines.pdf These guidelines specifically address issues involving people with seizure disorders, as well as accessibility for individuals with physical, visual, hearing, and speech or language disabilities. These guidelines provide the design requirements to achieve universal access for all people, including those with disabilities. An important feature of this book is that it includes numerous examples of the guidelines applied for the Macintosh platform.

Implementation Strategies For Web Content Accessibility

At the foundation of a strategy for assuring Web content accessibility, each organization must establish a set of priorities for which accessibility issues receive primary and immediate attention. In 1999, The World Wide Web Consortium (W3C) established a useful set of priorities for implementing accessibility standards for a Web site (see URL under Internet sites). Web design elements that enhance accessibility have been assigned to one of three priority levels. For each priority level, W3C has listed a number of checkpoints for individual design elements. These checkpoints can serve as a basis for evaluating the overall accessibility of Web content. For items given *Priority 1* status, guidelines must be followed to ensure all disability groups will be able to access the information contained in a Web document. An example of a *Priority 1* checkpoint is as follows:

> Provide a text equivalent for every non-text element (e.g., via "alt," "longdesc," or in element content). *This includes:* images, graphical representations of text (including symbols), image map regions, animations (e.g., animated GIFs), applets and programmatic objects, ascii art, frames, scripts, images used as list bullets, spacers, graphical buttons, sounds (played with or without user interaction), stand-alone audio files, audio tracts of video, and video. (Checklist of Checkpoints for Web Content Accessibility Guidelines 1.0, 1999, p. 3)

A Web content developer should comply with *Priority 2* guidelines to prevent disability groups from having difficulty accessing information in the document. For example, *Priority 2* guidelines require that foreground and background color combinations provide sufficient contrast to be easily viewed by someone having color deficits and when displayed in black and white only. Further, the designer should clearly identify the target of each link.

Priority 3 guidelines may or may not be addressed, but still can cause access difficulties for one or more disability groups. To comply at a *Priority 3* level, the content developer must specify the expansion of each abbreviation or acronym in a document where it first occurs, the primary natural language of a document, a logical tab order through links, form controls, and definitions of objects. Organizations are encouraged to adopt the W3C guidelines and checklists as a means of improving web content accessibility.

Internet Sites

The following list of Internet sources provides support, information, and free testing of existing materials:

1. *Disability Information Links.* The National Information Center for Children and Youth with Disabilities (NICHCY) is an information and referral center focusing on disabilities and disability-related issues of children from birth to age 22. Their information is targeted for families, educators, and other professionals. This site offers an extensive set of links to PDF-format publications. The NICHCY home page is located at http://www.nichcy.org/.
2. *Web Content Accessibility Guidelines.* The World Wide Web Consortium (W3C) provides a comprehensive set of Web design guidelines at http://www.w3.org/TR/WCAG/. W3C's Web Accessibility Initiative is supported in part by the U.S. Department of Education's National Institute on Disability and Rehabilitation Research, the European Commission's Information Society Technologies Programme, Canada's Assistive Devices Industry Office, Microsoft Corporation, IBM, and Verizon Foundation.
3. *Quick Tips.* Department of the Navy Web Information Service provides *Quick Tips on How to be Section 508 Compliant* located at http://lej-www.med.navy.mil/section508/tips.htm These tips

address specific html code requirements for images and image maps, multimedia, page organization, table and frame layouts, and hypertext links.

4. *Website Design.* The Trace Center of the College of Engineering at the University of Wisconsin provides a comprehensive set of links dedicated toward building more usable Web sites at http://trace.wisc.edu/world/web/. These links include valuable Web access tools for both users and authors.
5. *Page Checker.* Validate your pages with an ADA validation tool such as *Bobby*, sponsored by IBM and downloadable from http://www.cast.org/bobby/DownloadBobby316.cfm for a $99 charge. A second alternative is A-prompt Test Program available at http://aprompt.snow.utoronto.ca/as a free download. W3C HTML Validation Service is freely available at http://validator.w3.org/. This service checks documents for compliance with W3C accessibility guidelines and makes recommendations for improvements.
6. *Model Programs.* The Family Center on Technology and Disability (Family Center) is a project funded by the Office of Special Education under the U.S. Department of Education. One of its goals was to identify exemplar programs that provide technology support and services to families of students with disabilities. The Family Center Web site at http://fctd.ucp.org/fctd/htm provides a brief description of six model technology support and service programs, including sources of funds, populations served, and services provided, as well as contact information. These can be used as templates that an organization can use in establishing its own program.

Conclusion

It is clear, given the resources now available, that educators can begin to address the issue of web accessibility for diverse learners. Any society will strengthen itself by recognizing and supporting universal access to instructional materials for all people. While facilitating the participation of individuals with disabilities, awareness of emerging accessibility issues and work towards full Internet access must increase to improve the participation of individuals with particular learning preferences as well (visual, auditory, kinesthetic). It is the hope of the authors that this article will encourage educators to become more aware of the issues and resources surrounding access to the Internet and promote a desire within them to ensure equal access for all learners.

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Bridging the Digital Divide in South Florida

Tom W. Frederick, Ed. D.
Golden Glades Elementary
Miami, Florida, U.S.A
tomwfred@yahoo.com

Mary Kay Bacallao, Ed. D.
St. Thomas University
16400 NW 32nd Avenue
Miami, Florida 33054 U.S.A
mbacalla@stu.edu

Abstract: This paper will focus on the efforts over the past two years of the South Florida PT3 group to Bridge the Digital Divide. Success stories with African American and Hispanic pre-service teachers will be shared. PT3 collaboration with an African-American elementary school will be discussed from the viewpoint of the teachers and administration of Golden Glades Elementary School in Opa Locka, Florida.

The St. Thomas University Plan to Bridge the Digital Divide in South Florida

A consortium of schools with St. Thomas University in Miami, Florida as the lead partner was awarded a PT3 Capacity Building grant during the first year of the PT3 program. The teacher education program at St. Thomas University serves students of many ethnic groups. It is located in an urban area with a large African American population along with immigrants from many Hispanic countries and the Caribbean.

The purpose of the initial grant was to work with area elementary schools, such as Welleby Elementary, to train the pre-service teachers at St. Thomas University and Trinity International University to use computers effectively in classroom instruction and thereby impact the diverse students in Miami-Dade County. The grant sought to train teachers who will not only teach in the inner city schools but stay in the inner city schools. By serving pre-service teachers who represent these underserved populations, the program sought to impact inner city classroom instruction.

What Do the Administrators and Teachers at Golden Glades Elementary Have to Say About Their Involvement with PT3 and Universities?

Golden Glades Elementary is a small PK-6 elementary school in Opa-Locka (Greater Miami), Florida. Its 520 students are predominately African-American and 90% of its students qualify for free or reduced school lunch.

The use of technology to increase student performance had been a high priority at Golden Glades since 1994. Through numerous grants and commitments from both the school's regular and Title I budgets, the school had been retrofitted and its infrastructure expanded with both hardware and software acquisitions. Every classroom was equipped with 4-7 internet ready computers, a local area network equipped with diagnostic/prescriptive software, an instructional management system, and a media center with a fifteen station computer lab. Teachers were mandated to involve students with computer assistance instruction for a minimum of 140 minutes a week.

Yet student performance continued to wane. Technology was used by teachers as required but little integration occurred between the curriculum and that technology. There were few technology experts on staff, and their roles were so diversified that little innovation was in evidence.

Then PT3 occurred. Given the opportunity to partner with Saint Thomas University and Florida Gulf Coast University in a collaborative effort, seven members of the Golden Glades Elementary staff became technology experts. With this diversity of expertise came the beginnings of curricular change. WebQuests and "integrating computer software to match curriculum" became catch words. LCD panels and computer/television hook-ups became necessary. Teachers began asking for different software programs and they began using them in different ways. True curricular change had begun.

The effects of true curricular change cannot be measured in short blocks of time. Yet the test scores of Golden Glades Elementary showed great gains in 2001. Anticipation for further test gains in 2002 is great. PT3 hopes to improve public education by training future teachers for the technology of tomorrow. Yet, when organized properly, it can also influence the public sector today. Golden Glades is a living example.

On-Line Presence

Information about our project may be viewed at: http://garnet.fgcu.edu. To view these discussions, one may register for the PT3 Fall and/or spring courses and create an identity. Once this is done, posting will be enabled for the viewer. Our website also contains information that documents our workshop activities with our partners. Our website is located at: http://coe.fgcu.edu/PT3/home.htm.

National Educational Technology Standard-Based Lesson Plans Are Written

The technology enhanced lesson plans for the Fall 2001 Semester are written and can be viewed on the BEACON database. The website for BEACON is www.beaconlc.org. Selected lessons will be shown at this session.

Integrating Technology in the Pre-service College Classroom and Beyond by Developing Exit "e-portfolios"

Mary Kay Bacallao, Ed. D.
St. Thomas University
16400 NW 32nd Avenue
Miami, Florida 33054 U.S.A
mbacalla@stu.edu

William Halverson
Florida Gulf Coast University
Ft. Myers, Florida, U.S.A.
bhalvers@fgcu.edu

Abstract: The PT3 project, "Bridging the Digital Divide in South Florida" has proposed a module comparing outcomes of pre-service teachers that produce electronic portfolios to outcomes of pre-service teachers using traditional paper portfolios. Also, pre-service students will be evaluated on the degree and quality of technology integration into the field experience and internship experiences in the K-12 classroom. But first, the PT3 project will incorporate in one existing pre-service educational technology course; the creation and implementation of an e-portfolio project. This project will be implemented by using collaborative initiatives, online communities, and student initiated ideas incorporated within a pre-service Introduction to Computers in Education EME 2040 course.

History of the Project

In 1996, the Florida Department of Education introduced the Educator Accomplished Practices (EAP). These EAP standards "recognize the relationship between a strong foundation of content and pedagogical knowledge and the ability to apply this knowledge in practice while exhibiting professional behaviors." To demonstrate these standards, many institutions now have pre-service students develop, and present, in a formal review, an exit portfolio. An exit portfolio helps these pre-service students organize and show accomplished practice evidence. At Florida Gulf Coast University, for the first time, in one course called Introduction to Computers in Education, EME 2040, during the Spring 2002 Semester, pre-service students will be developing and implementing an electronic portfolio. An "electronic" exit portfolio (e-portfolio) hopes to take the student learning process a step further by integrating appropriate technology throughout the pre-service experience and beyond.

Purpose

This presentation will be a collaborative session examining the challenges and successes of the several components in integrating an e-portfolio project in an existing pre-service college course.

On-Line Presence

Information about our project may be viewed at: http://garnet.fgcu.edu To view these discussions, one may register for the PT3 Fall and/or spring courses and create an identity. Once this is done, posting will be enabled for the viewer. Our website also contains information that documents our workshop activities with our partners. Our website is located at: **http://coe.fgcu.edu/PT3**

Interdisciplinary Partnerships

We have fostered relationships among other departments by recruiting professors from other disciplines to be participants on the subject area teams. We began with professors from Communication, Guidance and Counseling, Math, Science, and English. Several of the professors we originally recruited have resigned due to the differences between their professional fields and teacher education at the elementary level. We have, however, retained a few professors from other departments.

Professors Collaborate with Pre-Service Teachers

We have addressed the need for collaboration with K-12 teachers by placing eighteen K-6 teachers from five elementary schools on the subject area teams. This has been an essential part of our project as professors and pre-service teachers relate with classroom teachers on a regular basis. Four of these K-12 teachers serve as team leaders.

The Foundation Standards in the Curriculum Guidelines for Teacher Preparation Programs in Computer/Technology Literacy developed by International Society for Technology in Education for NCATE will be included within the e-portfolio project.

The completed e-portfolios will be hosted on the student.fgcu.edu domain for the students to use during their studies and for one year or so after they graduate. It is the authors hope to host all of the students' e-portfolios on the College of Education domain when it is feasible to do so. This would showcase our students Education Technology Proficiency. The domain for this database of student e-portfolios would be located at www.coe.fgcu.edu. Selected e-portfolios in progress hope to be shown at this session.

Community Mapping: Learning and Teaching in Context

Gina Barclay-McLaughlin
Theory and Practice in Teacher Education
College of Education
The University of Tennessee
Knoxville, TN
United States

Abstract: This paper is designed to share efforts used to prepare pre-service teachers and practicing teachers to work more effectively in urban schools with diverse populations. Pre-service and practicing teachers use community mapping methods and integrate technology skills to increase their understanding of the contexts within and beyond the classroom that influence their students' learning and development. Additionally, community mapping methods and technology skills support teachers to identify, examine and make maximum use of nontraditional learning opportunities.

Introduction

In every community there are opportunities and assets to support and improve instruction and learning (McKnight and Kretzman, 1993). Urban inner city communities often generate negative images and are perceived from the outside as contexts of crime, despair and hopeless (Mead, 1986). Little attention has been devoted to capturing the natural and available opportunities and assets that might support growth, learning and development. In these settings many untapped assets exist. They are reflected in individuals, formal and informal groups, organizations and institutions, traditions and customs, and the many artifacts within a given context. Too often, teachers focus narrowly on the learner or traditional resources of the classroom setting. Some lack a real sense of the full range of gifts and resources, even within their own classrooms, that can help to motivate students and support desired learning outcomes. Resources of the school are sometimes underutilized, forgotten, and in too many cases, unknown. Instead, substantial attention is centered on student deficiencies and the inadequacies of their families and neighborhoods/communities. This paper is an attempt to capture strategies used by pre-service and in-service teachers to increase their understanding the contexts, processes and mechanisms that contribute to desired behaviors and positive outcomes for students in their classrooms and schools.

Community Mapping

McKnight argues that far too much attention has been devoted to the negative aspects of declining communities. He (1993) popularized the notion of community mapping when he published with John Kretzman, Building Communities from the Inside Out. The authors demonstrated through their neighborhood work in Chicago that communities are filled with assets, which are substantially overlooked and underutilized. Similarly, the work of Dunst, Herter, Shields, and Bennis (2001) offers a focus on community-based mapping natural learning opportunities to support the inclusion of children with disabilities and other special needs. The authors describe community mapping as methods and procedures used by practitioners and parents to locate and compile information about everyday learning opportunities. The focus is on opportunities for learning. Thus it is a shift from barriers to assets. Community mapping can serve as a viable process and method of identifying such opportunities and resources.

Community Mapping and Technology

Community mapping is now emerging as a powerful tool for teachers and technology can be used to facilitate and enhance this process. This integrated approach for identifying contextual assets and influences on children's learning also enables teachers to capture and examine a range of ways to start from the familiar in order to facilitate and broaden student learning. Examining the various contexts in which children interact in daily life offers teachers greater depth in understanding their students and their needs. . As a growing number of teachers in urban schools live outside of the communities of their students and have different cultural experiences and histories, it has become increasingly important to bridge the gap. This kind of understanding is essential for maximum use of natural learning opportunities. Technology is a useful tool for capturing the information and documenting its occurrence.

The Mapping Process

In this section we offer a brief description of the community mapping process and examples of the ways teachers explore and identify learning opportunities. Participating teachers are required to work in groups for a number of reasons. First, the notion of community suggests social interaction and engagement. Second, it is often helpful to explore new and unfamiliar territory with feedback from others. Third, it helps to have support in using equipment and making decisions about what to capture and how to best do so. Finally, group projects provides multiple perspectives and serves as a check and balance system.

Participants have available to them an array of tools to capture and present their work. They have access to still and video digital cameras, audio tape recorders, laptop computers, and projection machines. Additionally, they have the benefit of a variety of software materials to support their attempt to capture and present their work and experiences during and after the investigation. This includes, but is not limited to, power point, word, photo shop, hyper-studio, inspiration, media player, i-movie, and pinnacle.

The process officially begins with teachers forming groups. Participants of the group meet initially to plan the process; determine roles, tasks, and responsibilities; and to make plans for a final class presentation. Mapping begins with a focus on the classroom and available opportunities for learning in this context. Teachers sometime shadow a student to get a sense of social interactions in the setting. The physical setting and social and emotional climate of the classroom are also important features of the classroom to capture.

The next phase is center on the school context. This phase of the process is often a surprise to practicing teachers who find assets they have never used. Shadowing a teacher and a student in this context offers important insights. We have found that teachers use resources in different ways, even at the same school. Phase three provides a focus on the family context. Capturing the home and family contexts requires trusting relationships. Nonetheless, teachers feel they have gained valuable insights to guide their practice.

The final phase of this process is the community. Participants create a map of the community and attempt to identify available services and resources. In each phase there is an attempt to shadow as least one individual to gain a sense of a typical day in the life of the individual.

Throughout the process teachers write reflections about their experiences and continuously document the role they each play within the group. Group members share with each other a description of each person's role in the group during the process. A group reflection is required at the end and is designed to capture and summarize their collective effort in the process.

In groups, participants collect and document artifacts to collectively construct their reflections of classroom, school, home, and community contexts. The tools allow individual and groups to capture evidence of the natural environment, maximize opportunities and resources to support instruction, and take advantage of a range of activities and experiences. Though a continuous process of reflection, participating teachers in training create slideshows to formally share their constructions. These constructions include relationships and experiences that are connected to their students' daily lives.

Conclusion

Group presentations and class evaluations demonstrate the value students place on this learning experience. It includes sights teachers feel they have gained about their students and the contexts that influence their behaviors and learning. More important, teachers share how new knowledge and insights inform or change the work they do with children, families, and the community. The work of participating pre-service and practicing teachers illustrates the stages of the process for preparing teachers to connect with the natural environment of children. This new or increased level of understanding guides their teaching practices and maximizes opportunities for learning and achievement. The use of technology throughout the process is a useful and objective source for capturing learning at each phase. It is also a source for continuous reflection and reference.

School District Websites: An Accessibility Study

Marty Bray
Claudia Flowers
The University of North Carolina at Charlotte

The Americans with Disabilities Act (ADA) of 1990 provides the same civil rights protection to individuals with disabilities that apply as a result of race, gender, national origin, and religion (Button & Wobschall, 1994). Title III of the ADA directs that public facilities make reasonable modifications to control discrimination and support accessibility in policies, practices, and procedures (Council for Exceptional Children, 1994). As a result of this landmark legislation, accessibility alterations such as providing ramps to elevated areas and providing accessible signage through height adjustments and raised lettering have become commonplace across the United States.

The Perkins Vocational Act of 1984 called attention to America's need to support individuals who were less fortunate by birth or economic circumstances. The Act underscored the need for improving vocational programs and serving special populations of students. The Act created an awareness of the population of people that had gone unnoticed with little or no training.

The World Wide Web (WWW) has become an invaluable resource for many people with disabilities. Accessibility across platforms and geographic distance makes the WWW an ideal universal tool for gathering and disseminating information (Heflich & Edyburn, 1998. Many school districts use the Internet to disseminate a wide variety of information to students and parents. Wong (1997) discussed using the Internet for increased self-advocacy by individuals with physical impairments. It is ironic, however, that while technological developments have enhanced and provided new exciting opportunities for the WWW, they have, at the same time, complicated and limited the accessibility of the content and resources for individuals with disabilities.

Physical barriers are obvious accessibility concerns. Web page developers need to be just as aware that on-line barriers can create significant problems for some users. The Americans with Disabilities Act requires that all organizations make reasonable accommodations for individuals with disabilities. Even though there has not been a judicial ruling on WWW accommodations for individuals with disabilities, home page developers should work towards designing and building Web sites that are accessible to all individuals. It is important that Web page developers use and follow standards that allow accessibility to all WWW users.

To examine the accessibility of school districts' home pages a descriptive study was conducted. The population Web sites for this study were school districts located in the United States and Canada. A list of 567 School District Web sites was randomly selected from an online school web directory. Each home page was analyzed using the software package Bobby 3.2 (Center for Applied Special Technology, 2000), which allows researchers and other professionals to evaluate Web pages in accordance with the W3C Web Accessibility Initiative's guidelines.

Approximately three-fourths (74.3%) of the home pages were not approved by *Bobby 3.2*. This indicates that at least one Priority 1 error (seriously affects accessibility) was detected on these pages. There was an average of .91 Priority 1 accessibility errors on the School District home pages. In addition, the average number of Priority Two and Priority Three errors was 2.33 and 1.64 respectively.

Web developers at school districts need to examine their Web sites for accessibility problems. It is strongly recommended that validation methods be used in the early stages of Web development, which will help make problems easier to correct and assist developers in avoiding many accessibility problems. In addition to evaluation tools such as Bobby 3.2 expert and novice users with disabilities should be invited to view home pages and provide feedback about accessibility or usability problems and their severity.

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Distance Learning: Eliminating the Digital Divide

Sheryl Burgstahler, Ph. D.
Affiliate Associate Professor, Director of DO-IT (Disabilities, Opportunities, Internetworking and Technology),
Co-Director AccessIT (National Center on Accessible Information Technology in Education)
University of Washington, U.S.A.
sherylb@cac.washington.edu

Abstract Today, distance learning is the fastest growing mode for the delivery of instruction. Distance learning programs desire to bring learning to anyone, anywhere at anytime. However, some students, including those with disabilities, cannot fully participate unless design features are employed to make distance learning courses accessible to them. Designed well, distance learning options create learning opportunities for students with a broad range of abilities and disabilities. Designed poorly, they erect new barriers to equal participation in academics and careers. This paper summarizes strategies and lists resources for developing distance learning courses that do not create a digital divide.

New distance learning courses seem to be appearing everywhere. However, the idea of learning at a distance is not new. It has been around for a long time. Instructors have used printed materials and the postal system to deliver correspondence courses for hundreds of years. Televised courses were offered soon after televisions began to appear in homes. Today, in specially equipped facilities, instructors teach several classrooms full of students brought together through interactive television. Delivery of courses via the Internet is now common. Many distance learning courses use multiple modes of delivery. For example, class discussions may take place using electronic mail; course content may be delivered via the World Wide Web, printed materials and television; and the class might occasionally meet in a televised instructional facility. Distance learning programs often have as a goal to reach as many students as possible. While they almost always consider people separated by distance and time, they rarely consider issues faced by potential students and instructors with disabilities. Many distance learning courses erect unintended access barriers for students and instructors with disabilities, creating a digital divide between those who can participate and those who cannot.

Ethical grounds can be used to argue that courses should be designed so that individuals with disabilities can fully participate. Many people simply consider it to be the right thing to do. Others are more responsive to legal mandates. The Americans with Disabilities Act (ADA) of 1990 requires that people with disabilities have equal access to public programs and services. According to this law, no otherwise qualified individuals shall, solely by reason of their disabilities, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination in these programs. The United States Department of Justice clarified that the ADA applies to Internet-based programs and services by stating, "Covered entities that use the Internet for communications regarding their programs, goods, or services must be prepared to offer those communications through accessible means as well" (ADA Accessibility, 1996). It is clear that distance learning programs have a legal obligation to make their courses accessible to qualified students who have disabilities.

The following paragraphs give examples of access challenges faced by people with disabilities and present design considerations for assuring that a course is accessible to potential instructors and students with a wide range of disabilities. The field of universal design provides a framework for this discussion.

Barriers Encountered by Students with Disabilities

Specialized hardware and software products, often called assistive technology, allow individuals with a wide range of abilities and disabilities to fully operate information and networking technologies (Closing the Gap, 2001). However, assistive technology alone does not remove all access barriers. Listed below are examples of access challenges faced by students in typical distance learning courses.

Mobility Impairments: Some potential students may not be able to move their hands. They may use alternative keyboards, mice and/or speech input devices to gain access to Internet-based course content and communication. Sometimes people with mobility impairments do not have the fine motor skills to select small buttons on the screen. If their input methods are slow, people with mobility impairments may not be able to effectively participate in fast-paced "chat" communications. Participants may face access challenges if place-bound meetings required in a distance learning course are not wheelchair-accessible.

Hearing Impairments: Most people who are deaf or hard of hearing face few challenges in accessing the Internet since most resources do not use sound output. However, when Web sites include audio output without providing text captioning or transcription, a student or instructor who is deaf cannot access the information. Course videotapes that are not captioned are also inaccessible to these students. They may also be unable to participate in telephone conferences or videoconferences unless sign language interpreters or other accommodations are provided.

Blindness: Individuals who are blind often use a computer equipped with screen reader software and a speech synthesizer. Basically, this system reads with a synthesized voice whatever text appears on the screen. They may also use a Braille refreshable display that presents screen text line by line in Braille with small plastic pins. To navigate the World Wide Web they may turn off the graphics-loading features of a standard Web browser. Students who are blind cannot interpret graphics (e.g., pictures, charts, drawings, image maps) unless text alternatives are provided for their speech output systems to use. Printed materials, videotapes, televised presentations, projected slides, and other visual materials also create access challenges for people who are blind. These barriers can be overcome with alternate formats such as audiotaped printed materials, Braille printouts, electronic text, tactile drawings, and audio descriptions or transcriptions for videotapes.

Low Vision and Other Visual Impairments: Students with limited vision can use special software to enlarge computer-generated screen images. Using this software, however, means that they may see only a small portion of Web pages at a time. Consequently, they can become confused when Web pages are cluttered and when page layouts change from page to page. Standard printed materials may also be inaccessible to them. They may require large print or electronic text that can be enlarged or accessed with a screen reader. When Web pages are designed in such a way that students must be able to distinguish between colors, individuals who are colorblind cannot successfully navigate the pages or understand the content.

Specific Learning Disabilities: Some specific learning disabilities impact the ability to read, write, and process information. Students with some types of learning disabilities may need to use audiotaped books. When accessing a computer, some use speech output and/or screen enlargement. They may have difficulty understanding Web sites when the information is cluttered, when confusing vocabulary or grammatical structure is used, and when the screen layout changes from one page to the next.

Speech Impairments: People with speech impairments may not be able to effectively participate in interactive telephone conferences or videoconferences. However, modes of participation, such as electronic mail and chat, that do not require the ability to speak, are fully accessible to them.

Seizure Disorders: Flickers at certain rates (often between 2 to 55 hertz) can induce seizures for people who are susceptible to them.

Principles of Universal Design

For some students, visual, hearing, mobility, speech, and learning disabilities can impact their participation in distance learning classes. If a course developer designs a course to maximize access as the course is being developed, fewer access challenges will arise when the course is offered. It is much easier to plan ahead than to create accommodation strategies once a person with a disability enrolls in the course. Simple steps can be taken to assure that the course is accessible to participants with a wide range of abilities and disabilities.

"Universal design" is defined by the Center for Universal Design at North Carolina State University as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design." (http://www.design.ncsu.edu/cud/univ_design/ud.htm) At this Center, a group of product developers, architects, environmental designers, and engineers established a set of principles to apply in the design of products, environments, and communication and other electronic systems. General principles include: the design is useful to people with diverse abilities; the design accommodates a wide range of individual preferences and abilities; the design communicates necessary information effectively, regardless of ambient conditions or the sensory abilities of the user; the design can be used efficiently and comfortably, and with a minimum of fatigue; and appropriate size and space is provided for use by people with a wide variety of body sizes and physical skills. When designers apply these principles, participants can use their products and services with a wide variety of abilities and disabilities. The next sections provide examples of how employing universal design strategies can make distance learning courses accessible to everyone.

Place-bound Instruction

Some distance learning courses include interactive videoconferences, proctored examinations, and other on-site instructional sessions. In these cases, the facility should be wheelchair accessible and the furniture should be able to accommodate wheelchair-users. Accessible restrooms, telephones, and parking should be available nearby. Instructors should speak clearly; face students when speaking (to facilitate lip reading); and describe all visual materials (for those who cannot see them). Standard disability-related accommodations, such as sign language interpreters, should be provided when requested.

Internet-based Communication

In some distance learning courses students and instructors communicate via real-time chat systems, where, students and instructors communicate at the same time. Besides imposing scheduling challenges for everyone, this type of communication is not effective for people who type very slowly. This includes people with some types of learning disabilities and those using alternative input devices because of impaired hand use. Instructors who use such tools should be prepared to allow an alternate method of communication (e.g., e-mail) for students with disabilities. Text-based electronic mail, bulletin boards, and electronic distribution lists generally erect no special barriers for students with disabilities. E-mail communication between individual students, course administration staff, the instructor, guest speakers, and other students is accessible to all parties.

Web-based Materials

Applying universal design principles to the design of Web pages makes them accessible to individuals with a wide range of disabilities. In 1999, guidelines for making Web pages accessible were developed by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C). Effective in 2001, the United States Architectural and Transportation Barriers Compliance Board (Access Board) developed standards for Web pages of Federal agencies as mandated by Section 508 of the Rehabilitation Act Amendments of 1986. Although the legislation is targeted at Federal agencies, the standards provide a model for other organizations working to make their Web pages accessible to the broadest audience. Both of these sets of guidelines can be found at Web sites listed at the end of this paper.

To make Web page content and navigation accessible, certain types of inaccessible data and features need to be avoided or alternative methods need to be provided for carrying out the function or accessing the content provided through an inaccessible feature or format. For example, a distance learning designer can avoid using a graphic that is inaccessible to individuals who are blind, or he can create a text alternative for the content that is accessible to the screen readers used by those who are blind. Web pages for a distance learning class should be tested with a variety of monitors, computer platforms, and Web browsers with the graphics- and sound-loading features turned off. Testing to see if all functions at a Web site can be accessed using a keyboard alone is also a good accessibility test. Special programs (e.g., A-Prompt, Bobby, WAVE) are available to test Web pages for accessibility.

Printed Materials

Braille, large print, audiotape, and/or electronic formats may be required by students who are blind or who have specific learning disabilities that affect their ability to read. Making the text of printed materials available on-line is a good solution for students who cannot read standard printed materials.

Video Presentations

It is best if videotapes or televised presentations are captioned for participants who have hearing impairments and audio described (that describes aurally the visual content) for those who are blind. If the publisher does not make these options available, the distance learning program should have a system in place to accommodate students who have sensory impairments. For example, the institution could hire someone local to the student to sign audio material for a student who is deaf. Real-time captioning (developed at the time of the presentation) or sign language interpreting should be provided when requested by participants in videoconferences.

Telephone Conferences

Standard telephone conferencing is inaccessible to students who are deaf. Instructors who use telephone conferencing for small group discussions could allow e-mail communication as an alternative. Students who is deaf may be able to participate in a telephone conference by using the Telecommunications Relay Service (TRS), where an operator types what the speakers say for deaf students to view on a text telephone (TTY) and translates printed input into speech, however this system might be too slow to allow participation in lively conversations. A similar videoconferencing system is available in some regions. Another accommodation involves setting up a private chat room on the Web. A transcriptionist types the conversation for the deaf students to view. Students can also type contributions into the chat room that can be voiced by someone monitoring the chat room.

Benefits for Everyone

Distance learning courses are designed to reach out to students no matter where they live and no matter what schedule they are on. If universal design principles are used in creating these courses, they will also be accessible to any students who enroll in them and any instructors who are hired to teach them, regardless of the abilities and disabilities. Applying universal design principles assists people with and without disabilities. For example, using clear language and navigational mechanisms on Web pages facilitates use by those whose native language is not the one in which the course is taught as well as people with visual and learning disabilities. People who have turned off support for images on their browsers in order to maximize access speed benefit when multimedia features provide text alternatives for the content, as do people who are blind. Similarly, people who cannot view the screen because they must attend to other tasks benefit from speech output systems that are often used by people who are blind. Captions provided on videotapes and video clips assist people who work in noisy or noiseless surroundings and people for whom English is a second language along with people who have hearing impairments. Making sure that information conveyed with color is also available without color benefits those using monochrome monitors in addition to those who are colorblind. When carefully designed, distance learning courses do not need to create a digital divide.

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References and Resources

The following resources are useful to those who wish to research this topic further.

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A-Prompt, http://aprompt.snow.utoronto.ca/

Captioned Media Program, http://www.cfv.org/

Center for Applied Special Technology (CAST), http://www.cast.org/udl/

The Center for Universal Design, http://www.design.ncsu.edu/cud/

Closing the Gap 2001 Resource Directory, http://www.closingthegap.com/

DO-IT (Disabilities, Opportunities, Internetworking and Technology), http://www.washington.edu/doit/

EASI (Equal Access to Software and Information), http://www.rit/edu/~easi/

International Center for Disability Resources on the Internet, http://www.icdri.org/

National Center for Accessible Media (NCAM), http://ncam.wgbh.org/

Recordings for the Blind and Dyslexic, http://www.rfbd.org/

Section 508 Standards of the Access Board, http://www.access-board.gov/sec508/508standards.htm

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Vanderheiden, G.C. (1990). Thirty-something million: Should they be exceptions? Human Factors, 32(4), 383-396, http://www.trace.wisc.edu/docs/30_some/30_some.htm

WAVE (Web Accessibility Versatile Evaluator), http://www.temple.edu/inst_disabilities/piat/wave/

Web Accessibility Initiative, World Wide Web Consortium, http://www.w3.org/WAI/

WebABLE, http://www.webable.com/

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A Window of Opportunity: Computer-Mediated Communication and Multicultural Education

Lucretia O Carter
Assistant Professor of Instructional Technology
Illinois State University
United States
locarte@ilstu.edu

Abstract: This paper is a report on the findings from a study I conducted on the integration of multicultural education and computer-mediated communication (CMC). A qualitative approach was used to collect and analyze data. Analysis of the data allowed me to build logical connections of evidence in relation to the integration of multicultural education and CMC based on the recognition of a shared pedagogy. Parallelism in the pedagogies of the two areas—CMC and multicultural education—created a window of opportunity for unique practices and instruction. The outcomes are presented.

Introduction

Due to the features and innovative uses of computer-mediated communication (CMC), some educators (Appelbaum and Enomoto, 1995; Cummins and Sayers, 1996; McCormick, 1995; Riel, 1992; Roblyer, Dozier-Henry and Burnette, 1996) are exploring its significance to multicultural education. A popular perception is that because of its capabilities of linking, expanding, and interacting, CMC is an ideal technology for fostering some goals of multicultural education. Essentially, this ideal rests on a belief in the pedagogy that multicultural education and educational technology have in common. With a common pedagogy serving as the basis for the two, it is asserted that certain CMC practices can support certain practices in multicultural education while simultaneously, the principles of multicultural education can inform the educational use of CMC.

Damarin, in "Technology and Multicultural Education: The Question of Convergence," (1998) compares electronic pedagogies with emancipatory pedagogies, concluding that the two are parallel. Damarin ascribes the parallelism to two primary ideas:

1. the rejection of student accumulation of preselected facts as the driving mode of education and
2. the assertion that the social organization of the classroom must change in ways that not only displace the authority of the teacher as a dispenser of all valuable knowledge but also disrupt the traditional hierarchies (pre)determining who succeeds in school (p.17).

Damarin provides the following table to illustrate the parallelism of the two pedagogies which allow them to support each other.

Emancipatory Pedagogies	Electronic Pedagogies
Reject 'banking system' of education	Knowledge shared by student and computer-based resources
Decenter the teacher	'A guide on the side, not a sage on the stage'
'From margin to mainstream'	Recognized multiple ways of knowing

The parallelism portrayed in Damarin's table illustrates a "pattern of consistencies and sameness across areas of practice that do not share common elements" (p. 18). Damarin contends that

> These consistencies can create a window of opportunity for practitioners (including instructional developers, curriculum planners, and teachers) who focus on educational technology to join those who focus on equitable multicultural education in an effort to define and devise curricula and activities that serve their common purpose. (p. 18)

This window of opportunity created by the consistencies between the emanicipatory pedagogy of multicultural education and the electronic pedagogy of CMC was the starting point for this study.

The Study

Through this particular window of opportunity, multicultural education and CMC were brought together to foster an on-line forum. The on-line forum, purposed to facilitate discourse construction on critical pedagogy, supplemented a graduate English course on U.S. multiculturalism and the composition curriculum. The nine graduate students enrolled in the course interacted, via web conferencing, with five experienced teachers. While the graduate students were located at a predominantly white university in the mid-west and had little experience teaching students of color, the experienced teachers were located in different cities throughout the U.S. and taught courses whose enrollment was predominantly that of students from underrepresented groups.

The objectives of this setup were to help students prepare to address the demands of educational reform, engage in collaborative critical inquiry, and make reflective decisions regarding multicultural education pedagogy in the composition curriculum. By helping to overcome time and space boundaries between students and teachers, CMC was employed to facilitate a democratic environment where

- the participatory construction of discourse could take place among the graduate students and experienced teachers;
- attention would be devoted to the practices of experienced teachers so that educational research could be linked with reflective practices;
- and students and experienced teachers would collaboratively develop materials and activities that promote a critical pedagogy for composition classes.

A qualitative approach was used to collect and analyze data. Data were collected through the transcripts of the on-line discourse, audio-taped interviews conducted at the end of the course, field notes, course artifacts, and user profile information (provided by the web conferencing system). Because CMC is a medium of medium of written discourse, the online activity was archived and then the written exchanges observed. Also, interviews were conducted using Anderson and Jack's (1991) interview and analysis techniques which entails shedding greater agendas of convention and listening for meaning in the participants' moral languages, meta-statements, and attending to the logic of the narrative. Analysis of the data allowed me to build logical connections of evidence in relation to the integration of multicultural education and CMC.

Findings

Patterns of interactions and exchanges relevant to the philosophy, purpose and objectives of the course emerged. They can be categorized into two types of interactivity and interactions: designed and unplanned.

Designed interactions corresponded with the objectives of the course and electronic forum. These exchanges were required of the students and experienced teachers and were mediated, usually prompted by a general question to everyone. For example, to prompt discourse among the participants concerning linguistics issues, the instructor posted the following questions: " Should students have the rights to their own languages? And what are the implications?" Such was done to stimulate dialogue, critical thinking, and reflection on pedagogical practices concerning issues of linguistics. Designed interactions were further categorized into the following:

(1) Establishing Presence, designed to unveil the backgrounds, experiences and perspectives of the participants, and which was essential to constructing discourse informed by multiple perspectives;
(2) Linking Educational research and reflective practices, which allowed students to compare critical theory with the practices of the experienced teachers; and
(3) Collaborating and Sharing, where participants asked questions, raised issues, and shared ideas about resources, materials and activities.

Unlike designed interactions, unplanned interactions and exchanges were not mediated, prompted, nor necessarily anticipated. However, when the transcripts were analyzed, unplanned interactions appeared to be just as significant to the relevance and application of the forum as the designed interactions. These interactions seemed more democratic because the students initiated them. There were three categories of unplanned interactions and exchanges:

(1) Responding to Course Readings, in which students introduced, commented on, and asked questions about specific topics and issues from the course readings that were of specific interest to them;
(2) Supplementing In-class Discussions, where students revisited and elaborated on in-class discussions; and
(3) Lending Personal Testimonies, where participants went beyond sharing professional practices and academic thought and revealed personal narratives making potentially abstract participants become more personable and human..

Evident in unplanned interactions and exchanges is the participants' interest in and invested ownership of the forum.

In this particular window of opportunity, the consistencies between the emanicipatory pedagogy of multicultural education and the electronic pedagogy of CMC provided a concrete foundation for determining the purposes, structure, and activities of the on-line forum and a unique environment for supporting them. Through interviews, the participants reported that their on-line experience stimulated thinking, provided models and ideas, and added legitimacy to the importance of gaining multicultural scholarship. Essentially, they welcomed this opportunity.

While the consistencies between the two pedagogies supported this unique window of opportunity for the participants, interpretations of their experiences shed light on issues and limitations that stem from the elements that multicultural education and CMC do not have in common. Three major issues emerged as participants described their experiences.

1. *Equitable Access*. CMC was used to access the perspectives of educators who are currently immersed in issues related to the course content, but because of time and distance were inaccessible. However, technological inequality permitted only those privileged with Internet access to participate. Equitable access research shows that Internet access is available less in schools with large numbers of students of color and of low-economic status than in schools whose students are predominantly white and who are of high economic status (Doctor, 1992; Leigh, 1999; Novak, 1998; Romiszowski and Mason, 1996). Therefore, the on-line discourse was shaped by the perspectives of those teaching in environments that are predominantly white while the perspectives of those teaching where there are large numbers of students of color did not have the opportunity to contribute.

2. *Software Capability and Design*. Also, interviews revealed that participants that did not possess the skills to overcome technical difficulties seemed to remain on the periphery of participation. Consequently, the central members of the forum were those who are technologically proficient. CMC is not for the "technically timid" (Ruberg and Sherman, 1992). One of the participants stated: "Why can't we use the software to reconstruct race relations…? Well, because the only software available for us to do that is too difficult…"

3. *Electronic Atmosphere.* Furthermore, because of its absence of nonverbal status cues, CMC is noted to render a democratizing effect on communication and discussions (Harasim, 1993). However, according to participants' interpretations of their experiences, the exclusion of nonverbal status cues seemed to contribute to a falsified, abstract, imperceptible community where they did not feel totally comfortable with making proclamations, rendering judgment and sharing beliefs and practices. Such a community can have an ostracizing effect on participants who don't feel they meet with the perceived conditions of the forum's environment.

Conclusion

Traditionally, the agendas of multicultural education and technology have been pursued separately. However, as evident in this study, parallelism in the pedagogies of the two areas creates a window of opportunity for unique practices and instruction. Integrating multicultural education and CMC allowed us to create an environment where unique learning opportunities were available. Graduate students were able to correspond with teachers who were immersed in the issues outlined in the course. Together the participants constructed discourse on critical pedagogy in composition, and shared and developed resources and materials.

While parallelism in the pedagogies of multicultural education and CMC provide opportunities, the elements that they do not have in common can leave a gap in activities and practices. As shown in this study, the limitations or shortcomings of this particular integration of multicultural education and CMC were related to the socially and culturally based assumptions of technology designers, developers, and implementers (Damarin, 1996). Future integrators should seriously consider issues of equitable access, software design and compatibility, and the abstractness of the electronic atmosphere as they influence participation.

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Field-based Technology and Critical Friends Principles in Teacher Preparation

Viola Garcia
Irene Chen
Department of Urban Education
University of Houston Downtown
E-mail: cheni@uhd.edu

Abstract: For several decades video technology has been used in teacher education for self-improvement, assessment, students feedback and various other purposes. Digital video technology allows teacher educators to videotape snapshots in urban schools that capture student and teacher demographics, teacher-student interactions, collaborative, flexible grouping of diverse student populations, best practices in teaching, and general characteristics of urban school settings. Selected digital video clips can be integrated into the course curriculum by teacher educators to explore urban culture as the dominant form of community life in contemporary schools. The edited video clips can be disseminated to all students via the Internet, CD-ROMs or videocassette formats. The students in the SOSE3306Culture of Urban Schools course can view the video clips for discussion and reflection with the entire class. The paper will discuss how a collaborative relationship between an ISD and a University helped design and develop an online Multicultural Education course using a field-based approach and digital video technology. The topics of the paper include: the collaboration of the ISD and the University Teacher Education Program, planning and scheduling the use of digital video, video taping sessions, selecting of clips, matching the clips with the curriculum and schedule, and final dissemination of the clips via CD-ROMs.

Introduction

Many teacher education programs offer at least one course on multi-cultural education with a strong emphasis on authentic experiences and exposure to different school cultures and ways of thinking. However, delivering the multi-cultural education course over the Internet while maintaining the same degree of rigorous critical thinking is a considerable challenge.

Beginning from Spring 2002, students taking the online Web-based course SOSE 3306 at the University of Houston Downtown thus assemble a realistic snapshot of urban school settings in the greater Houston area. Typically students at UH-D come from diverse backgrounds: some are current school teachers while others are traditional undergraduate students; some grew up in another country and culture, while others graduated from high school some time ago and become teachers as second careers. It is important to provide a realistic perspective on current urban issues in public education for those entering the teaching profession.

In looking for a good model for online discussion when designing the WebCT online course, SOSE 3306 Cultures of Urban Schools, the authors incorporated the Critical Friends Group (CFG) principles into the various field-based technology activities of the course. One of the designers of this course has worked with CFG for over a year and is also teaching educational technology courses. The other designer of the course is the Director of Field Experiences for the Teacher Education Program at UHD. The online course is offered for the first time in Spring 2002 with maximum of 25 students. The purpose of the paper is to explain how technology is used to enrich students' early field-experiences and how CFG processes have been implemented into the interaction of the online course.

Early Field Experiences

Through field experiences, teacher candidates observe and work with real students, teachers, and curriculum in the natural settings of K-12 schools. Common sense alone dictates that pre-service teachers who participate in field experiences in school settings are better prepared to understand and deal with the complex realities of today's schools, classrooms, and students.

The rationale for field experiences in teacher preparation is grounded in the work of John Dewey (1904; 1938). He was a strong advocate for the experiential training of teachers. Dewey viewed the teacher as learner, and thus the need for that learner to be provided experiences for constructing his or her own learning.

A study conducted in Texas (Fleener, 1998) provided evidence that candidates who receive increased amounts of field experiences in their teacher preparation programs are retained in the profession at significantly higher rates than those prepared through traditional campus-based programs.

According to nationwide survey results, the vast majority of teacher candidates first engage in field experiences prior to their junior year in college. A total of 77% of elementary programs and 70% of secondary programs require candidates to first participate in field experiences in PK-12 settings during their first or second year of college (Huling, 1998).

Field experiences prior to the student teaching experience are commonly referred to as early field experiences. Teacher candidates participate in early field experiences in a variety of schools and classrooms. In elementary preparation programs, according to Huling (1998), 77% of the candidates work in more than one PK-12 setting while 73% of secondary candidates participate in early field experiences in more than one PK-12 setting.

The online course SOSE 3306 which is a prerequisite course to the field-based "blocks," attempts to provide students, who are typically juniors, with early field experiences. Instead of participating in lectures in a university classroom, the intention is for students to watch interviews, classroom snapshots via technology, and conduct investigations by physically visiting and conducting local school investigations. In designing the course, the CFG model has been integrated by the authors' into the course activities.

The Professional Development Model of Critical Friends Groups

Critical Friends Groups, although practiced in K-12 for some years, has only recently been incorporated into higher education through coach training. For several years, the National Coalition of Essential Schools and The Annenberg Challenge Institute have devoted efforts into formalizing an approach to school staff "self-analysis," through a program called "Critical Friends Groups," or CFGs

> CFGs are the product of a simple idea: providing deliberate time and structures to promote adult professional growth that is directly linked to student learning. A CFG consists of eight to twelve teachers and administrators who agree to work regularly together to define and produce improved student achievement. As a group, the members establish and publicly state student learning goals, help each other think about better teaching practices, look closely at curriculum and student work, and identify school culture issues that affect student achievement. Each CFG chooses a coach who is selected either from the school staff or from the ranks of trusted outsiders. The coach helps the group build the sense of trust that must exist if they are to work together in a direct, honest, and productive way. The coach also helps the members learn and master techniques that sharpen self-insight, promote creativity, and encourage candid, usable peer feedback.
>
> (http://www.harmony.pvt.k12.in.us/www/cfg_p1.html, accessed on Dec 15, 2001)

To summarize, a CFG is a group of six to twelve educators working with students everyday within a school or district who meet on a regular basis to explore and change their teaching practices in order to improve student learning. More and more schools and districts are using "CFG processes" in other settings as well, such as in staff meetings, in-service workshops, cross-school study group meetings, administrator's meetings, and department and team meetings, etc. Most CFGs in the Houston area meet on a monthly basis to share teaching practices, collaboratively examine student work, and reflect on how teaching practices impact student learning. Participants also engage in regular peer classroom observation and occasionally discuss readings to inform their reflections and practice.

Administrative Aspects of the Online WebCT Course

The following WebCT features have been employed to facilitate Critical Friends Groups (see Figure 1):

Syllabus: A syllabus is used to inform students of the general course requirements.

Welcome Page: This page is sent out to the students' personal e-mail addresses prior to the semester to greet the students. It is also included in the course homepage for review purposes.

Classroom Norms: Students taking online courses have special challenges such as new classroom rules, due dates, correspondence, emergency contact methods, interaction with peers, etc. These pages attempt to explain the classroom norms so that students are more comfortable and confident and so that they can have a rewarding learning experience.

Calendar: Since the online students may not come to the University campus at all, they may not be familiar with the university routine. The calendar informs them of the scheduled readings, assignments, due dates of major project, etc. using a format for weekly work.

Bulletin Board: To encourage virtual interaction, the electronic bulletin board function is also used. All bulletin board topics are referred to by week number to assist students in locating the area and content for a specific week.

Course Module: The course module feature of WebCT has been modified as the Table of Contents. This starts with general instructions for the week and displays weekly activities below the weekly introduction as explained in the following section.

WebCT Mail: The WebCT Mail is used for instructor-student and student-student correspondence. Some projects are received as e-mail attachments.

The Content of Course Modules

The Table of Contents (or Course Module) serves as the major point of contact for students' work on projects (see Figure 2). Each week starts with an Introduction that informs the students what to work on and how to complete the assignments. This is unlike the lecture-type format and attempts to integrate the messages and lectures into the various projects. Under weekly titles, project descriptions together with handouts in digital format (HTML, MS Word, RTF) are posted. Since this is a projects-based course, each week the students have to complete 2-4 projects. Some projects are as easy as reading a short chapter and posting comments through the mail, while others are more complex, semester-long projects that require investigation of the topic by interviews, Web searches, observations, team collaboration, etc.

Technology Field-Based Activities: The school district requires that Internet use and image consent forms be signed by parents to release snapshots of students for instructional purposes in university classes. Through the University's collaboration on the Partnership for Quality Education (PQE) project, the Department of Urban has these parent consent forms for taking video snapshots of students on file. The classroom snapshots were taken in natural classroom settings (see Figure 3). The content of the activities was natural and was not pre-arrange for the videotaping. The teacher interviews were also taken in the teacher lounge, again, to provide a natural setting for student understanding (see Figure 4).

Critique of Classroom Activity Snapshots: At the beginning of the semester, students in the online course are provided with video clips in PowerPoint format on the course CD. The classroom snapshots range from two minutes to seven minutes. The video clips include classroom activities taken in a local urban elementary school. Students watch the video clips and evaluate the classroom activities by applying the five dimensions of multiculturalism discussed in the Banks' book. They post their critique on the electronic Bulletin Board. To encourage students to refer back to the textbook, the five dimensions of multiculturalism are used as a framework. The five dimensions of multiculturalism include 1) Equity Pedagogy, 2) Prejudice Reduction, 3) Empowering School Culture, 4) Content Integration, and 5) the Knowledge Construction Process. The text-based discussion principle of CFG, reminds students to refer back to the exact page or section in a text to enhance communications and understanding of the text. When critiquing the classroom activities, the students are required to give exact examples of what they have seen to support their argument or point. The online posting activity is a good model for critical thinking, interactive online discussion, and CFG. Other CFG discussion principles were built into the electronic Bulletin Board activities as well.

Developing Reflective Practitioners: Reflection is a strong emphasis of CDF. On the same course CD, there are interview clips of four teachers of different genders, years of teaching experience, teaching subject areas, and cultural backgrounds. The interviews range from two minutes to seven minutes. For each teacher interview, the students are to complete a rubric that asks them to gather information from the snapshots about the teachers' background, examples of teachers' cultural shock when they first started teaching in urban schools, and teaching strategies for different learning styles. The rubric ends by asking the student to reflect on which are the most touching remarks and why, what they agree and disagree with, and other aspects of the teacher interviews.

Critical Friends Groups Implications: Strengths and Weakness

Nationally, CFG is one of the approaches used in providing professional development in schools learning communities (http://www.usm.maine.edu/smp/projects/cfg.html). The National Commission on Teaching & America's Future (1996) has recommended that future teachers have more rigorous preparation and more authentic field-based experiences to enable them to cope with the increasing complexity, challenges, and diversity of current schools and classrooms. What has been advocated is a more holistic conceptualization of the preservice teacher experience and increased collaboration between universities and public schools (Guyton & McIntyre, 1990). This class CD used for technology field-based is a exactly a product of increased collaboration between universities and public schools.

Given the technological scenario for the future that has just been painted, it is fair to ask whether such future systems are capable of delivering an appropriate level of quality of teacher preparation. Research on distance education by and large has shown that, when appropriately planned, distance education can be as effective as conventional classroom based education. While there are some exceptions in terms of certain types of content or certain groups of students, the move towards integrated multimedia networking may be expected to extend the range of effective distance education applications (Collis, 1991).

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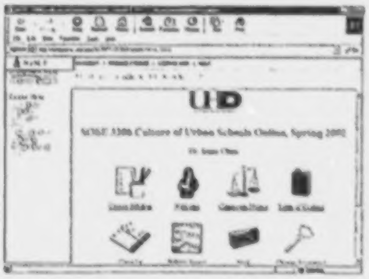

Figure 1: SOSE 3306 online through WebCT

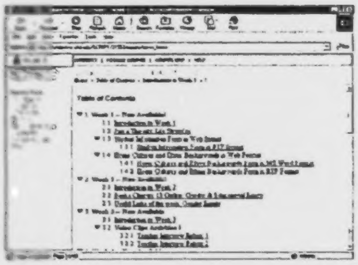

Figure 2: Table of Content for easy navigation

tivity 1 - Windows Media Player
File View Play Favorites Go Help
Radio Music Media Guide

Figure 3: A snapshot of classroom activities

Target: V1A A1

Figure 4: A snapshot of teacher interview

Gender Bias in Software: Issues, Implications, and Considerations

Jennifer Groendal-Cobb
Social Studies Education
University of South Florida
United States
Piano1231@aol.com

Jennifer Patterson
Social Studies Education
University of South Florida
United States
Jenmarpatt@cs.com

Abstract: The digital divide encompasses not only race and socioeconomic status, but gender as well. The gender gap in technology is a result, in part, due to biased software that has been made accessible to females. This paper will provide a brief history of the gender gap in technology, review the available literature on gender-biased software, and explore the ramifications inherent in its use. In addition, recommendations will be offered that are designed to assist teachers in selecting and implementing gender equitable software into their classrooms.

Although technology is playing an increasingly important and omnipresent role in our society and the world, inequities continue to exist in access and manner of use within various groups throughout society (Clark & Gorski, 2001). Race, ethnicity, age, socioeconomic status, education, disability, language, and gender are factors associated with what is called the Digital Divide. Initially, the Digital Divide was primarily related to a lack of access to technology, but more recently the Divide has been further deepened by disparities in technological usage (Clark & Gorski, 2001).

Since the early 1980s, much research has been conducted on the existence of the gender gap in technology, which continues to be a pervasive and persistent problem (AAUW, 2000; Fiore, 1999; Gehring, 2001; Koch, 1994; Mark, 1993; Sanders, 1993; Sanders & Stone, 1986). The gender gap is evidenced at home, in schools, throughout media and society, and in the workplace. A number of complex factors are attributed to the gender gap in technology. There are psychological, social, attitudinal and environmental components that work in concert that affect females' attitudes, interest, and use of technology (Mark, 1993). Females receive inadvertent and implicit messages that the computer is not for them, and avoid it accordingly. As a result, females suffer from lower self-confidence about their technological abilities as well as a lack of self-esteem (Sanders, 1993). Furthermore, this lack of experience leads to negative attitudes toward and disinterest in technology-related endeavors, both of which have serious implications for females' educational and professional opportunities. As the number of jobs in technology-related fields grows exponentially, the opportunities for women to participate in that field will be decreasing. The end result of the gender gap is that women will be ill prepared for a world that is becoming increasingly technological (Sanders, 1993). Because technology permeates society in numerous ways, it is imperative that issues of gender equity in technology be confronted and resolved.

Factors contributing to this gender difference are perhaps the most important part as well as the most difficult part of achieving technological competence. As stated earlier, studies have shown that computers are more attractive to boys than to girls and the literature reports several factors that might attribute to the gap in both access and usage. In many cases, both electronic games and home computers are the primarily vehicles of entertainment for children. Unfortunately, these vehicles reveal stereotypes and promote misrepresented conceptions of gender roles that can lead to a gender gap in technology.

While the video game business has grown to become a $10 billion industry in the United States, it remains an industry overwhelmingly geared to and supported by men and boys (DeBare, 1996a). Industry analysts estimate that no more than 30 percent of all video game players are female (DeBare, 1996a). The reason why these numbers are so low, is because video games are not being created to interests girls. Studies have shown the digital divide within gaming started in video arcade back in the early 1980s and has continued to exist today (Kiesler et al,1985; DeBare, 1996a). These studies addressed issues and implications related to girls' interest in electronic games, preferences of software and their opinions on using technology either as a source of education or as entertainment. Although there was evidence of girls' genuine interest, there emerged themes of misrepresentations or misconceptions of the use of computers.

As there has been concern to games being a product to widening the gender gap in technology use, there also has been concern toward educational software. Over a decade ago, only a few educational software programs were being developed, but times have changed. Everybody is making software, which includes interactive storybooks, multimedia reference works, animated adventure games; and application type programs, word processors and spreadsheet programs. Some educational software incorporates simulations or exploration and others are designed to teach and/ or drill specific facts or academic skills. Whatever the technique, it is crucial that software designers understand the way children view gender and work to develop software that does not perpetuate gender stereotypes or bias. The literature shows supportive evidence that educational software, as do games, is presented in a format that adheres to violence and war and more traditional male sports (Lepper & Malone, 1987; Chappel, 1996).

In addition to games and educational software, gender bias exists in clipart programs. In the past, researchers have investigated media images harmful to females in media and instructional materials, (e.g. textbooks), and have looked at the quality and content of pictorials and content in written instructional materials. As technology becomes more pervasive both in our classrooms and in the business world it is important to examine for any gender disparities that might exist in computer software. Researchers are turning to analyzing images from art files in software programs for evidence of gender bias (Dyrud, 1997; Milburn et al, 2001). Dyrud (1997) examined over 14,000 clipart images in different Windows-based programs and found that only 4.54% of the total images depict women and they are typically represented in stereotypical roles, e.g., secretaries, nurses, and teachers. In addition, Milburn (2001) investigated two top-selling computer clipart packages and found that more males were shown in more diverse/active roles than females, which again perpetuates misperceptions of gender roles, as females taking a more passive role versus the males being more assertive.

The world of computing is inescapable and inextricably tied to children's socialization. As it is the responsibility of educators to help reduce the bias that exists within accessibility of use and the software that is available for children, it also lies with society as a whole. Beginning in the early years of females' lives, equitable software needs to be introduced to generate interest in technology. In order to improve the situation, open-mindedness must be encouraged and the cultural stereotypes, which perpetuate the inequalities, must be eliminated. By increasing the number of women in the computing field, this will encourage young females and other women to pursue the profession. Unless issues of equity and fairness are promoted, females will continue to be at a disadvantage in an increasingly technological world, which will have serious repercussions for the world itself.

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Critical Race Theory and the Digital Divide: Beyond the Rhetoric

Patricia Randolph Leigh

"Crossing the Great Divide": A tale of inequity

Long ago in a faraway, harsh, and barren land lived two groups of troll-like beings known as the Binefs and the Uninefs. How these creatures came to inhabit this land had long been forgotten and the history of how the Binefs came to rule over the Uninefs was similarly lost to both groups. The feeling was, especially among the Binefs, that this was how things always were and how things should, in fact, be. The two-headed Binefs believed themselves to be superior in every way to their one-headed 'cousins', the Uninefs. This inferiority myth was passed on from generation to generation and was widely accepted by both groups of Nefs. In fact inferiority myth justified many things, especially the enslavement of the Uninefs by the Binefs.

The land inhabited by the Nefs was hard and rocky and required brutally intense labor and much sweat and toil to prepare the soil for food production. The Uninefs worked in the fields year after year, generation after generation, planting and harvesting food for their masters, receiving only leftovers for themselves. This food, called knowledge, had in fact been altered under the direction of the Binefs and a hybrid was created. Hybrid knowledge food could only be easily digested by the Binefs, and since it was the only legally produced food in the land, it left the Uninefs in danger of starvation. The enslaved Uninefs did manage to sustain themselves, but their inability to fully digest the food took a toll on their physical abilities. Even those Uninefs who had not fully accepted their alleged inherent inferiority, were weakened after years of compromised nourishment and were unable to effectively resist and win out over the Binefs.

The ancient land of the Nefs lay south of an enormous chasm referred to as the Great Divide. Nef mythology held that the northern border of their land marked the end of the world for physical beings and further claimed that the lush green land on the other side was occupied by gods and goddesses. Many Uninefs had plunged themselves into the chasm in attempts to escape their oppressive existence while numerous Binefs perished in their attempts to discover a means of crossing the divide. However, after countless failed attempts, the Nefs were successful in developing a mechanism for reaching the mythical lands. Of course the tools needed to make such a journey were initially available only to the wealthiest of Binefs and to none of the enslaved Uninefs. After all, there was no reason to provide for the escape of the ruling Nefs' free labor. In addition, because of their compromised diet, the enslaved Nefs were physically weaker than their masters and unable to endure the long, arduous journey across the Great Divide.

The Binefs were truly amazed at what they found in the mythical land of the northern region. To them, the fertile rich soil was truly enchanting and magical. With little effort they grew fields and fields of their hybrid knowledge crops and the new settlers flourished without the help or need of slave labor. They became comfortable and fat. The passing years brought new groups of Nefs to the region and, in addition, many generations were actually born in the land north of the great chasm. Most Nefs of any means had long ago escaped the southern region, leaving that harsh land primarily to the Uninefs, who, incidentally, had been freed from slavery as a result of the massive migrations of their masters. A few Uninefs did manage to make it across by hook or crook, but for the most part, though free, the Uninefs were physically too weak to make the journey and still lacked access to the mechanisms, regardless of how rudimentary or advanced, necessary to venture across the chasm. The small number of superior Binefs that remained in the harsh southern region did so also because of economic reasons. After all, not all ancient Binefs had been wealthy slave owners, just most.

The Nefs that tilled the rich soil of the northern region began to take pride in their labor and accomplishments and soon forgot how they eschewed such work in their ancient lands. These new generations of Binefs, in fact, put a high value on hard work and rugged individualism. Moreover, they publicly claimed to have put aside their feelings of superiority over the few Uninefs that were living among them or the many that remained in the barren southern region. Furthermore, they claimed no responsibility for how their ancestors had enslaved the Uninefs and had treated them badly. The fact that generations of Uninefs, though few in number compared to the Binefs, were flourishing as their neighbors was evidence that past enslavement or ill treatment was no longer of any consequence. Even the Binefs that held on to the ancient inferiority myth had come to believe that it was wrong to enslave fellow Nefs. But all that was in the past and this was a new time and day. It was widely believed that any Nef with the wherewithal could escape the southern region and was free to work the rich soil across the divide. In fact, for those who still held fast to the inferiority myth, the large numbers of Uninefs that failed to make the journey or who perished in their attempts was further proof of their inherent inferiority.

Even after Uninefs on either side of the divide were free to produce food crops of their choosing, they continued to plant and harvest only the hybrid knowledge food. This was all they knew. Though this food still was not easily digested by Uninefs, over time their systems began to accommodate it more readily. Having adequate amounts of food that the rich soil so graciously yielded and being released from the rigors of slavery allowed the Uninefs to gain physical strength. These Uninefs who had an abundance of hybrid knowledge food did, however, discover some side effects not reported by their enslaved ancestors. After ingesting a full meal of hybrid knowledge they would experience hallucinations wherein negative, grotesque, and often demeaning images of themselves and fellow Uninefs would appear. At other times they would recall or have visions of life south of the divide as being just, democratic, and ideal. Still yet, if they overate or indulged in extremely rich varieties of the food knowledge, they would have bouts of amnesia about the past life of Uninefs and forget about their brothers and sisters still residing south of the Great Divide. When they relayed these strange incidents to their neighboring Binefs they found that, generally speaking, the Binefs felt and thought that way much of the time. Binefs viewed the negative visions and images of Uninefs and the altered recollections of the past (or the lack of recollections) as normal and healthy. In fact, they credited the food knowledge for keeping things in perspective and for keeping their thinking in line with reality. In any case, the Binefs believed that the past was not so bad after all and, even so, why dwell on the negative.

Hybrid knowledge crop production became as important in the northern region as it had been in the south. It continued to be the economic base for Nef societies and ultimately gave rise to experts who, in later years began to focus their attention on the tools and means of crossing the divide. After all, it was obvious to all, crop experts included, that the rich northern soil produced the hardiest crops. Yet many Nefs remained stranded in the ancient lands and needed to avail themselves of the opportunities that awaited them elsewhere. The most radical of northern Binefs and Uninefs wanted to close the divide altogether. They believed that the ravages of slavery, poverty, and/or poor diet and health had taken its toll on the southern Nefs, especially the Uninefs, leaving them unable to recover well enough to cross the divide. However, this was a radical view held only by a small number of northern Nefs who had not been affected so profoundly by the amnesia inducing knowledge. They remembered the strength-sapping labor that most ancient Uninefs endured and acknowledged the fact that no Nef would have had the strength or resources to cross the divide and explore the mythical lands without the benefit of slave labor. They argued that all generations of Nefs owed a great debt to the enslaved Uninefs of past ages and believed one way to repay the debt was to close the divide, making the journey to the fertile northern lands easy for the feeblest of southern Nefs. But because the Great Divide was ever so expansive, their ideas were dismissed as illogical, impractical, and, most of all, too labor intensive. Most of the northern Nefs, on the other hand, who voiced concerns about their brethren in the southern region looked for other ways to allow them to share in their bounty. Special groups of these crop experts across the northern region would travel miles and miles to council meetings concerning the theory and practice of crossing the Great Divide. However, despite their best rhetoric, nothing really changed from year to year. This is not to say that some Nefs did not benefit from the concerns and efforts of their cousins to the north and succeeded in journeying over the chasm. The overwhelming majority of Uninefs remained in the harsh land of the south while more of the unfortunate southern Binefs were able to make their escape. In either case, the most robust of the Binefs and Uninefs were able to take advantage of the opportunities and aid offered by the northern council. The departure of the strongest Nefs increasingly left the burden of southern crop production on the weakest Nefs. The Uninefs that were repeatedly left behind because of their lack of physical strength continued to struggle with the unrelenting soil to produce the hybrid knowledge food that, unknown to them, served to keep them in a weakened state. Their systems never had a chance to adapt so they were unable to gain the strength that the fortunate few northern Uninefs enjoyed. But despite the lack of progress in remedying the situation and because of the historical amnesia that flourished in the northern lands, the Nef council continued to meet year after year and talk about the unfortunate conditions that continued and were worsening in the ancient lands, proposing new and innovative means of transporting the southern Nefs across the Great Divide.

Deconstructing the Divide

Critical Race Theory maintains that racism is endemic and pervasive in American society to the extent that all but the most blatant, egregious racist behaviors and attitudes are considered normal. Thus, Critical Race Theorists, most notably Derrick Bell (1987) and Richard Delgado (1995), have used storytelling to bring into focus issues of race and racism in American society. The use of allegory allows the reader to view all too familiar issues and situations from new angles and perspectives. In 'Crossing the Great Divide' the author uses allegorical storytelling to illuminate issues of racial inequality in the United States and to explain why the gaps in educational opportunities, including access to information technology, persist into this century. In this story, the Uninefs are faced with these insurmountable gaps in the form of a vast and expansive chasm. This chasm represents the enormous inequalities in access to information technologies that exists between racial, ethnic and social-economic groups; a phenomenon that has come to be known as the digital divide. However the chasm or Great Divide is also a symbol of the many inequities that began and were nurtured long before the information or digital age. This immense chasm represents an 'analog divide' wherein historically disadvantaged racial groups, specifically Black Americans, have been denied equal access to economic and educational opportunities. Thus the stage was set for the digital divide, which widened the gap or compounded the problem, once this nation and globe passed into this age of information technology. One cannot understand why the Uninefs in this allegory are unable to cross the divide without understanding their history of oppression. By the same token, one cannot effectively address issues digital inequity as it pertains to African Americans without understanding the history of their oppression and how that oppression initiated and continues to support and foster inequalities in educational opportunities and achievement. One cannot in fact offer viable, long lasting solutions to the digital divide without seriously looking to alter attitudes and institutions in the general society. There is little hope of closing the digital divide while leaving the analog divide untouched.

The hybrid knowledge food represents a dominant epistemology that is riddled with theories of inferiority and consists of a body of 'knowledge' and 'truths' that support the superiority of the dominant group. African Americans have had a steady diet of education grounded in this dominant epistemology that has served to influence their views of themselves. In "The White Architects of Black Education", Watkins (2001) describes the role of philanthropies in the establishment of Black educational institutions not long after slavery was abolished. He maintains that some of the most influential philanthropic organizations served to maintain the social order that found Blacks at the bottom. Blacks schools were used as instruments of social engineering wherein the curriculum prepared students for occupancy of the lower layers of society only. Furthermore, the curriculum was absent of any African history or experiences that would engender a sense of pride in the African American student. In his work concerning reparations, Robinson (2000) states, "[f]ar too many Americans of African descent believe their history starts in America with bondage and struggles forward from there toward today's second-class citizenship. The cost of this obstructed view of ourselves, of our history is incalculable. How can we be *collectively* successful if we have no idea or worse, the wrong idea of who we were and, therefore, are? We are history's amnesiacs fitted with the memories of others…. America' contemporary racial problems cannot be solved, racism cannot be arrested, achievement gaps cannot be fully closed until Americans—*all Americans*—are repaired in their views of Africa's role in history. (p. 16)."

Like the Uninefs in the tale, African American children know little about their history beyond enslavement and therefore cannot truly understand the predicament they are in. Their history and even their oppression is blatantly left out of American art and history. There is little to comfort them in their struggles. There is no past to take pride in or to foster self-esteem. Furthermore, they have little to counteract the negative images of themselves and their innate abilities that have been ingrained for decades, even centuries, by means of their educational experiences. Robinson further states, "Blacks and no less whites, need to know that in centuries preceding that Atlantic slave trade and the invention of a virulent racism to justify it, the idea of black inferiority did not exist (p. 17)". However a dominant epistemology that supports racism and inferiority theory severely alters and omits the accomplishments of those from oppressed groups and the history of their oppression that would explain why they fall short in almost every measure of economic and educational achievement. Many Black Americans are trapped in the most impoverished urban areas in this nation without truly understanding the ongoing effects of slavery and the social and economic discrimination that followed slavery and prevented the escape of all but a relative few. Wilson (2001) states, "[o]ne of the legacies of historic racial and class subjugation in America is a unique and growing concentration of minority residents in the most impoverished areas of the nation's metropolises (p. 15)" He further explains that "[i]f large segments of the African-American population had not been historically segregated in inner-city ghettos, we would not be talking about the new urban poverty (p. 23). However, according to Wilson, segregation alone does not explain the emergence of what he defines as the new urban poverty. " I mean poor, segregated neighborhoods in which a substantial majority of individual adults are either unemployed or have dropped out of the labor force altogether (p. 19)." Job discrimination, residential segregation, public policy that allowed for the concentration of low income housing, in addition to the absence of effective labor-market policy have all contributed to blight of the inner city and the continued entrapment of the ghetto resident. Like the weakened Uninefs who were unable to journey into the mythical northern regions, many African Americans are living in a cycle of poverty without the resources or strength to pull themselves up the socio-economic ladder. They attend poorly funded schools, with poorly trained teachers, and with uninspired curricula. They are not told that they are the victims of decades institutional racism that created their dire situations. Rather they are told to look to the growing Black Middle Class as proof that it is possible to 'be anything you want to be'. The message is that failure to achieve means one is inherently unable to achieve. How else would one explain the incredible numbers of African American children that find themselves in impoverished homes and who fail or drop out of school. If a history of racism and truncated opportunities do not account for the schools described in Kozol's (1991) "Savage Inequalities", then inferiority theory must. That is the message that poor African American children are ingesting and internalizing daily. The analog divide must be faced for what it is and American institutions challenged to accept responsibility for closing gaps that they were complicit in creating. The fact remains that most minority children attend schools with high minority enrollments and limited and often scandalously absent resources. Educators interested in closing the digital divide for some of America's poorest and most despised children should perhaps first look at the true source and nature of the problem. If one cannot or will not get to the root cause of a problem, it is unlikely that one will uncover the most effectual solution.

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Bridging the Digital Divide: A School's Success Story

Edmundo F. Litton
School of Education
Loyola Marymount University
United States
elitton@lmu.edu

Abstract: This study is meant to contribute to the discussions on the digital divide. The goal of this project was to study the role of technology in the educational experience of diverse learners. "Diverse learners" in this study refer to students who share one, two or all of the following characteristics: female, an ethnic minority, or economically poor. This study explores issues surrounding the digital divide and documents what a high school has done to encourage their female Latina students to see the importance of computer technology in their lives. Data was gathered though observations and interviews with students, teachers, and administrators of the school. The results show school leadership and parental involvement are among key factors that can assist students see the importance of computer technology in their lives. Interviews with students also revealed that having access to a computer at home has an impact on computer literacy.

Introduction

Many educators believe computer technology has the power to improve the education of diverse learners in elementary and secondary schools. This belief has led to major investments in computer technology in schools. Massive amounts of money are being spent on purchasing equipment, connecting classrooms to the Internet, or providing professional development for teachers. "The investment in technology for schools resembles the investments being made in many 'dot-com' Internet companies. In both cases, the investments are based on the *potential* of new technologies, in the hope that this potential will be fulfilled in the coming years" (Kleiman, 2000, p. 7).

While computer technology has improved the educational experiences of many students, research has shown that there are still members of the educational community who are not included or represented in the technology agenda. Computer technology has fallen short of its promises to students who are female, ethnic minority, and students who are poor. The gap between those who are able to fully participate in the technology agenda and those who are not is often referred to as the *digital divide* (Bracey, 2000).

My goal is to study the role of technology in the educational experience of diverse learners. Diverse learners in this study refers to students who share one, two or all of the following characteristics: female, an ethnic minority, or economically poor. For this study, I explored issues surrounding the digital divide and I documented what a Catholic high school in the Los Angeles area is doing to encourage their students to see the importance of computer technology in their lives.

Background

Computer technology allows students of different backgrounds to arrive at a solution to a problem by sharing diverse viewpoints. Despite this major benefit of using computers in teaching, research has shown that some students are not benefiting from learning through computers.

Female students are less likely to see the importance of computers in their lives than male students. Gender inequity in education is nothing new. Sadker and Sadker (1995) first showed how schools perpetuate the underachievement of female students, especially in Mathematics and Science. Gollnick and Chinn (1997) explain that the underachievement of females in school is a product of a system that perpetuates the belief that female students are not as academically capable as male students. Teachers expect less of their female students. It is therefore not surprising that female students are less interested in computer technology. Kelly (2000) states, "one of the first indicators of this gender disparity may be the Advanced Placement exam in computer science. Girls accounted for only 17 percent of the test takers on the A exam and 9 percent on the more difficult AB exam" (p. 155). Huber and Schofield (1998) studied the attitudes of male and female elementary school students in Costa Rica. Their study revealed that female students have a less positive attitude towards computers than the male students due a number of factors: male biased software, the stress on competition in most computer classes, stereotypical view of computer use as a male activity (even by female computer teachers), less teacher assistance for female students, and less computer use of female students outside of the classroom. As a result of these school experiences, female students are less likely to seek a career in the computer industry and are not able to enjoy the same economic prosperity as their male counterparts.

Economics also plays a role in how computers are used in teaching learning. Access to computers is a major factor that prohibits all students from learning through computers. The high cost of computers still prevents many schools from making computers available to students. Schools in affluent neighborhoods are also more likely to have a full-time technology coordinator and teachers in less affluent districts have less access to professional development (McAdoo, 2000). Furthermore, students in poorer communities use computers for drill-and-practice type of activities while students in affluent communities use computers for inquiry-based lessons and collaborative learning (Kleiman, 2000). Thus, in poor communities, the computer leads the student. In rich communities the students control the computer for their own purposes. In order to bridge the digital divide, researchers and educators need to come up with ways to make computer usage meaningful for people who are poor.

There is belief that the digital divide will fade due to "market pressures, with decreasing hardware and connectivity costs inevitably leveling the digital playing field" (Carvin, 2000, p. 3). However, some researchers have been able to show the members of ethnic minority communities may not see computer technology as important to their lives even if they have the money to purchase computers. Holmes (1997) notes that many African Americans do not see the Internet as a relevant part of their lives. Hoffman and Novak (1999) show that the absence of relevant multicultural content on the Internet makes surfing the World Wide Web less interesting to ethnic minority communities.

Schools can play a major role in bridging the digital divide. While access to computers in schools have increased dramatically, Becker (2000) notes that most the most creative and frequent uses of computers in schools are still not related to the general curricula. Most usage of computers is still only a part of specialized classes, such as computer classes. Becker (2000) discusses several factors that affect computer usage of schools. First, access to computers in the classroom often dictates how much work a teacher may assign a student. Becker points out that teachers with at least one computer in the classroom are more likely to assign computer work more frequently than those teachers who have to bring their class to a computer lab. Teachers who also had computers in the classroom, were also more likely to use various software (e.g. spreadsheets for Math and Science teachers, word-processing for English teachers) than those who had access to computers in a lab. Secondly, Becker shows that teachers must have the necessary expertise to use computers effectively for teaching. "To use computers effectively in their classroom, teachers must have certain levels of expertise in basic computer operations" (Becker, 2000, p. 54). Teachers must also believe that the use of computers can really make them more effective educators.

Computer technology has the promise of making learning and teaching a more meaningful experience for diverse populations. No one has quick solutions to the problem of the digital divide in schools. However, "as a society, we need to establish a comprehensive strategy that addresses it from all angles. Access, literacy, content, cultural relevance, and community needs are just a few of these factors" (Carvin, 2000, p. 13).

There have been institutions that have addressed the problem of the digital divide. Furger (1998) discusses the success of "The Odyssey Project", a project designed to integrate computer skills and activities across the curriculum at the Albany Academy for Girls, New York. The project was specifically for middle school students because "there's no more critical time than middle school years to expose girls to the many and varied uses of computes, to give them rich opportunities to explore their capabilities, and to lay a solid foundation that will give girls the skills and the confidence they need to explore other aspects of the technology during their high school years and beyond" (Furger, 1998, p. 142). The project was successful because he students were empowered to select the appropriate technology to complete the activity. The use of computers was not the focus of the activities. Technology was a tool to complete the activity.

The Computer Clubhouse (organized in collaboration with the MIT Media Laboratory) in Massachusetts sought to provide access to technology to inner city youth. "The Clubhouse is based not only on new technology, but on new ideas about learning and community – where young people and adult mentors work together on projects, using new technologies to explore and experiment in new ways" (Resnick, Rusk, and Cooke, 1999, p. 266). Children who came to the clubhouse where given the tools that were necessary to learn how to design and create computer based products. They were not merely consumers of the technology.

Methodology

This project is an ethnographic study of an educational institution that is attempting to eliminate the digital divide. . St. Matthias High School in Downey, California is an all female Catholic high school. About 90% of the students are Latina and fall at or below the poverty guidelines set by the government. Despite the fact that these students fit the profile of people who are part of the "have nots" in the digital divide, an initial analysis of the documents presented to me reveal that the school is doing many things to ensure ethnic minority female students who are poor are benefiting from the technology revolution. My goal is to describe what the school is doing correctly to bridge the digital divide by interviewing students and teachers and observing technology classes at St. Matthias High School. Interviews with key administrators were conducted.

Results

My case study of St. Matthias High School in Downey shows that schools can bridge the digital divide. 90% of the students who attend this all-female high school are Latina and come from low socioeconomic backgrounds. Yet, 100% (n = 30) of the students who were interviewed (representing different levels of computer proficiency) all stated that they felt comfortable using computers. These students were also able to describe how they use computers for their schoolwork and believed that knowledge of computer skills are important for their future. The students appreciated the computer training they are receiving at their school.

St. Matthias High School is able to bridge the digital divide because of the following qualities:

a. *Vision for Technology*: The school created a multi-year plan for technology. The plan is updated every year and is revised in consultation with a technology committee composed of school administrators, students, community representatives, and higher education professionals. In 1995, the school did not have a single computer. By 2001, the school had over 100 computers (purchased and donated), a server, digital cameras, and a satellite connection for the Internet. All the teachers in the school have a computer in their classroom. All of the classrooms are wired for the Internet and have software appropriate for the teacher's content area. The school also has several labs that teachers and students can use.

b. *Leadership*: The school has an administration that is an advocate for technology. The administration and teachers in the school truly believe that their students need to be computer literate in order to have a better future. Technology is a priority and the administration continues to set aside resources for equipment and professional development. The administration also spends time developing partnerships with all of the school's stakeholders. The community shares leadership for technology. The school has established an advisory board composed of students, parents, teachers, parents, university professors, and community leaders.

c. *Professional Development for Teachers*: Teachers were given the opportunity to attend seminars and training sessions related to technology. The school administration set aside money for teachers to attend national conferences. Teachers were given paid time-off to attend conferences and workshops. In the questionnaire administered for this study, the teachers stressed in their responses that the professional development that was provided to them by the school was invaluable. The professional development allowed them to explore how computers can improve their teaching. The teachers also stated that the school administration empowered them to learn about computer technology at their own pace based on their individual needs.

d. *Parent involvement*: The school administration knew that the parents of their students had to believe in the importance of technology. In order to do this, the school created an opportunity for parents to see how technology can change their lives. The school began offering tuition-free Microsoft Office certification classes for the parents. Parents attended classes in the evening and on weekends. At the end of the training period, the parents received a certificate of proficiency. They were then able to use these certificates to get better paying jobs. The parents have now become advocates for the use of computer technology.

e. *Successful fund raising*: The school administration knows that they need money to purchase equipment or professional development. Every year, the school hosts a carnival that raises about $50,000 for technology. The entire community is involved in the carnival. Aside from the carnival, the principal writes several grants every year.

f. *Meaningful computer use in the classroom*: Both teachers and students used computers in meaningful ways. The use of computers is integrated in the curriculum. Teachers used computers for attendance, grades, research, and preparing lessons. Students can connect to the Internet to check their grades or look at assignments posted by the teacher. Students used computers to complete school projects. In an Art class, students created web pages to display their photographs. In one Religion class, students used PowerPoint to present their reports. In all instances of computer use in the school, the curriculum drives the use of the technology. In one Spanish class, students used language software to practice vocabulary exercises.

g. *Leadership opportunities*: Students who decide to take the advanced level computer classes, become technology leaders in the school. They assist teachers and other students. These students also maintain the school server and web sites. Whenever a contractor comes to the school to do routine maintenance on any computer equipment, these students are asked to observe the work that is being done. These students, in many ways, receive technology training that is beyond using computers for school projects.

St. Matthias High School is doing an exemplary job of bridging the digital divide. However, many of the students felt that the absence of a computer at home prevented them from becoming even more computer literate. Students who do not have computer access at home are less likely to use the Internet for schoolwork. Students who have computers at home often spend time learning software on their own time. This "anytime, anywhere" access is important for empowerment.

Conclusion

Schools can be a catalyst for bridging the digital divide. "Schools play a critical role in ensuring equal opportunity for less-advantaged children by providing access to a wide range of enriching experiences including exposure to computer technology" (Becker, H. J., 2000, p. 45). Schools have the power to motivate or discourage students from participating in the technology revolution. It is clear that schools must be willing to make the necessary commitment in personnel and finances. Schools must also start with a vision of technology use that includes use of computers by all members of the school community (administrators, teachers, students, and parents). Involving all stakeholders will lead to ownership of the technology vision of the school. Lastly, schools need to make an effort to assisting students to have access to technology at home.

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Digital Equity Toolkit

Robert McLaughlin, National Institute for Community Innovations, US

The National Institute for Community Innovations (NICI) in collaboration with the PT3 program's digital equity task force, has developed a free toolkit pointing preservice and inservice educators and teacher education faculty to free resources enabling them to address the digital divide in their classroom and community.

Inequitable access for students and educators in low-income communities to learning technology resources remains a vexing and substantial problem in the US and in many other nations. At the same time, foundations, corporate philanthropies and public sector initiatives are investing enormous sums to reduce the digital divide in classrooms and communities. Yet, future and current educators and those who provide teacher preparation and professional development remain almost entirely unaware of these resources, how to tap them, and how to integrate them into educator inservice and preservice.

NICI has developed a free web-based ***Digital Equity Toolkit*** to point educators to free resources to reduce the digital divide. The Toolkit currently focuses on US-based resources but will become a more internationally oriented resource over time. NICI is working with several national educational organizations to assist in bringing the Toolkit's resources to the attention of educators and teacher education faculty.

In this session, participants will learn about the toolkit, explore how to use it in teacher preparation, and recommend enhancements in the toolkit's format, contents and usability.

Embracing Critical Perspectives on Multicultural Pedagogy in Teacher Education: An Online Intercultural Exchange

James C. McShay, Iowa State University
Israel Colón Jr., New York City Technical College

The multicultural literature clearly documents the challenges teacher education programs face in preparing competent culturally responsible teachers for our nation's schools. Many educational researchers support the notion that teacher education programs are not doing enough to prepare predominately White, female, and middle-class teachers who come from homogeneous settings to embrace emerging critical perspectives on multicultural pedagogical practices in schooling. The literature also suggests that numerous socialization factors affect preservice teachers perspectives on race, ethnicity, gender, social class, and ability. The purpose of this ongoing project is to explore how computer mediated communication (CMC) can be used to create new and varied opportunities for prospective teachers to explore, and as a result, broaden their own perspectives on critical issues facing cultural diversity in education.

This paper reports on a work in progress that will share information about the design, implementation, and evaluation of an asynchronous eight-week online intercultural learning exchange between two distinct groups. These two groups consisted of 44 preservice teachers enrolled in a teacher education program at a Midwestern university and 18 preservice and inservice teachers enrolled in a teacher education program at a college located in an urban setting on the east coast. A web-based course management software program, WebCT, was used to support this online intercultural learning exchange between both groups of students. WebCT's discussion board feature was used to create a learning environment that promotes reflective discourse and interaction among the participants. After exploring the process of creating a culturally diverse online community of educators; this paper identifies specific strategies for enabling predominately White preservice teachers to understand powerful socialization factors that influence the way in which they think, feel, and behave. Furthermore, preservice teachers explore how their participation in various social systems help to construct their own perspectives on multiculturalism and schooling through reflecting critically on their collaborations with inservice teachers who live and work in an urban populace. Observations on the inservice teachers' reactions to this multicultural experience will also be shared. Finally, this paper calls for further research on how computer mediated learning environments can help teacher education programs prepare competent culturally responsible teachers for the multicultural classroom.

Creating Accessible Powerpoint Presentations for Students with Disabiliites

Tamara L. Pratt, Mercyhurst College, US

Description

Learn how to incorporate Power Point with instruction for students with physical disabilities in order to enhance their learning experiences

The intended objective of this poster presentation is to expose teachers to the many adaptive uses of Power Point as a teaching tool. Participants will see how Power Point is used to assist students with disabilities. Participants will be able to think ahead of adaptations needed for their students with disabilities, to make students active participants of their learning. Prerequisite skills participant skills include basic knowledge of computer use, how to import and export files, and the use of a scanner.

The presenter is a current graduate student in the field of Special Education at Mercyhurst College working with the PT3 grant. She has experience developing accessible Power Point presentations for students with multiple disabilities.

I. Universal Design – means it's accessible to most students with disabilities.
    A. Visual Disabilities
        1. Less distracting environment
        2. Color reversal
        3. Large font – simple
        4. Mouse over to describe pictures, buttons, directions…
        5. Consistent placement of buttons
        6. Text voice over
        7. Screen reader for web browsing
    B. Hearing Disabilities
        1. Minimize background distractions such as music, animation.
        2. Minimize excessive noise levels in work area such as other students.
        3. For students with partial hearing loss use headphones to listen to presentation.
        4. Limit text to clear and large –bold key ideas, phrases, and vocabulary words.
        5. If you import an iMovie make sure you have closed captioning.
    C. Physical Disabilities
        1. Use mouse over to eliminate need for mouse click to progress to next slide.
        2. Consistent button positioning to eliminate too much mouse movement.
    D. Learning Disabilities
        1. Highlighting text, key points vocabulary words.
        2. Voice over for reading text
        3. Minimizing background distractions
        4. Headphones
        5. Consistent placement of buttons
        6. Larger text
        7. Color reversal
        8. Chunking content (short sections)
        9. Ability appropriate text, age appropriate content

II. Achievement of Objectives
    A. Mouse over
    B. Voice over
    C. Button placement
    D. Slide transitions
    E. Voice recording
        1. slide narration
        2. inserting voice on a slide
    F. Changing font size, color

G. Bold or highlighted words, phrases
H. Cursor speed
I. Automatically open as presentation or does student need to start presentation
    1. show begins automatically
    2. slide begins as an outline

Equity Lenses: Diversity-Responsive Use of Advanced Technologies for Math and Science Education

J. David Ramirez, CLMER/CSULB
Kim Williams, Northwestern University
Kevin Rocap, CLMER/CSULB

The work to be shared in the proposed SITE paper was supported by a seed grant from the Center for Innovative Learning Technologies (CILT), as part of an NSF grant administered by SRI. CILT is an organization made up of partner institutions and individual members nationally involved in the design, development, implementation and evaluation of advanced technologies in math and science. Apropos to the "Digital Divide" theme of the CILT2000 conference the goal of this seed grant project was to help inform an agenda for equity and diversity-responsiveness within CILT and with regard to educational technology efforts in IT and educational associations similar to CILT.

CILT has a commitment to addressing the digital divide, yet there is a recognized need within CILT to define criteria for what we mean by equity, diversity and action in a CILT context. Without a framework for identifying issues and strategies, it's difficult for us to move forward with this commitment strategically and to support and inform CILT members about approaches to addressing equity in R&D efforts. The paper authors facilitated the development of equity lenses, guidance and criteria, through the use of which we may view, assess, recognize and transform, as appropriate, CILT-type endeavors with regard to their contribution to addressing issues of diversity-responsiveness and equity, particularly with regard to the Digital Divide.

To accomplish this, we involved key technology, math/science and community leaders as well as collaborating partners in the development of an "equity lenses" framework for identifying issues and strategies synergistically, across the four CILT themes - Visualization and Modeling; Ubiquitous Computing; Community Tools; and Assessments for Learning. The equity lens project was initiated with the overall goal of identifying promising research and development, educational and community-based activities and other programs that consider issues of equity and diversity as integral to their work. Members of the equity lens group, though bringing different experiences to this project, all held a collective belief in the importance of developing helpful rubrics or guides for considering equity and diversity issues in the research design of CILT-type projects.

We engaged in several key activities in order to draft key issues, rubrics and guidelines. 1) We queried colleagues about projects that they were aware of which consider issues of equity and diversity in at least one phase of their work (e.g., design, piloting, data collection); 2) We met with SRI researchers (February, 2001) to obtain permission to review CILT seed grant abstracts. Our goal was to examine the abstracts to see if, or where, diversity and equity issues were addressed. We also considered how equity and diversity issues could have naturally been included. 3) We met as a group in late February to discuss our projects and what we'd learned. 4) We met in June, 2001 to develop a broad-based survey designed to query the CILT membership and members of the advanced learning technology community and the educational research community about equity and diversity issues. 5) We presented our platform to a group of IEEE conference attendees in Madison, WI. We also asked these attendees to review our survey and provide feedback about the questions we proposed to ask of those described in #3. 4) Through on-line discussions and phone conferences we planned a focus group meeting in California for Fall 2001. 5) We are gathering and analyzing surveys to further the development of criteria, guidance and rubrics that will be shared through this SITE presentation.

This paper will share the findings and the guidance and criteria of this CILT seed grant effort and will engage participants in considering specific issues in the design, implementation and evaluation of advanced learning technologies in K-12 math and science education.

'Facelessness' and its Impact on Democracy and Diversity in Virtual Communities

Carol Reid
School of Education and Early Childhood Studies
University of Western Sydney
Australia
c.reid@uws.edu.au

Abstract: This paper investigates the relationship between new technologies, pedagogy and cultural diversity. The importance of this research for teacher trainees cannot be underestimated. Teachers are expected to use new technologies in classrooms often without any critical understanding of their impact on the social and cultural dynamics of classrooms (Lankshear and Snyder, 2000:121). In this paper, the contradictory socio-cultural dynamics produced by 'facelessness' in an on-line community are examined.

Introduction

The research project on which this paper is based was entitled *"Framing Technological Literacy: an ethnography of social space in teaching and learning on-line"*. It was an ethnographic study of the socio-cultural dynamics - including pedagogical frameworks - when using Information and Communication Technologies (ICTs) in an undergraduate subject - *Cultural Diversity and Learning*. This was a first year social science subject that I authored and taught to primary teacher education students. Students used a discussion board and email as well as a subject website and other materials within the teaching platform called 'Blackboard'.

In focus group discussions at the end of semester, students talked about their experiences of using ICTs in this way. All four focus groups, in addition to many of the discussion threads, made reference to the absence of visual clues, and in particular to the absence of face. For some this was liberating and for others it created a sense of vulnerability. To contextualise these socio-cultural dimensions, the elements of the subject *Cultural Diversity and Learning* need to be outlined.

The subject Cultural Diversity and Learning takes a critical approach[1] and has two strands. The first is concerned with developing concepts and understandings about the ways in which cultural diversity is constructed at the national, local and global level. There is an examination of traditional, liberal and critical ideologies and pedagogical frameworks in education and how they shape space for cultural diversity (Solomon, 1995).

These understandings are then applied to cyberspace to critically analyse knowledge and information found on websites, as well as the material contexts from which they have been produced. Two main approaches are introduced: neo-Marxist and feminist post-structuralist. Neo-Marxist theories regarding the commodification of information and entertainment are used to explore the potential for democratic use of the Internet. This is not only about production but also about the way in which children are being turned into consumers as the defining principle of childhood. Feminist post-structuralist analysis of the same sites shifts the focus to textual analysis - the design, representation and reproduction of identities in cyberspace. Indeed, the design of the website incorporates a background visual metaphor of a brick wall on every page. This idea was borrowed from Pink Floyd's album, "Another Brick in the Wall"[2].

Part of the subject is an on-line module in Weeks 7-9 entitled 'Cultural Literacy'. Cultural literacy is understood in this context as "a connection between the recognition, production and retrieval of what is constituted as information, on the one hand, and its use or deployment as a communication practice on the other" (Schirato and Yell, 2000:36). Students use on-line readings from journals and other cultural studies websites worldwide[3] as well as film reviews provided by Paul Byrnes, a Sydney Morning Herald journalist. During the three weeks, students discuss focus questions around readings - individually - in on-line forums. Once a week they respond in groups to a substantive question on all the weekly readings, which is an assessable item.

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[1] See Reid, 2000 for full discussion of this approach.

[2] In the lyrics, education in general was seen as 'thought control' with the outcome being conformity and loss of diversity.

[3] Particular thanks to Douglas Kellner of UCLA for permission to link to his very useful website.

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Disney is used as a focus for critique as Disney enterprises are strong examples of the commodification of entertainment and information. In addition, Disney is widely critiqued by academics - and everyone knows Disney. Disney images and characters largely convey a homogenised view of the world by erasing or crudely stereotyping the diversity of sexualities, genders and ethnicities found globally. Perhaps not surprisingly this erasure is often understood more by those marginalized than other groups. For example, Arabic teacher education students are quite critical of Disney Enterprises as the Disney studios were well known for their anti-Arab sentiment during the Gulf War as well as the fact that Arabs are often portrayed as the bad guys in Disney films for children. For other students there is dismay that their beloved Disney is the object of critique!

When students have completed this module, they search for their own sites, then compare and contrast their findings (in pairs) using the analytical skills and concepts derived from the on-line module and understandings developed earlier. Students combine visual, communicative and technological literacies with social and cultural theory to critically analyse information and entertainment on the Internet. In this way, they develop pedagogical understandings about the way in which ICTs can be used to teach critical literacies. The knowledge gained from both forms of literacy practice - communicative and socio-cultural - frames their exploration of the Internet and enables a socio-cultural analysis of websites for children. Analyses are presented using PowerPoint slide shows or constructing websites thus learning practical skills and knowledge about the pedagogy of software in the context of socio-cultural analysis.

In the remainder of this paper, there is an exploration of the students' responses to the on-line component of this subject. Their responses reveal the connections between the knowledge or content of the subject, the medium - in terms of the communication literacies employed - and the nature of the interactions, in terms of whether or not they were democratic and inclusive.

'Facelessness'

In the [embodied] tutorial you might think ' oh this person might think I'm a bit of a dropkick', but if it's on the Internet people are less inhibited and they're going to write what they think. [Young woman - focus group]

The analysis of discussion threads in this subject, and focus group discussions at the end of semester, revealed the centrality of 'face' - both its presence and absence - in social relations. The decoupling of faces and names, and time and place, appears to afford students a perceived degree of anonymity despite the fact that their names appear next to their contributions. The fact that peers are not able to judge them appeared to be more important than the fact that the lecturer was able to do so. This indicates a perception about social relations - indeed power relations. Are we, for example, more afraid of judgement when it is faceless? Is judgement harsher when those we judge are unknown to us? In an attempt to answer these two questions, the paper examines the tensions created by 'facelessness', in particular how 'facelessness' shapes democratic space in a culturally diverse community.

'Othering' versus 'deliberating'

I think it must be a personality thing. People being hard on the strangers that they didn't know, because they haven't developed friendships and they don't all know what everyone's like...(woman -focus group)

The 136 students involved in this project were largely unknown to each other as they were in their first semester of study in primary teacher education. In a sense then, they were unable to construct an image, or face, of authors who contributed to on-line debates, nor were they able to do so in other classes since their tutorial groups were different for every subject. For some this caused anxiety but for others a lack of knowing the embodied Other appeared to provide opportunities for a more deliberative democratic ethos (London, 1995). Deliberative democracy, London argues, "is rooted in the ideal of self-governance in which political truths emerge not from the clash of pre-established interests and preferences but from reasoned discussion about issues involving the common good" (ibid: 34). As argued elsewhere (Reid, 2000) the desire to "read off" difference (as in the process of "Othering") as opposed to negotiating difference is hegemonic among undergraduate teacher education students. A shift from a focus on the presumed identities of students appears to have been enabled when the relationship between the subject content, the student demographics[4], and the medium, merged in sometimes-powerful ways.

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[4] See end of Reid, 2000 for graphs of local population in terms of religion and number of overseas born.

I think the online really suited cultural diversity – the online part of it - because it [reality] is like that. There are lots of different points of view and I don't think you would have got as much out of the subject in a tutorial situation, face-to-face.[mature woman - focus group]

This particular observation was supported by another student, a mature-aged female, who commented that some students spoke more *for themselves* [my emphasis] on-line than in embodied space. She explains:

They are quiet [in embodied tutorials] —Muslim ladies are quiet, very quiet. Their names on the discussion board... had a lot to offer. It must have been incredible for them too, to voice their opinions. It was easier for them...

It certainly appeared that some students felt comfortable drawing on their own cultural knowledge and sharing it with their fellow students. At times, this appeared to be an outlet for pent up resentment or frustration for those who had felt themselves subjected to the ignorance of others. For example on one discussion thread:

- An Islamic student expressed the annoyance she felt when people assumed that wearing a scarf [sic] was 'a Turkish thing, and not an Islamic one.'
- Another Islamic student agreed, protesting against the ignorance and stereotyping which often insists that all Arabic speakers must be Lebanese, that all women who wear a scarf [sic] must be Lebanese, and that all female followers of Islam must be oppressed. This student insisted that 'the solution here is pure and simple - education.'

A large number of students exchanged information about their personal biographies in order to explain their different reactions to their learning experience. This sort of exploration was of great relevance in a subject like *Cultural Diversity and Learning* where the students are encouraged to explore the intersection of their own biographies and their ideological positions in relation to the social construction of difference and diversity. This positionality became evident when students considered their audience and whether or not they felt constrained on the discussion board.

Definitely –because it is so—it's a touchy subject, and everybody is so multicultural, here especially.[young fe male - focus group]

That was the point that I had, but also too, to make sure that I didn't offend anyone, that I had said the exact thing that I wanted and it couldn't be taken out of context I suppose. It made me concentrate a lot more on what I was actually thinking and what I really felt about the subject.[mature female - focus group]

The tension created by 'facelessness' is also assisted by certain literacy practices. Students disagreed over what text types are liberating in terms of on-line discussion. Some like the fact that you can use a narrative approach and state your own ideas drawing on personal experience while others found this tone acted to filter or exclude their voices because they felt uncomfortable with personal revelation. This has considerable implication for literacy practices in terms of text types but also cultural literacy in terms of the social and cultural dimensions of the Internet, as a cultural field. The apparent 'search for voice' is typical of the new ways in which those with cultural capital in one context have to learn new forms of literacy (Lankshear and Snyder, 2000), as cultural capital in one field is not necessarily as powerful in another cultural field (Shirato and Yell, 2000).

Productive Literacy Practices

You can say more, and you can tell people off more. You can write a load of waffle, you can be rude, you can have a considered response, but yeah it's different, it's very different. [Mature woman - focus group]

Agger's (2001) tentative social theory of the Internet suggests that authoring (websites, homepages, hypertext) is an essential part of struggle in the democratisation and humanisation of the Internet. The text types students use are very diverse as the woman above astutely observes. Creating democratic spaces requires openness to a range of literacy tools that people use to connect to new knowledge. However, not all literacy practices are productive. Two mature male students in this project discussed some aspects of what they saw as productive literacy practices.

That critique of each other [on-line] is good...sometimes, it puts people back in their places so to speak whereas in tutorial sometimes...you just let it go...sometimes you can say real crap and people agree with you...they don't even listen, they're not even there.

I thought about what I was going to say, which maybe you don't do in a normal tutorial. You don't know what questions necessarily are going to come up, but I can remember definitely thinking you know—maybe I perhaps started tending to think, you know, should I or shouldn't I say something radical, you know what I mean?

However, while this direct type of literacy practice was productive in terms of providing a much broader dialogue of ideas across the student body, the 'faceless' aspect of the discussion created a rebound effect in ways that were not predicted. One of these was related to the use of peer-based assessment.

Some Effects of Recoupling Names and Faces

...we came together and we didn't know anyone... I think peer marking became a bit hard, but then again I guess it was good too because you did it genuinely.[mature male - focus group]

Despite the fact that many students were liberated by 'facelessness' it was not necessarily because identity was removed. The fact that others are complicit in the construction of our identities, embodied and virtual, is evident when the removal of an embodied identity was replaced by a cyber identity in the on-line discussions. For example, one all female focus group had a prolonged discussion on the relationship between the cyber identities they had come to know and the emotions they attached to the names based on these cyber identities. When the recoupling of names and faces occurred it produced effects of power that in the context of face-to-face peer marking became difficult for some students who had been outspoken on the discussion site. One student commented:

You learned all these names and now you'd go 'oh yeah, you put a name to a face'. Not that you'd remember what they spoke about, you just remember the feelings.

Others found that a lack of personal embodied knowledge produced an almost 'ferocious objectivity':

You just took everything that they said and you marked them on what they'd said. Critical, I think.... Ferocious is a strong word, critical I think because you didn't have that personality, like the personal side.

While this sense of alienation was not felt by all students, the effects of recoupling names and faces demonstrates the unintended consequences of 'facelessness' in teaching and learning on-line, in particular its link to technologies of power such as assessment and profiling activities (Robins and Webster, 1999).

Conclusion

'Facelessness' in this social science subject produced socio-cultural dynamics that were enmeshed in both virtual and embodied communities (local, national and global). This created an environment of greater risk whereby strategies of negotiation, dialogue and deliberation were most valued. Literacy practices which best supported the ability to produce such complex texts were based on knowledge of social and cultural structures and processes. Such knowledge framed technological and communicative literacy. This critical approach demonstrates that pedagogically, science (including social science) "is a social and historical activity" which cannot ignore "the social and communitarian dimensions of cognition based as they are in language" (Olssen, 1996, p.289).

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CLMER Telementoring: Diversity-Responsive Teaching and Learning with Technology

Kevin Rocap, CLMER/CSULB, US
Yolanda Ronquillo, CLMER/CSULB, US
Joe Feria-Galicia, CLMER/CSULB, US

Since 1996 the center for Minority Education Research (CLMER) at California State University, Long Beach has worked closely with multilingual, multicultural, critical educators to develop professional development communities of practice meaningful, diversity-responsive uses of computer and telecommunications technologies in K-12 teaching and learning and teacher preparation. This work was initiated as a K-12 inservice teacher and parent professional development program with CLMER as the lead agency for the Pacific Southwest Regional Technology in Education Consortium (PSRTEC) and has been expanded and enhanced to address pre-service preparation issues as part of a PT3 Catalyst grant. Our purpose is to work in partnership with cadres of 20-30 teachers, parents, pre-service teachers and/or faculty as communities of practice, to learn together what we can do to improve access to information and communication technologies, to develop high-quality multilingual, multicultural learning approaches and to develop critical pedagogical strategies. We draw on theories and practices of multilingual, multicultural and anti-racist educators that include Paulo Freire, Alma Flor Ada, Sonia Nieto, Gloria Ladson-Billings, Jim Cummins, J. David Ramirez, KimOanh Nguyen-Lam and others.

The design of the CLMER Telementoring model has been to ensure that all participants engage as a community of practice around the following key CLM ER Telementor "lenses:"

- Critical Pedagogy
- Language (multilingual education and language rights)
- Anti-Racist Education
- Standards
- Community Learning Theory (relates to school-home-community collaboration, as well as to adult learning, community organizing and diversity-responsive approaches, e.g., culturally-based approaches such as Razalogia, born out of Chicano/Latino organizing strategies and culturally-responsive community wellness approaches).
- Technology Fluency

CLMER Telementoring goes beyond teaching about technology and is about improving critical approaches to teaching and learning while understanding, applying and critiquing issues of meaningful technology integration in the context of participants' practices.

CLMER Telementoring Methods

We have several ways that we make the lenses above a concrete part of the process. We engage in readings drawn from such sources as our own Virtual Power publication and the Beyond Heroes and Holidays anti-racism-across-the-curriculum text that we helped to produce. We also draw, as mentioned, from practitioners and theorists of multilingual, multicultural education such as Sonia Nieto, Jim Cummins, Alma Flor Ada, Paulo Freire and others (including making use of a critical pedagogy framework for planning learning activities and agendas). We also draw on sociocultural learning theories and practices associated with Computer-Supported Collaborative Learning. We then use technology communication and collaboration tools (e-mail, listserv, WebBoard, ICQ, etc.) to develop K-12 learning projects and to encourage reflection on diversity-responsive teaching and learning in the context of participants' current and anticipated practices. Participant learning projects may be as small as a learning activity and as large as the creation of a Community Learning and Technology Center, with most reflecting participants developing diversity and equity-themed project-based and/or problem-based thematic learning activities. Participants also have specific responsibility for mentoring others, making use of online and face-to-face approaches.

CLMER Telementor Requirements

There are some requirements of Telementors:

- Active participation in all planned professional development activities

- Agreement to create a project or unit of practice to be carried-out in one's own classroom/learning environments (these have varied from project-based learning activities to the formation of Parent Centers or Community Learning and Technology Centers. We don't have a cookie-cutter requirement for these except that they reflect integration of the CLMER Telementor lenses).
- We expect administrator support at a participant's site for their work as CLMER Telementors, for providing 8 days of paid release time and free professional development opportunities we ask administrators generally to grant 6 days of release time to their teachers at a later date to allow them to mentor and support others, as a way of sharing their knowledge/experiences.
- Participants give back by agreeing to a plan to mentor others, in their own schools, communities, or in other venues. Some of our sessions engage participants in dialogue about the purposes and practices of mentoring in order to strategize and action-plan together on their own mentoring plans.
- Active participation in planned online communication between face-to-face meetings.

Workshop Purpose

This workshop will share readings, resources and strategies associated with the CLMER Telementoring community of practice approach to professional development, as well as engage participants in active review and critique of learning projects designed by CLMER Telementors and invite sharing among participants of issues and promising practices for developing technology-enhanced, diversity-responsive teaching and learning approaches that target success and participation for underserved K-12 learners. Strategies and purposes for integrating visual and creative hands-on arts activities while developing critical multicultural approaches and developing technology fluency will be shared. Further, we will share the experiences and processes of working across diverse stakeholders, including teacher education faculty, teachers, low-income parents, pre-service teachers and others to "level the playing field" in the development of high-quality, diversity-responsive, community-connected learning projects.

The Robot League: Lego Mindstorms RIS in Schools

William Rust, Kansas State University, US
Kevin Kramer, Kansas State University, US

The Robot League is a bootstrap initiative of Kansas State University. The concept is to encourage interscholastic and intramural competition using Lego® Mindstorms™ Robotic Invention Systems™, RIS, kits. Participants, in classes, clubs, other school groups or homeschool groups, build autonomous robots that compete in pre-defined events. While all students are invited to participate, special emphasis is given to members of groups traditionally underrepresented in engineering, including females, minorities and low SES students.

Membership in the league is self-selecting. An open invitation was sent to area schools and those who asked to join were admitted. Teachers signing up were provided with one or more RIS kits. The two main requirements for accepting the kits were participating in one or more interscholastic competitions hosted by Kansas State and a 1-2 page written evaluation at the end of the year.

Participation ranges from 5th grade to high school. Some teacher initiatives pair high school students as leaders with middle and elementary school groups. Some participants are identified as gifted while most are not. At least one participant has been identified as marginally learning disabled.

The fundamental purpose of the league is to change attitudes among students. Many of the participants do not view school as particularly relevant or engaging nor do they view fields requiring higher education as viable options. By providing manipuables that require higher order thinking to accomplish well defined goals in a competitive environment, the league hopes to encourage students to take more math and science classes in high school and be better prepared for college. In addition, the league hopes to foster better feelings towards the school and encourage school spirit by having both intensely competitive but also light-hearted competitions.

This presentation will focus on how to set up a robot league and what were the short-term effects on the students participating. Other issues include multi-age classrooms and the relevance of technology in schools. The hands-on workshop includes building and programming a robot and participating in one of the league tests.

Bridging the Digital Divide through Technology Integration in an Urban Elementary School: A Study Report

Amy Staples, Ph.D.
Department of Exceptional Education
School of Education
University of Wisconsin-Milwaukee

Elizabeth Buchanan, Ph.D.
School of Information Sciences
University of Wisconsin-Milwaukee

Teachers who possess strong content knowledge and embed technology across all aspects of their teaching as a central means of creating active, engaging, and challenging learning communities have the potential to close the perennial gap in achievement between students in urban schools--who typically are members of minority, and often lower socioeconomic, groups--and their counterparts elsewhere (Children's Defense Fund, 1999). Statistics show that children of color in urban environments have fewer opportunities to access technology than their Caucasian counterparts of comparable income (Hoffman and Novak, 1998). Further, Caucasian Americans are more than twice as likely to own a computer than their peers of color (Hoffman and Novak, 1998). Even when children are placed in schools with computer technology, children in urban environments tend to engage in drill and practice activities rather than more meaningful activities which entail higher order thinking (CEO Forum, 1999). This finding may be due in part to teachers' feelings of inadequacy regarding effective technology use (NCES, 1998). NCES (1998) reports that only 20% of teachers feel well-prepared to integrate technology into their teaching.

In an effort to ease the digital divide, faculty and staff from the Schools of Education (SOE) and Library and Information Sciences (SLIS) at the University of Wisconsin-Milwaukee (UWM) and faculty at Starms Discovery Learning Center (DLC) in the Milwaukee Public Schools (MPS) forged a collaborative effort to address three key issues: teacher preparedness, technology availability, and technology integration. Students and teachers participated in a community-based project designed to narrow the digital divide through increasing students' knowledge of the local community and civil rights movement via the construction of a multimedia documentary.

Subjects in the study were kindergarten through fifth grade students in an inner city school, 80% of whom qualified for free or reduced lunch, 80% of whom were African American, and 20% of whom had disabilities. In other words, children who, due to their race, socioeconomic status, disability, and location of residence, are the very children who are typically excluded from enrichment programs such as the one herein. Teachers received staff development in various technologies and consulted with technology staff regarding the conceptualization of classwide projects which integrated technology. Students used digital cameras, digital video cameras, scanners, and various software tools to learn and share information about the civil rights movement in their city and nation. Information was obtained through traditional print resources as well as interviews with notable public activists, prominent local individuals, and neighborhood families, visits to the Black Holocaust Museum, and presentations by journalists who documented and archived the civil rights movement. Teacher and student attitudes, skills and beliefs surrounding technology were surveyed via questionnaire, interview, videotape, and worksample review.

The proposed presentation will discuss the projects and share findings, including student technology projects.

Considering Digital Equity in Teacher Preparation Programs: A Framework for Integrating Issues of Equity Across Content Disciplines

Nancy Allen, Paula Hamm, Patricia McIlveen, Martha Martini, David Ramirez, Paul Resta, Amy Staples, and Joy Wallace

The Preparing Tomorrow's Teachers to Use Technology (PT3) initiative sponsored by the Department of Education funded Schools of Education (SOE) across the country to support the integration of technology into teacher preparation programs. This funding affords SOEs the opportunity to reform or revise their teacher preparation programs in a number of ways including: revising or offering explicit technology coursework; integrating technology into existing methods courses; and helping faculty increase their technology skills. The goal of this work seems clear. The intent is that new teachers will be better prepared to integrate technology into their classrooms, to the betterment of the education for all of their students. In order to better the education for *all* students, the notion of digital equity must be addressed.

Digital equity exists when two conditions are met. First, every student must have equal physical access to technology tools, computers, and the Internet. Secondly, and equally important, this access must be occur with a meaningful teaching and learning context that directly responds to the needs of diverse students with regard to gender, race/ethnicity, culture, language, language proficiency, and special educational needs. How can we help teacher candidates develop this sensibility.

In this session we will present a Digital Equity Framework that SOEs can use as a guide to develop and assess the extent to which technology and equity issues are successfully integrated in their teacher preparation program. This framework draws upon the collaborative experience and expertise of representatives from PT3 projects with a commitment to digital equity and who have formed the Digital Equity Learning Community. .

The Digital Equity Framework can be used with faculty and students to facilitate the systematic integration of technology and equity issues across teacher preparation courses. The Framework allows teachers to plan instructional activities within subject areas, determine appropriate uses of technology and review the degree to which student diversity is being considered. Examples of how this model might be used will be provided.

Self, Visual Representation, Voice and Online Social Identity

Sharon Tettegah, University of Illinois, Urbana Champaign, US

Purpose

This paper documents key issues in electronic mediated visual representations of social identity, based on the teacher's psychological capital, in an online web-supported teaching and learning environment. Visual representation is very important because of a teacher's psychological capitol. Psychological capitol is defined as the memories, attitudes, experiences, and beliefs, which serve to provide the foundation for behaviors and practices. How teachers talk about things, do things and practice things in a classroom.

The constructs of social identity embedded in electronic visual representations of voice are new and recent phenomena. The first question I pose deals with, how does culturally embedded social identity emerge from textual representations of the person who is expressing their voice? If the visual as a mode of representation is systemic, rule governed, and an effect of the values of the culture and social identity in which it is used, then can we as researchers come to know what culture someone is from or their social identity merely by there visual representations in electronically online mediated environments (Bruner, 1977; Kress, 1998)?

Online studies on social identity (SIT) will become a very important issue in education. According to the research on SIT, social identity theory is defined as that part of an individual's self concept that is based upon the value and emotional significance of belonging in a social group (Jones, p. 214). Abrams and Hogg, 1990, defines social identity as 'the individuals knowledge that he belongs to certain social groups together with some emotional and value significant to him of the group membership (p. 7)(Tajfel, 1972a). Many other researchers contend that communication, talk and discourse are all culturally embedded (Trudgill, 1974; 1983). For example, Wertsch presents arguments using Bakhtin's notion that utterances and utterance meaning are inherently situated in sociocultural context. He states, because the production of any utterance involves the appropriation of at least one social language and speech genre, and because these social speech types are socioculturally situated, the ensuing account assumes meaning is inextricably linked with historical, cultural, and institutional setting (Wertsch, 1991), p.66.

As we immerse ourselves in on-line text production, different modes of representation will be extremely important relative to issues of culture and social identity. Many educators and researchers in online education claim that the online teaching and learning environment removes such variables such as gender, race, class, ethnicity, etc. The change in landscape is here, moving from voices being seen and not heard, as would occur in a classroom where education courses are taught (Kress, 1988; Paton & Neilson, 1999).

Methods

Subjects

Data were obtained from sixteen intern teachers in an online web supported multiple subjects credential program in California. A qualitative methodology was chosen for investigating the text relating to on line discussion forums. Various qualitative methods such as discourse and content analyses were used.

The six teen participants in this study are enrolled in a statewide California web supported multiple subjects pre-intern and intern credential program. The participants are in a cohort directly under the supervision of learning support faculty. The learning support faculty directs, supervises and mentors the intern teacher through four stages until completion of the multiple subjects program. The intern teacher completes all of their assignments online in an activity forum. The primary method of communication between the intern and learning support faculty is through the activity and discussion forums. Some other forums are also used to communicate, such as, synchronous (chat) rooms and a virtual teacher's lounge. The participants' ethnic background, sex, and age are diverse.

The main objective was to conduct exploratory and descriptive research methods that addressed the following research questions:
1) Does an intern teacher's psychological capitol influence how they begin to discuss and facilitate volatile issues on race, gender, ethnicity, sexism, ableism and ageism on-line? 2) Are intern teachers more or less likely to freely discuss issues related to social justice on line? Can patterns be distinguished in the textual representations of voice depending on the gender, age or ethnic group of the intern teacher? First the researcher sought to see how the participants responded to the general question on what is multicultural to determine what prior knowledge the teachers held on this social construct. Next, the researcher sought to determine if the teachers would discuss the issues stated above openly and freely. The results follow from threaded on line discussions. I write the words exactly as the teachers wrote them on line. I believe that it is best to represent the textual print from the teacher's own voice. Therefore, this paper discusses visual representations of voice by selected intern teachers.

Data transcript from asynchronous forums (online discussion forums) required methods of analyses that would yield a higher resolution of detail, much of which was descriptive in nature. Qualitative methods described in Kvale (1996), Miles and Huberman (1984) were thus used to examine transcripts of focus group discussions. Content analyses and meaning condensation were conducted to note patterns and clustering of responses. Two independent raters coded the transcripts first using "open coding" techniques that determined logical groupings of responses, and then "focused coding" methods that identified emergent themes (Emerson, Fretz & Shaw, 1995). Coding of transcripts was accomplished collaboratively, as raters deliberated emergent themes and any discrepancies until a consensus was achieved.

Written comments on transcripts were also analyzed for content and themes. The researcher developed and then applied codes to the discussion forum transcripts and revised the codes to capture the essence of what was revealed in the data. These data was used to develop individual and cross-case narratives of the participants and to identify the sources of changes on participant's

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visual representations of voice. The same qualitative process of analyses used for focus group data was used to examine responses from the surveys. Results are reported as content "themes" and patterns.

Results

The intern teachers were asked what is multicultural education the following responses were stated contextually on-line. The following responses were

Teacher #1.

Multicultural education covers two areas: 1) education that is aimed at reaching students from all cultures and 2) education about all cultures. I believe, we, as teachers, need to educate ourselves about the cultures represented by our students. We need to try to understand nuances of the cultures. For example, what a teacher's status is in the eye s of that culture and whether it makes a difference if that teacher is male or female. I also believe our students need to learn about cultures that may be different from their own. They need to realize that, though culture may be quite different, it is not better or worse than their own...just different. I believe conflict often comes from ignorance and/or misunderstanding. If our students know something of each other's cultures, I think they will understand each other better and, hopefully, get along better now and as adults.

Debra

Teacher #2

Multicultural education to me is two ways of communication underscored by a respect for diversity of all people. I mean two ways in that students and teachers bring their varying cultures, experiences, preferences, language, dress, religions, etc. to a common place with the result that all students and teachers may become familiar and more aware of other cultures. In turn they take away a better understanding of other backgrounds.

Understanding and respect need to be stressed, when discussing various cultures and traditions. We don't have to argue all the merits and deficiencies of each culture. To find the best culture is not the object. There is no such thing. We may remind students that a bouquet of flowers is much more lovely and more interesting if there are many types of flowers in the arrangement. In our diverse school populations, the students make up an excellent multicultural pool to draw from.

Frances

Teacher #3

I don't have a lot of experience or understanding of multicultural education, per se, so I am glad we are focusing on it in our discussion. This said, to me also, multicultural education is more than heroes and holidays. It includes awareness and understanding of the cultural backgrounds of our students and members of the larger community. When referring to culture, I include ethnicity, language, heritage, religion/spirituality, and ways of interacting. Regarding our classes, I think we should be prepared to expose our students to multiple perspectives and be prepared ourselves to be exposed and accept multiple perspectives. More importantly have students analyze why the perspectives of oppressors and oppressed differ.

Janet

Education Significance and conclusions

The teachers engaged in ongoing textual representations of social identity and social justice issues begin to generate questions that occurred in their classrooms and apply the concepts of social identity and social. For example, one teacher said, " I had an interesting 'aha' day where I was able to apply what I was learning on-line. I work in an urban school district, and this question comes up more often than I ever expected it to, from white teachers, parents and teachers of color and the community in general. I had yet another experience with the question, " Do middle-class, white teachers have any business teaching students of color in an urban, low socioeconomic level school? Can they be successful? Or are they doing more harm than good? These questions generated many on-line discussions regarding issues of diversity, social justice and bilingual education. One teacher responded, " This is a very good question..." In fact, my dad and I were discussing this very issue over the holidays. My dad is a retired, over 65 Jewish, white male. He commented that most volunteers and teachers, who help children read, are white and that there needed to be more diversity." From this comment many other teachers got into the pros and cons to teaching in such environments. Another teacher commented, that she believed that if we had more teachers of different races teaching it would be wonderful, but not based on the fact that the children have cultural needs or culturally relevant pedagogy, but just by virtue of the fact we needed diversity.

The benefits of this research are numerous. In our current age of electronically mediated environments such as on-line courses and degree program, this research will explore the possibilities of developing specific curriculum that deals with issues on social identity in a web-supported (on-line) environment. It may also allow for a more in depth discussion of social constructs, such as, volatile issues as race, class, gender, and disabilities since the participants are not engaged in face-to face interaction. It also allows for immediate responses to classroom issues because the teacher can immediately get on-line to engage in a threaded discussion without having to wait for next week's class.

The author concluded that an on-line environment provided a different method of communication about such issues, but in general individuals were still reluctant to deal with issues particularly around race. I found that more people were able to freely express themselves without having the sneers, rejection and embarrassment that sometimes occurs when in a face-to-face classroom environment. Research in this area also targets populations who would normally not be able to engage in such discourse due to limited access to colleges and universities.

This study only touches on a minute aspect of voice as it relates to web-supported online teaching and learning environments; it generated more questions than answers. Some others questions, which may be investigated in the future include: Is psychological capital so embedded that changing environments from face to face talk to online textual representations will not matter how the others may see or experience the person's voice? How much culture can emerge from the textual representation of the person who is expressing their voice? If the visual as a mode of representation is systemic, rule governed, and an effect of the values of the culture in which it is used, then can we as researchers come to know what culture (race, ethnicity) someone is from merely by there visual representations (Kress, 1988; Paton & Neilson, 1999)?

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Bridging the Differences on the Web Through Effective Communication and Collaboration

C. Y. Janey Wang
Doctoral Candidate
The University of Texas at Austin, U.S.A.
janeywon@mail.utexas.edu

Abstract: This paper explores how effective communication and collaboration among online learners of diverse backgrounds are encouraged by design. In addition, communication techniques utilized by members in the Web-based learning community in bridging differences, achieving group goals, and optimizing individual learning are explored. The researcher suggests that the ideal curriculum bridges diversities by encouraging, inspiring, and inviting multiple perspectives within a highly flexible environment of multiple communication methods, learning styles and approaches.

Introduction

Globally, market expansion and course offerings are increasingly assisted by use of the Internet. In education, the Internet has been widely used in preparing learners for "future responsibilities" and "success in life" (Dewey, 1938, p. 17). Cross-nation collaborative projects on the Internet across disciplines have exponentially increased internationally in recent years. Amidst the hype of cutting-edge technology, however, it is often overlooked that computers do not think, only humans do; computers do not have agency, humans do; technological difficulties do not limit intellectual advancement, humans do. Technology potentially provides an array of resources, but also presents constraints. Indeed, humans ultimately decide how to utilize new technologies, and these decisions are often based on both proven (or unproven) and discovered strategies. To integrate technology into instruction and learning, it is essential to focus on human needs, strategies, perceptions, and experiences communicating and collaborating in the cyber-learning environment — rather than solely on the functionality of technological tools.

As Web-based learning communities and online school partnership projects exponentially expand globally, effective communication and collaboration is, as never before, of vital significance. Web-based instruction provides opportunities for a diverse body of individuals to interact. In order to optimize individual learner's strengths and talents, Confucius said, instruction should be tailored to meet individual learner's needs. While instructors are challenged to understand and be sensitive to the needs of learners in their design and implementation of Web-based courses, learners' success hinges not only on their willingness, attitude, and devotion to achieve shared goals in a sea of information, but also on how they handle the challenges of consolidating fellow learning community members' multiple views, perspectives, and approaches.

Based on my experiences as a student, researcher, course moderator, instructional designer, and teaching assistant in a Web-based collaborative learning curriculum model, this paper explores how effective communication and collaboration among members of diverse backgrounds may be encouraged in the design and implementation process and what intercultural communication techniques may be or have been utilized by members in the Web-based learning community in bridging differences, achieving group goals, and optimizing individual learning. This paper examined a Web-based collaborative learning course model at the University of Texas at Austin. In this course model, multiple perspectives are valued and group diversity was considered in forming collaborative virtual teams. Factors such as ethnicity, gender, computer skills, and geographic locations were also considered in building virtual teams. Students engaged in activities where knowledge is constructed through negotiation among collaborators from diverse backgrounds.

Diversity, Communication, and Web-Based Instruction

The Internet is a global society involving users of diverse backgrounds, and this global society is comprised of various communities with unique cultures. This Internet society is constantly evolving due to the evolution of tools and stakeholders involved. In this society of communicating collaborators, the methods of communication and collaboration evolve along with technological tools and human interaction dynamics. Web-based instruction has often been implemented to supplement, enhance, and transform existing curriculum. Some instructors use the Web to post syllabus online, to supplement face-to-face class teaching, to broaden the scope of their instruction, or to deliver courses in their entirety. Many distance-learning courses, however, have encountered high attrition rates (Galusha, 1997), unequal participation and individual commitment, role ambiguity in group contexts, absenteeism, inattention to social relationships, and students feeling overwhelmed (O'Hara-Devereaux & Johnasen, 1994). The viability of effective communication and collaboration in the absence of face-to-face interaction has been questioned (Handy, 1995). Students may feel isolated, unmotivated, or unchallenged when they find course content irrelevant, perceive the environment as impersonal, can not obtain immediate technical or instructional feedback, and feel disconnected from fellow learners,. These shortcomings originate from a lack of understanding and sensitivity to the dynamics of human interaction and the nature of human learning.

Communication in this Web-based collaborative learning environment includes both task and social aspects. Due to communication limitations, online collaborators easily spend a large portion of time understanding, checking, confirming, coordinating, and negotiating to obtain mutual understandings and to construct shared knowledge. With the limitations in Web-based communication tools and the resultant reliance on interpretations and assumptions, effective communication among learners of diverse backgrounds is very challenging. A few examples of Web design that may be open to cultural interpretation include: various expectations for communication, the amount and type of information desired, communication styles and preferences, level of task orientation, variation in understandings, group orientations, and group dynamics.

Communication among people of congruent cultures, societies, and backgrounds – or even from the same family – is challenging. Communication among people of different cultures, societies, and backgrounds is even more challenging. Collaborative communication across cultures in the online learning environment requires the willingness of community members to listen, respect, and accept different perspectives and to accommodate and negotiate to reach shared meanings. Community members must also be flexible in accepting ambiguities; provide mutual respect, trust, and support; and develop cultural sensitivity and understanding of the value of multiple perspectives. Finally, community members must negotiate shared meanings in obtaining mutual understanding in order to reach consensus for the achievement of shared goals and needs.

Conclusions

Given the diversity of the global Internet society, cultural sensitivity and flexibility are essential to collaborative virtual classroom success. Future studies should focus on in-depth understanding and analysis of the needs of learners from diverse cultures. Web-based instructional designers, instructors, and moderators should employ multiple approaches and strategies in designing, developing, and implementing their courses and in assessing students in order to meet the needs of learners from diverse backgrounds and to inspire and encourage constructive communication and collaboration. Cultural sensitivity may assist in bridging the cultural diversities and contributing to overall course success. Building global communities of diverse learners requires that courses not simply represent an autocratic instructor's curriculum in the absence of consideration of multiple needs and resources; the ideal curriculumshould encourage, inspire, and invite multiple perspectives, provide a highly flexible environment where multiple communication methods, learning styles and approaches are invited.

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Together We Form a New Culture: Students' Perspectives on the Influence of Diversity in a Web-Based Collaborative Learning Community

C. Y. Janey Wang
Doctoral Candidate
The University of Texas at Austin, U. S. A.
janeywon@mail.utexas.edu

Abstract: This paper investigates students' perspectives on how cultural diversity impacts learning in an online collaborative learning course. Specifically, how students successfully achieve optimal learning in this online learning community as they collaborate with members of diverse backgrounds was explored. Study participants were eight Instructional Technology Planning and Management (ITPM) students. ITPM was offered in Spring 2001 at the University of Texas at Austin (UTA), and was conducted within a Web-based collaborative learning environment. Findings suggest that collective and individual successes are enhanced by the formation of a collaborative group culture within this setting. Evidence that diverse views on culture and that new cultures evolve within the Web-based collaborative learning environment were found. Results suggested that Web-based collaborative learning course instructors should consider group diversity in their collaborative team assignments in order to further facilitate group dynamics and optimize learning.

Introduction

The development of computer network technology provides opportunities for dynamic human collaboration. Educators of all instructional levels are learning and integrating technology into curriculum and instruction. Internet access in public schools and instructional sites in America has increased from 35 percent in 1994 to 89 percent in 1998 and is expected to grow further. Student computer use has also increased from 27.3 percent in 1984 to 68.8 percent in 1997 (U.S. Department of Commerce, 1998). Major reasons for this rapid growth include technology's capacity for reaching remote locations while providing immediate and engaging communication, its promise of collaborative opportunities, and the human need for connection and interaction. Given the increasing opportunities and challenges for global communication and collaboration among members in the learning community, it is essential to assess methods of bridging the differences among community members and to establish curriculum that facilitates meaningful interactions and collaborations among members of divergent backgrounds.

The current study is an extension of a previous exploratory study conducted by Wang (2001). The four participants of that exploratory study represented four different ethnic backgrounds (American, Chinese, Latino, and Southeast Asian) and were all Computer Supported Collaborative Learning (CSCL) students, which was offered at the University of Texas at Austin (UTA) in Fall 2000. Based on the same course model and offered by the same instructor, participants of the current study were from another course, Instructional Technology Planning and Management (ITPM), offered in the following semester, Spring 2001 at UTA. The CSCL 2000 and ITPM 2001 courses both employed Web-based collaborative learning to both on-campus and tele-campus students. A major finding of the previous exploratory study was that, due to the overwhelming reliance on text communication and concomitant lack of non-verbal communication cues in the Web-based collaborative learning environment, collaborators relied on their own assumptions and interpretations in communicating and interacting with the instructor, staff, and peers. As a result of these missing non-verbal communication cues, misunderstandings frequently occurred while group success relied on individual's communication and management skills. Culture, as described by participants, impacted communication and collaboration within this setting. Yet, cultural-related communication factors were largely taken for granted, perhaps because communication is so routine.

The Study

The current study sought to include diverse views. In recruiting prospective participants, diversity in participants' course accessibility (on-campus and tele-campus students), gender, and ethnicity were striven for. In all, four on-campus and four tele-campus ITPM students were recruited on a volunteer basis to participate in this study. Participants (five European-Americans, one Korean, one Mexican-American, and one Chinese) were all 25 to 55 years of age and evenly divided by gender, and were interviewed either face-to-face or by phone. To ensure data triangulation, three types of data were collected: individual interviews, online discussion archives, and focus group audio conferences. Participants were asked to define cultural diversity, to describe how diversity affected their communication, collaboration, and learning in this ITPM Web-based collaborative learning course, and to discuss strategies they have used or may use to bridge in-class cultural, social, and individual differences in order to achieve optimum collaboration and learning. The individual and group interview tapes were transcribed, categorized, and analyzed. The online discussion archives, e-mail responses for follow-up questions, and online chat transcripts were also analyzed.

Findings

Findings suggest that diversity is viewed as being beneficial but challenging in that group diversity, while providing collaborators opportunities for exposure to multiple perspectives, views, and approaches in which to further reflect on their own learning also challenges collaborators with divergent views and personalities, ways of communicating, approaching issues, and work styles. Results indicate that certain communication, management, and social skills are essential in order to achieve effective group collaboration while optimizing individual learning. Study participants viewed group diversity as necessary for meaningful interactions and endorsed the idea that group diversity provided multiple perspectives and "reality-check" opportunities. Participants thought collaborative group intellectual exchange was facilitated by the diversity of members in regards to gender, geographical region, community, work, personality, and frames of minds.

Participants said dialogue is essential in drawing strength from diverse expertise within the learning community. An emerged theme expressed by participants is that a unique online collaborative learning culture forms within these settings. This new culture entails unique approaches to communication, interpersonal skills, information management skills, and knowledge about global cultures and values. Further, this environment spurs new manners and need to multi-task, to interact with others of multiple and diverse backgrounds, and to not simply obtain information, but manage, make connections, apply, and reflect. This requires an infusion of variations in expertise, frequent information sharing and exchange, positive and constructive feedback, and knowledge construction, co-construction, and re-construction. Participants reported that learning is more meaningful when collaborators identify themselves to the group and find their contributions useful for group success. In order to work online to achieve goals and produce joint effort products with those of divergent cultural or socio-economic backgrounds, worldviews, values, and interests, communication skills in expressing, negotiating, and decision-making are essential, participants indicated. Further, the willingness to be committed, accountable, and responsible to group success, as well as information, time, and people management skills are also essential to success within this setting, respondents indicated.

Conclusions

While successful collaboration within the cyber environment is impossible without interfacing with a computer, it is equally reliant on effective human interaction and cooperation. Results indicate that an unique collaborative culture in the online learning environment arises, based on mutual respect, effective communication and management skills, cooperation, positive interdependence, commitment to a collective goal, and amalgamation of strengths from diverse expertise among community members. The challenge within the cooperative and collaborative environment is to discover how individual members' strengths can be melded into collective outcomes that are greater than the addictive contributions of individual members. The instructors, instructional designers, and online moderators/ facilitators should be aware of and avoid imposing or framing their values on learners when designing and implementing courses. Collaborative learning community members should learn to not only express and respond to ideas, but to also listen and facilitate fellow members' ideas in order to enhance overall group success while simultaneously optimizing individual successes.

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Teaching and Learning in Intergenerational and Intercultural Classrooms: Report on a Classroom-based Research Project

Minjuan Wang, San Diego State University
mwang@mail.sdsu.edu

Terre Folger, Westminster College
folgert@jaynet.wcmo.edu

Abstract: This study describes and relates the experiences of Dr. Wu, a junior, female foreign-born faculty member at a west coast U.S. university. Dr. Wu and her students faced the challenges of a culturally diverse classroom in her first teaching assignment, "Technologies for Teaching," a graduate-level course offered for in-service teachers and students enrolled in teaching credential coursework. We will address issues of intergenerational and intercultural communication and suggest effective strategies to facilitate communication and learning in classrooms with instructor and student diversity. The paper discussion format will offer the opportunity for sharing this information with those interested and involved in college classroom research, as well as provide feedback to our research efforts.

Purpose

College classrooms are becoming more complex in nature. Changes in the professoriate, the student population, and rapidly developing technology contribute to this complexity. Finkelstein, Seal, and Schuster (1999) suggest that radical changes are occurring in the academic profession as more women, foreign-born, and minority scholars become college professors. In regard to technology, students have diverse backgrounds, levels of expertise, and learning needs. Kellner (1998) writes that faculty face the "challenge of providing people from diverse races, classes, and backgrounds with the tools to enable them to succeed and participate in an ever more complex world," (p. 211). This study describes and relates the experiences of Dr. Wu, a young, female foreign-born faculty member at west-coast U.S. university. Dr. Wu and her students faced the challenges described above in her first teaching assignment, "Technologies for Teaching," a graduate-level course offered for in-service teachers and students enrolled in teaching credential coursework.

In this paper, we address issues of intergenerational and intercultural communication and suggest effective strategies to facilitate communication and learning in classrooms with instructor and student diversity.

Theoretical Framework

The authors hold the social constructivist belief (Ernest, 1995; Rogoff, 1990; Vygotsky, 1978, 1986) that shared knowledge develops through joint activity and communication. This belief accords classroom communication a central place in the study of teaching and learning (Barnes, 1976; Edwards & Mercer, 1987; Edwards &Westgate, 1987). Diversity also impacts communication and attitudes in the technology classroom (Chamberlain, Guerra, & Garcia, 1999; Freedman & Liu, 1996; Kay et al., 1983).

Intergenerational and intercultural classroom dynamics affect pedagogy. Kay et al. (1983) report that an intergenerational classroom had greater student participation than a comparable classroom. Wlodkowski and Ginsberg (1995) report ways to motivate people in culturally diverse classrooms, emphasizing fairness and respect as they suggest strategies that facilitate diverse people's learning together.

Methods

The interpretive paradigm (Maykut & Morehouse, 1999) provides the methodology and directs the case study method (Yin, 1989, 1994) used in this study. In the case study, two class sections are considered two holistic cases, and the groups and individuals are considered the embedded cases.

Participants

Dr. Wu taught two sections of the required course, "Technologies for Teaching" (Section 1, n= 19; Section 2, n= 18). Both sections included in-service and pre-service educators, ranging from 23 to 60 years in age. The age range in Section 2 was larger (ages 22-60) than in Section 1 (ages 23-33). Section 2 was also more ethnically diverse.

Dr. Wu was born in a small village in northern China. She attended Beijing University, receiving her B.A. in Chinese Literature. Dr. Wu then earned her Master's degree in Comparative Literature at a major U.S. east-coast university. She received her Ph.D. in Information Science and Learning Technologies from a large mid-western university, where she embraced a constructivist approach to teaching and learning. At present, she is an assistant professor at a U.S. west-coast university.

Course Description

"Technologies for Teaching" is an introductory course that provides hands-on experience with computer technology in education. The goal of this course is empowerment of pre-service and in-service teachers as users of computer-based technology with instructional and professional applications.

Data Sources

In this study, multiple data sources were used. Web-based Incoming and End of the Semester Surveys, administered in Week 1 and 16 are data sources for assessing learning outcomes and students' perceptions of the classroom environment. In Week 9, the students completed an informal, voluntary email survey on diversity awareness. The email survey provides information regarding students' perceptions of cultural and generational diversity.

Dr. Wu, assuming the role of participant-observer, took notes during the students' in-class group activities and wrote reflective memos of classroom communications. The structure of the class, a combination of instructor presentation and students' hands-on activities, made observations possible.

Part Two of the End-of-Semester survey and Dr. Wu's determination of students' grades assessed learning outcomes. Determinants for evaluation were (a) portfolio projects, (b) journal entries on readings from the textbook and the course website, (c) a PowerPoint presentation related to teaching and learning (with an emphasis on technology), (d) degree of development in a web-based learning unit, and (e) classroom participation. For grading purposes, all students submitted a one to two page reflection on their collaborative process. The students completed their written reflections at the end of the semester.

Data Analysis

Quantitative and qualitative methods were combined in data analysis. Initially, we analyzed the quantitative survey data from the two web-based surveys. These data are accompanied by description of the themes and patterns discovered in line-by-line and axial coding of the narrative data (Strauss & Corbin, 1998).

Results

Results are reported for incoming student data, students' learning and attitudinal outcomes, student-written reflections, and learning outcomes. Part Three of the End-of-Semester survey assessed students' attitudes about the "Technologies for Teaching" curriculum. The e-mail survey produced limited, but interesting results regarding students' awareness of generational and cultural diversity. Written reflections regarding students' perceptions of collaborative group work revealed three major themes.

Incoming Student Survey

The Incoming Student survey showed that the students in the two Sections were similar in enrollment status. No statistically significant differences were found between the entering self-rated computer skills, awareness of ethical use of computer or technology, and the integration initiative of the students in the two sections.

Learning Outcomes

An independent t-test ($p=0.5529$) performed on response data indicates no statistically significant differences between the two sections' self-perceived technological skills at the end of the semester. However, the average grades of the two sections were significantly different ($p<0.005$).

Attitudinal Outcomes

End of Semester Survey

Part Three of the End-of-Semester survey assessed students' attitudes about course curriculum. Students' attitudinal outcomes are related to the level of their engagement and the learning outcomes. Section 2 students had a more positive ($p<0.005$) reaction to the course.

Email-Survey on Students' Diversity Awareness

Three Section 1 students and five Section 2 students responded to the non-obligatory email survey. Six themes emerged. Themes identified in Section 2 responses are (a) respect for the instructor (b) sympathy with the challenges of teaching in a foreign country (c) enjoyment of the intergenerational and intercultural diversity and (d) appreciation of the instructor's cultural background. Section 1 students' responses resulted in two identified themes: (a) their lack of recognition of classroom diversity and (b) Dr. Wu's position as a role model for Asian American students.

Students' Written Reflections on Group Collaboration

Dr. Wu encouraged students in both sections to work in collaborative groups. Individual differences in students' attitudes towards learning and each other shadowed their teamwork orientations. The reflections reveal that Section 2 students' collaborations were motivated by common interest, and Section 1 students collaborated to complete assignments.

Discussion

Based on interpretation of the data, we consider the impact of cultural and generational diversity on communication. We also reflect on the influence of intercultural and intergenerational communication on learning outcomes.

Cultural and Generational Diversity's Impact

Cultural and generational diversity in these classrooms could have been an obstacle for effective learning. In this case, the instructor and students used their diversity to develop a supportive learning environment. Dr. Wu provided the opportunity for students to form groups based on their own criteria. As a consequence, some of the groups had members of similar backgrounds, while others reflected the diversity of the section. The groups discovered their own ways of communication and collaboration.

One group reports that they formed a group based on the strength of each member in designing, developing, researching or gathering information. The members disregarded age and ethnicity when looking for collaborators. Through his comments one student in this group implies that he is a member of a culture that transcends age and ethnicity, a teacher culture based on effective and open communication.

Communication's Impact on Learning Outcomes

It seems that diversity was not an obstacle but motivated students' engagement in learning tasks. In Section 2, the students formed groups that were diverse in both culture and age. They admitted there were differences in their styles, how they approached cooperative learning group tasks, for example, but also agreed that being able to openly express conflicts in opinion led to resolution. Resolving conflicts regarding learning tasks clarified their thinking and affected the quality of their work. They recognized intergenerational differences as well, but were able to arrange a "comfort zone" so that experience contributed to their projects as much as expertise.

Educational Importance

This research has implications for teaching in multicultural, generationally diverse classrooms and with regard to student-teacher interactions when diversity extends to faculty. Student and faculty diversity have enriched but also complicated the technology classroom. Because the course objective is students' incorporation of technological tools in teaching and learning, the students' diverse experiences provided more opportunities for the class to explore technology integration. On the other hand, the students' large variance in entering computer skills, learning styles, and English fluency created challenges for effective instruction. Instructional style, building supportive learning environments, and facilitating group collaboration were important factors in addressing these variances.

Dr. Wu balanced whole-class instruction with individualized learning. She reduced direct instruction and allowed individuals to self-pace their learning. She also paired students of different backgrounds during in-class activities. Students' reflection on their positive collaboration experiences is tangible evidence of success.

As Wlodkowski and Ginsberg (1995) noted, "people who feel unsafe, unconnected, and disrespected are unlikely to be motivated to learn" (p.2). Classrooms of diversity face such challenges if diversity is ignored and devalued. Dr. Wu was aware of the diversity and attempted to build a positive learning environment through that awareness. In this study, giving students sufficient latitude to form groups through choice and explore methods of collaboration provided a naturally formed "comfort zone." Student-student communications should be monitored and mediated by faculty. Instead of eliciting compromise as a solution to conflict, students should be encouraged to resolve the conflicts through negotiation and rational debate (Derry, Gance, Gance, & Schlager, 2000; Mercer, 1995).

Hall (1992) notes that individuals from different racial and ethnic backgrounds have subtle variations in the ways they communicate. Often, members of other cultures are unaware of these variations. Lack of recognition can lead to misunderstandings. Using examples, both culture- and nonculture-specific, to illustrate a point or an abstract idea is a common instructional strategy that has twofold application in a culturally and generationally diverse classroom.

Diverse Faculty Issues

Dr. Wu interacted with the Section 2 at a more complex social level because of a higher level of acquaintance. These students related to her that pivotal points to successful teaching were a) the instructor's attitudes and efforts and b) students' perceptions of faculty as knowledgeable, enthusiastic, supportive, and patient. Dr. Wu found that she incorporated student suggestions into classroom instruction.

Students from other countries, preparing to be teachers in the U.S., noted that they might "feel a cultural shock when meeting very challenging students." Dr. Wu responded that she had had similar feelings. Dr. Wu's experience implies that faculty born in foreign countries may find it necessary to adopt a more democratic and issue-oriented stance to encourage community-building in a culturally and generationally diverse college classroom.

Conclusion

From this experience, Dr. Wu drew three important conclusions. She observed that a) her own cultural expectations caused her to be offended by a student's critique of her teaching; b) students have expertise and expectations that can improve her teaching; and c) age and culture differences can build classroom community if facilitated positively. Likewise, as college classrooms become more diverse, it is important that our "teaching culture" recognizes and benefits from this diversity.

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SECTION EDITOR:

Wren Bump, University of Houston

The educational computing course for pre-service and in-service teachers continues to change and evolve as it tries to meet national technology standards, NCATE accreditation standards, the needs of the different school districts, as well as the needs of the individual candidates themselves. The designers of the educational computing courses, each at his or her respective universities, base their course revisions on input from all these entities (ISTE, NCATE, ISD's, candidates) in addition to feedback from candidates who have taken the course and colleagues who have taught a similar course. This section helps to further the change and evolution of the course with the theme still being the preparation of the beginning teachers and the professional development of the in-service teachers.

The papers for this year reflect this process, some more than others and some in very different ways. One paper by Ray advocates the establishment of a basic computer literacy exam. "As a result of this study it was determined that pre-service teachers should be tested on their overall basic computer literacy as well as participate in courses to enhance established computer skills in an effort to be well prepared to lead a twenty-first century classroom." She found that many teacher candidates, whom they hypothesized would be more computer literate that teacher candidates in the past, still did not many of the basic computer skills.

Other papers advocate changing the structure of the educational computing course. Whitaker and Hofer's paper describes a new model for pre-service educational technology classes in which "efforts are being made to tie the content of the class to the content of methods and content-area courses – which, if successful, will strengthen students' experiences with all classes". The paper by Crawford and Willis questions if standards can be met and evaluated through an online teacher education technology course. "The continual evolution of the national technology standards creates a continual state of flux within the world of instructional technology. However, this creative online environment offers the possibilities that may not be available within other specialization areas; namely, the opportunity to reinvent conceptual frameworks of understanding and creative endeavors."

And finally Brownell proposes integrating media literacy into the educational computer course for pre-service secondary teachers. He believes "an important step in doing this is application of an acquisition model of media literacy, where skills gained with technology (production) and knowledge about media messages and the system that brings us to them are presented in a positive way. At a time when the most powerful communication means to ever exist interacts with our students (and us) every day in literally thousands of ways, we must not teach about technology without recognizing this fact and the impact such interaction has on our personal, professional and civic lives. The course mentioned here is a natural place to start integrating these important concepts and skills into the education of future teachers. Knowing how, without knowing why, invites manipulation. Knowing how and why invites participation."

Wren Bump is a clinical assistant professor in the Instructional Technology Program at the University of Houston. This is her ninth year to teach the educational computing course at UH and before then she taught the same course at Texas A&M University and Texas Southern University. Her other educational experience is in elementary education and special education. She can be reached at wren@uh.edu or 713-743-4296. Class website: http://pdts.uh.edu/~wren/courses.htm

Integrating Media Literacy into a Technology Course for Preservice Secondary Teachers

Gregg Brownell
Division of Teaching and Learning
College of Education and Human Development
Bowling Green State University
USA
gbrowne@bgnet.bgsu.edu

Nancy Brownell
Division of Teaching and Learning
College of Education and Human Development
Bowling Green State University
USA
nbrowne@bgnet.bgsu.edu

Abstract: This paper, after briefly explaining the content, placement and delivery method of EDTL 367 - Computer Utilization in the Classroom - Secondary, presents a definition of media literacy and a rationale for integrating media literacy concepts and activities into the course. Examples of appropriate activities are given and a number of relevant resources for further information about media literacy are cited. As available, student and instructor reactions to a pilot introduction of media literacy concepts into the course are offered.

Introduction

Strong initiatives to integrate technology into the schooling of children in the U.S. have been constant for almost two decades, going back at least as far as the report "A Nation at Risk" (Gardner 1983; Martinez & Mead 1988). This discourse historically centers around the notion that skill with technology will be important for employment in the global economy and that therefore, skill with technology is, and will be, a necessary (and empowering) experience for our youth, especially as they become working citizens (Gilder 1993; Marshall & Bannon 1988; Naron & Estes 1986). Such interest has led to the general acceptance of the integration of a technology component into the K–12 curriculum and to the curriculum to prepare K-12 teachers (Brownell & Brownell 1998; Brownell, Haney & Sternberg 1997; Handler & Strudler 1997; Strudler, Handler, & Falba 1998; Ohio Department of Education 1996).

This movement, at times successful but always constant and kept in the public's sphere of attention consistently over time, does, however, have credible critics. Such critics question the reality of the proposed educational benefits of technology in schooling, the inequities of access to powerful technologies in school and in the greater society, and the sociological effects of a range of technologies in the schools and in society (Bowers 1993, Bromley & Apple 1998; Cohen 1987; Cuban 1986 2001; Giroux 1997; Marvin 1988; Ragsdale 1988; Sutton 1991).

Amid this debate, two (among other) intriguing areas emerge as a positive focus regarding both K-12 experiences with technology and preservice and inservice teachers' technology education. One area is the on–going investigation and use of technology in learning to help teach problem solving, critical analysis skills, and encourage creativity (Jonassen, 2000; Papert 1996; Papert 1980). This is especially interesting since some make a case that creativity is the determining factor in success in the global economy, not skill with technology (Reich 2000). The second area is that of broadening the scope and understanding of technology in the schools to include a media literacy perspective, which addresses important skills and issues beyond the "technology equals computers equals workplace skills" rationale/approach and also offers important opportunities for experiences with problem solving, critical analysis skills, and opportunities to enhance and encourage creativity. Integrating aspects of this second approach also offers the benefits of gathering insights from well–developed bodies of research in areas such as communications, literacy research, popular culture, and curriculum studies (Brownell & Brownell 2002, in print; Brownell & Brownell 2001; Hobbs 1998; Hobbs,1997; Kubey & Baker 1999; Tyner 1998).

This paper will address the integration of media literacy into a required course for secondary majors, EDTL 367 - Computer Utilization in the Classroom – Secondary. A brief explanation of the course will be presented and followed by a definition of media literacy, relevant example activities, and several resources for further information about media literacy.

EDTL 367 - Computer Utilization in the Classroom – Secondary

The EDTL 367 course was originally piloted in the spring of 1994 and became a required course for secondary majors in 1995. The intent is to provide learning experiences regarding elevant pedagogical concepts, as well as skills with technology, tailored to preservice students who will teach grades 7–12, though most expect to teach at the secondary (8–12) level. Although not a methods course, it is scheduled within a methods block wherein students concurrently take a methods course and engage in field experiences. The course description is: "Impact of the computer on educational methods and applications in the classroom. Evaluation of software. Integration of the computer and associated technologies into the content areas."

Media Literacy

Media literacy may be defined as the ability to access, analyze, evaluate and produce communication in a variety of forms (Aufderheide & Firestone 1993). As a part of the curriculum for schooling children and adolescents, media literacy is well established in every major English-speaking country in the world, except in the United States. That has begun to change over the last several years (Tyner 1998; McBrien 1999). Across the U.S., media literacy has begun to be addressed in state standards, the K-12 classroom, and in teacher education (Brownell & Brownell 2000; Kubey and Baker 1999; Hobbs 1998).

Beyond the brief definition above, there are several concepts about media literacy that are important and which focus on the media messages generated through various media (T.V., video, film, music, the web, computers, radio, etc.): 1) All messages are constructions; 2) Messages are not representations of social reality; 3) Individuals negotiate meaning by interacting with messages; 4) Messages have economic, political, social and aesthetic purposes; and 5) Each form of communication has unique characteristics (Hobbs 1997). Developing an understanding of these concepts through reading, discussion, activities and hands-on experiences with relevant media and tools to create media, can be a powerful experience for preservice and inservice teachers.

Additionally, scholars such as McChesney (2000, 1999), Rushkoff (1996), and Beder (1998) would hold that understanding the system that allows us to interact with powerful media/technology is an essential part of media literacy. This will be especially true in any society working to establish and/or maintain a representative/participatory democracy where access to relevant information and knowledge of its source, accuracy, "spin," and intent are crucial for informed decision making by citizens.

Media Literacy & Computer Utilization in the Classroom – Secondary

The basis for understanding our interactions with media (such as the types of media/technology mentioned above) is developing the skill of critical analysis and applying it to such interactions. The creation of media products is an essential component of such learning (hence the definition of media literacy above which includes the ability to, "...produce communication in a variety of forms.") Because of the ubiquity of media, opportunities to tie meaningful media literacy experiences to every subject are plentiful. Some, and usually almost all, forms of media with which we regularly interact provide opportunities to address (to name a few) subjects such as science, literature, math, the arts, history, politics, economics, writing, and reading (both in the traditional alphabetic sense and also in "reading" of art forms such as movies), etc. This can often be done without creating a separate course of study. Rather, by introducing key media literacy concepts within any subject area, the existing curriculum in that area can be addressed from a media literacy perspective. One other benefit of this approach is the comprehensive view that technology equals more than simply computing, while at the same time affording opportunities to use important, empowering technologies to create products that apply media literacy concepts and help develop problem solving and critical analysis skills, as well as encourage creativity.

Activities can be built around interaction with specific media/technology (T.V., video, film, the web, radio, computers, and so on) with attention to media literacy principles and media messages. In the broad sense, activities can include asking questions such as: What is the reason for (intent of) this media message?; What is its economic purpose?; What is its source?; What characteristics does the medium it is offered through possess?; How successful is it?; What is its target audience?; How can I appropriate the medium (technology) it uses for my own viewpoint?; etc.

In science, media messages can be examined in one or more formats (e.g., T.V. news, documentaries, film) about a controversial issues such as cloning (or toxic waste disposal, or nuclear power, or the extraction industries, or global warming). The use of different media techniques, and the various viewpoints expressed on the issue, can be compared to each other, and to the views of mainstream scientists. In math, the use of statistics can be explored in various media settings in relation to topics in politics (the 2000 election), the economy, the entertainment industry, advertising, and much more, to unravel the constructions where the numbers are used (or abused), such as commercials, stock market reports, political sound-bites, newspapers, etc. In literature, a greater understanding of film as an art-form can lead to a better understanding of novels and stories, both their structure and meaning, including their unstated purposes such as social control/influence or even blatant propaganda. As one teacher stated, "I can't teach a novel without students ending-up talking about films."

The web can be a rich source and an important source for understanding media literacy principles. Applications in library/research skills, writing and reading are obvious, as well as specific content found on the web. Students can take a topic (say commercialism in schools) and: 1) search the web to find sites on the topic; 2) analyze each site as a construction with an ideological/political, social, and economic purpose; 3) compare the site, as a construction, to student's views of social reality; and, 4) analyze the media techniques used in the construction of the site (not the technical techniques/design parameters) and evaluate the effectiveness of the site. Students can also compare sites on the same topic with different points of view. In a recent class, students did a similar activity to prepare for a debate (one side for, one against) on commercialism in the schools and then held the debate. The chance to look at the web in this way and to prepare for and then debate the topic proved highly motivational and sparked student involvement and excitement about both the topic and the idea of the web as a provider of carefully constructed media messages.

Students, after a brief introduction to public relations and propaganda techniques, perhaps from the view of advertising, or of politics, can make audio, video, or web-based constructions for a specific purpose, to convey their own media messages. Undergraduates can role play being secondary students and make a commercial for a calculus course, or for their school, or to support a levy issue (all of which teachers in our graduate media literacy course have had their secondary students do). Undergraduates could divide into two groups. One group could make a video attacking Wal-Mart's practice requiring that edits be made to lyrics and songs that they find objectionable before they will sell the CDs. A second group could make a video supporting the policy. (This is especially interesting when students learn that Wal-Mart is the largest retailer of CDs in the U.S. and is willing to use that power to gain compliance with their imposed standards from many artists and labels.) Adopting one of the many music video styles and the techniques of that medium, students can create a music video supporting a political candidate and, using the same results from the same research, create a music video against the candidate.

Resources

The brief sketch above is just that. Through the web especially, instructors and students can gain access to a wealth of materials about media literacy including background information, lesson plans and ideas, organizations and projects, videos, books, speakers, and, in a few cases, media literacy standards from forward looking states and districts. The following are a few places to get started on the web:

Center for Media Literacy: http://www.medialit.org
Media Literacy Clearinghouse: http://www.med.sc.edu:1081
Just Think Foundation: http://www.justthink.org
PBS Teacher Source-Media Literacy: http://www.pbs.org/teachersource/media_lit/media_lit.shtm

Media Awareness Network: http://www.media-awareness.ca
New Mexico Media Literacy Project: http://www.nmmlp.org
Instructional Materials in Media Literacy: http://www.cln.org/subjects/media_inst.html
MediaChannel.Org: http://www.mediachannel.org/classroom/front.shtml
Alliance for a Media Literate America: http://www.nmec.org

Conclusion

Media, and technology, are often referred to as "powerful," as in, "T.V. is a powerful medium." Gaining skills with technology, and learning about technology, must include an understanding of what makes media and technology powerful when we interact with them. Media literacy offers a way to gain this essential information; a way to get to the why, as well as the how, of modern communication media/technology; a way to understand how media messages are constructed, with what intent and success they spread; and a way to understand the system which brings us to these media messages.

An important step in doing this is application of an acquisition model of media literacy, where skills gained with technology (production) and knowledge about media messages and the system that brings us to them are presented in a positive way. At a time when the most powerful communication means to ever exist interacts with our students (and us) every day in literally thousands of ways, we must not teach about technology without recognizing this fact and the impact such interaction has on our personal, professional and civic lives. The course mentioned here is a natural place to start integrating these important concepts and skills into the education of future teachers. Knowing how, without knowing why, invites manipulation. Knowing how and why invites participation.

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From Video Tutors to Electronic Portfolios: Using Advanced Screen Capture In Support of Educational Technology Instruction

John Bryner, Southern Utah University, US
Matthew Nickerson, Southern Utah University, US

Among the many burgeoning "support" applications that can enhance the technology training of preservice teachers there is new group of simple and inexpensive "advanced screen capture" programs that should not be overlooked. Also referred to as video screen capture or moving screen capture they perform a rather simple yet powerful service. Like "older" screen capture applications, video screen capture can record whatever is displayed on a computer monitor but instead of a single "screen dump" video screen capture allows the user to record the monitor's image over time and create, as the name implies, a movie of what is happening on the screen.

At Southern Utah University's College of Education we have employed advanced screen capture techniques to enhance our educational technology course. At present this technology is helping in three important areas: 1) it supports faculty and lab assistants in teaching the basic software applications required for information literacy, 2) it enables teacher candidates to create powerful artifacts for their electronic portfolios, and 3) it introduces a new tool for K-12 teachers.

Educational technology faculty first used this capture technique in support of basic software training. There are several software applications that are covered in all sections of the course and instructors are anxious for their students to master the basics as quickly as possible so the important issues of integrating technology into teaching/learning can be discussed and practiced.. As reported throughout the country and in the literature, students are coming to college with a wide range of information literacy and computer skills. While some arrive having already mastered many productivity and Internet applications there is still a significant percent that come with considerable reluctance where computers are concerned and with few or no computer skills.

In an effort to reduce class time devoted to software basics and to support intimidated or less prepared students the faculty have created small video vignettes using movie screen capture that demonstrate basic operations for each of the principle software applications used through out the course. These vignettes, or video tutorials, are saved as Quicktime® movies and made available to students through the Internet via online course syllabi. Students who are struggling or who just need a simple reminder can open the video tutorial whenever they need assistance. This is especially helpful when the teacher or lab assistant is not available. The tutorials open in a small display window and can be viewed simultaneously with the application they are learning for quick and easy reference. The Quicktime® format allows students to pause, reverse or fast forward the tutorial in order to view the exact process in question and to view it as many times and at what ever speed they wish.

Reports in the literature attest to the successful use of similar video vignettes to support classroom instruction in a variety of different disciplines. Their use in training teacher candidates is proving equally successful. The ISTE standards are a prime focus of our educational technology curriculum and as candidates progress through their course of study they not only learn and practice the use of technology in the classroom, they are also mastering the tools necessary for creating and maintaining an electronic professional portfolio. Advanced screen capture tools are proving very useful in preparing artifacts for their portfolios that demonstrate competencies described in the ISTE standards. For example, a student can create a screen capture "movie" documenting their step by step creation of a PowerPoint® presentation. Because these advanced screen capture applications can include a sound track, candidates can narrate the process and add important pedagogical notes and/or personal reflection to their computer demonstrations that are destined for their portfolios. Even more powerful is the use of advanced screen capture with sound to record their lecture synchronized to the presentation slides demonstrating their appropriate use in the classroom.

Every hardware, software, or Internet application introduced to our candidates is taught and practiced at four levels: 1) basic functions of the application is demonstrated by the instructor, 2) candidates demonstrate basic mastery through projects that require direct application to a teaching problem or situation, 3) use of the application in the classroom is modeled by the instructor, and 4) candidates demonstrate appropriate use of the application in the classroom via individual or group projects (most often these projects reflect their emphasis or major area of study.)

Educational technology faculty at Southern Utah University are pleased with the teaching/learning outcomes resulting from our ongoing use of advanced screen capture as a part of our educational technology repertoire. Online tutorials, creating portfolios and modeling new teaching strategies make advanced screen capture software a very useful tool and we encourage educational technology faculty to consider this inexpensive and easy-to-use application as part of their instructional strategy.

Redesigning the Educational Computing Course to Incorporate the ISTE Standards

Wren Bump, University of Houston, US

Abstract

This paper describes the restructuring of the Educational Computing Course CUIN 6320 Technology in the Classroom, a graduate class at the University of Houston. The purpose of the restructuring was to model to the students the integration of the technology standards for instructional purposes so that they could learn what each standard meant to them as teachers and what it looked like in the classroom. There were many activities included throughout the semester that referenced the standards directly. There were also many opportunities for the students to reflect on the standards and how they applied to different instructional situations.

Proposal

In the next few years the state of Texas will be incorporating new certification tests that will require the prospective teachers to be competent in technology use and integration. Not only will the teachers need to know how to use the different technologies, they will have to be able to integrate those technologies into their classroom preparation, presentation and assessment. They will have to integrate in all areas of their lessons so that the students will be using the appropriate technologies as they learn, create, report and produce.

The semester began with a self-assessment based on the technology applications standards that have been adopted by the state of Texas. This gave the students an opportunity to reflect on their own skills and competencies while getting an overview of what the course would involve. Each class period involved some form of collaborative activity so the students could see how collaboration could lead toward more learning and involvement with the technologies and the standards. Individual activities gave students the chance to develop the technology skills that would be required for successful completion of the class. Collaborative extensions were assigned throughout the semester so that students would have to seek out resources in the community or at their schools. These collaborative extensions involved the use of technology in a practical way that could be applied even after the completion of the class.

A group project was begun in the middle of the semester that was based on the NETS-S learning activities. The students used collaboration in class and online to develop a learning activity that incorporated technology and met both technology standards and subject matter standards. The results of their efforts were compiled and added to the class website so that others could use them as a resource.

The final self-assessment and the final online portfolio tied the whole semester together and provided the students with a record of the development of their technology skills and competencies in technology integration. They left the course with a concrete product to share with others and use as a resource when they begin to teach.

Online Optional – Offering Choices

Sue Espinoza
Department of Secondary & Higher Education
Texas A&M University-Commerce
United States
Sue_Espinoza@tamu-commerce.edu

Elizabeth Pannell
Department of Secondary & Higher Education
Texas A&M University-Commerce
United States
Elizabeth_Pannell@tamu-commerce.edu

Abstract: Online-optional class sessions provide students in classes offered via video distance education with an option of attending class in an online mode if they qualify as online-eligible. Students determine which instructional delivery mode they prefer, and then work to be eligible to attend class in that mode. Choices may be based on preferred learning style, or on personal or professional schedules that sometimes interfere with class attendance.
Student reactions, as well as lessons learned, are included.

Technology and education – these two words are frequent companions as the concepts are becoming increasingly intertwined. Although technology was once considered an add-on in education, a supplement to the established (classroom-based) educational system, its role has expanded greatly. Various types of technology may now serve as the basis for new modes of instructional delivery at varying levels and for differing purposes. Some of these are basically an expansion of the concept of Distance Education (DE), although the approach may vary drastically from the correspondence courses that began the DE movement in the 18th century, long before the term was coined in the 1960s. Moore and Kearsley (1996) trace the history of distance education from those early days when correspondence courses were conducted via postal mail, through the early use of audio and video in the Open Universities in the 1970s, through the appearance and improvement of two-way videoconferencing (a concept in wide use today), to the use of computer networks to provide access to instruction from home or other 'distant' locations (as in today's expanding field of online courses). Much has been discussed about the changing face of higher education, as some traditional classroom-based classes may be supplemented (or replaced) by alternative instructional delivery methods. Some people have suggested that there may even be a demise of the university as we know it today. The more optimistic, though, suggest that expanding options available to students will but enhance the role of universities.

Students are at the heart of any educational system. Even as the relationship between technology and education is changing, so are today's students. This is especially true of those in higher education – at both undergraduate and graduate levels. Many are juggling work and family, along with their university classes. Time and distance often provide potential barriers to further higher education. Students who are unable to travel to campus at times when classes are offered are looking for alternate approaches. Universities are addressing this need by expanding to offer web- and video-based courses that may be taken via distance education. Community colleges and universities are increasingly reaching out to offer classes either face-to-face or via distance education, with promises that students will be able to complete most if not all of their coursework without traveling to the originating institution's campus. In this day of increasing competition, these options are becoming more prevalent, but generally, the delivery-mode options are on a per-course basis. A course is offered either face-to-face, online, or via videoconferencing. Often a course is offered in one mode only – so that at some time, a student will have to take it in that fashion. With the growing numbers of returning students (those who have been out of school for many years), we are faced with people who feel they know how they best learn, and this may cause some internal conflict for a student who must take a course through a delivery mode with which he does not feel comfortable. With that in mind, some courses are being offered via different delivery modes for different sections – so students can sign up for the method with which they feel most comfortable.

Instructors should consider the delivery modes that will best serve themselves, their students, and the content of each course. There are advantages and disadvantages to each mode, as well as to the way each of the elements (student, instructor, content) reacts to it. The role and/or relationship of the different delivery methods have been discussed by a variety of educators. Greek (2000) discussed this as a continuum:

> Rather than treating computer-and Internet-based education as a replacement for the classroom, I prefer to consider new technologies as creating the potential for a plethora of instructional delivery options. At one end of the spectrum would be a traditional face-to-face classroom environment that makes no use of new instructional technologies. These are likely to decline in number as students request Web sites, forums to post questions, etc., from all faculty and instructors. At the other end would be courses taught entirely using technology as a mediator between instructor and students. In between these two extremes are dozens of mixed mode options open for experimentation. Live classes may be less essential, and could therefore meet less frequently, in courses that feature email, discussions, chat, computer software, and/or video-conferencing. On-campus courses are also more likely to have distance learners in the classroom as Web-based video-conferencing comes more easily accessible. (p. 64)

This intermingling is occurring more and more frequently, and it is sometimes used to help prepare instructors and/or students for totally online or other distance education courses. This paper will describe a somewhat different approach – a video-based distance education class that includes some online optional class sessions, in which students who qualify as online-eligible may select the mode of instructional delivery for designated class sessions.

The Program

The need for qualified and certified teachers has become a major concern in many school districts, and programs to help alleviate the shortage are being developed. Some are aimed at recruiting people who have been working in other careers and who, for a variety of reasons, would prefer to change fields. One such program is emergency certification, where a person with a bachelor's degree takes education (and content area) courses leading to teacher certification, while actually teaching in a PK-12 (pre-kindergarten through 12th grade) classroom. Each required course is generally offered in one delivery mode – via traditional classroom, videoconferencing, or online – although some are offered in different modes for different sections.

Each delivery mode has its advantages and disadvantages related to students, instructors, and even content. Although most courses are taught using one primary approach, there is an increasing trend to include online activities within classes of all types. This may be an add-on optional activity, or may be an essential component of the course. Generally, though, every student participates in all the activities. Instructors, by integrating the Internet into their non-online classes, have the opportunity to take advantage of the unique characteristics that each delivery mode offers. Referring to similar situations, Chamberlin (2001) explained

> Many of us use the Internet to supplement our campus courses or teach hybrid courses, partially on-campus and partially online. Some of us teach fully on-campus and fully online courses at the same time. But all of us who teach in both worlds are double agents, caught in a struggle to bridge those worlds, and make effective use of both face-to-face and online environments to ensure successful teaching and learning.
>
> By taking advantage of the pedagogical strengths of on-campus and online teaching, instructors can offer students the greatest chance to discover their strengths and weaknesses as learners and the best opportunity to find their path to achieving success. (p. 11)

We have expanded this concept to include videoconferencing, along with online class meetings, and have discovered advantages and challenges for students and the instructors in our technology class for the emergency permit students.

The Students and the Course

Students in our teacher-education classes come from a wide geographical area, and some must travel an hour or more to get to class either on our main campus, or on a branch campus in a metropolitan area about an hour away. Most students have over-full schedules, with their families, their teaching duties, and their university classes, in addition to periodic extra evening job responsibilities (parent conferences, etc.). Their experience with technology varies greatly, from those who have never (or rarely) used computers, to those who used them on a daily basis in their previous careers.

As part of the emergency certification program, students are required to take a technology integration class at the graduate or undergraduate level (after completing or being exempted from an introductory computer skills class). The course is taught each semester in one of three different formats – either face-to-face (summer 1), online (spring), or via 2-interactive video (summer 2 and fall). Students with computer experience often opt for the online, or the videoconferencing class, while those with little experience often prefer *not* to take the online course, and often try to sign up for the undergraduate course (based on availability). Theoretically, the availability of different levels (graduate and undergraduate) and different delivery methods should help students address their scheduling concerns, and accommodate their learning preferences. However, we have discovered that this is not always the case – students often sign up for courses based on when, rather than how, they are offered.

But what about offering a course in which students have the option to choose the delivery mode for their class participation each week? This would provide flexibility for students, and it would also provide additional support for students who need it, as well as promoting collaborative activities to encourage development of networking skills to be used throughout their careers.

The concept was piloted during a summer subterm (4 hours a day, 4 days a week), with 2 online optional days per week. Several students took advantage of the opportunity, and it meant that students who were in class were able to receive more attention. It also encouraged people to complete activities quickly so that they would be eligible for the online option. To be online eligible, students needed to meet 3 criteria:

1. A student must have all activities/assignments completed satisfactorily, and
2. The student must have read the assignment message (sent out the evening before class) and feel able to complete all activities without assistance.
3. Send the instructor a message stating that the online eligibility criteria had been met, and saying that the online option was being exercised.

The course was taught via 2-way interactive video, with a facilitator (an ETEC Master's student who had previously completed the course and who had a technology position on her campus) at the remote site, and a computer lab available for use during (and before and after) class-time. The class focused on *Integrating Technology into Curriculum*, and activities were designed to relate directly to the students' activities in their k12 classrooms. Students were aware of the wide range of experiences, from those who have grown up with computers and feel they know everything (but may have uneven knowledge and skills), to post-baccalaureate career changers who have been in the business world for up to 20 years and who may not have touched a computer, to those who have used computers on a daily basis on their previous jobs and in their personal lives. The intimidation factor was great at first, but as the experienced students took the online option, the technology fearful gained confidence as they worked in the labs. Attending class gave them the opportunity to ask questions, and to share their joys and concerns with instructor, facilitator, and/or classmates. Online students expressed appreciation for that option – one student wrote, "I enjoyed today having the online option. I was able to get everything done....I do have a class at 1:00 and also had a teacher team meeting tonight...so I was a little late it finishing up." Another student did not feel the same, and said, "I do not feel confident enough to stay at home and work. I need to have more direction than what on-line gives to me." After coming to class that day, he did exercise his online option the next class, though. A student who wasn't quite sure, wrote, "I am going to attempt to do the 7-17 class online. The section 11-5 concerns me a little and if I have trouble I may come for the last part of class" – but he was successful at home and did not need to come for assistance.

As a pilot activity, this was considered successful, based on the student responses, as well as those from the facilitator who worked with students who attended the class sessions. The instructor had mixed feelings, and did not feel comfortable taking advantage of some of the specific characteristics of the video system – students were concerned that everyone did the same activities in the same way – but that may have something to do with the fact that it was such a condensed course in the summer, and there was little time to reflect on what had been happening, what they would be doing, and how this related to their professional teaching responsibilities. And it was close to the beginning of school, so people were getting ready to go back, but did not have access to their rooms (and resources) yet. With the success of that summer session, though, we were ready to approach the fall in the same manner, with a few minor changes.

The Fall

As always, scheduling problems arose with the fall class. The course would again be offered via videoconferencing, and the facilitator at the remote site would handle the video sessions as well as the lab activities there. However, there were more students wanting into the remote site than we had computers. Therefore, before class began, I had already told some students that we would be having online optional classes several times throughout the fall semester. Several students who were not able to get into the class at the remote site registered in the section on our main campus (where we had twice as many computers available), since they understood that they would not have to drive to campus each week. It was interesting to note that two of those people, though, did actually come to campus each week for the first half of the semester.

At the first class meeting, it was announced that to address the range of technology skills, as well as the time and location problems of persons juggling teacher/parent/student roles, some class sessions would be offered as online-optional, where students who qualified as online-eligible would have the option of 'attending' class in any location of their choosing. To qualify, all work must be up-to-date, with no missing or incomplete assignments, and the student must have read through the assignments for the class and must feel confident about completing the activities without assistance or questions. The assignment was scheduled to be sent out the night before each scheduled class meeting, so that students could determine if they were online-eligible or if they would need to come to class. The plan was met with joy from some, and skepticism from others. To provide everyone with the opportunity to 'try it out', the first class period was devoted to providing people with the skills to negotiate online assignments in our course management system and on e-mail, and the second week of class was totally online for everyone – building on the skills from the first night of class. That gave everyone the opportunity to experience the online environment, and it was interesting to see that some of the doubters on the first night were among the most enthusiastic after the online experience. After that first online class, one student wrote in her weekly reflection,

> I am glad we had Monday night's class online. Since it was a holiday, I would have hated driving to Commerce, especially since the thunderstorm would have messed up our class time. This was certainly convenient. I was not able to complete the assignments on Monday, due to the server being down. As it happened, everything has worked out well. This assignment was different. I did like the quiz over the chapter, even though I barely passed it.

Another student wrote, "Good evening, Dr. Espinoza. I am mentally exhausted after tonight's activities but enjoyed every minute of it", and a third said,

> This is my first experience with an online system for class and I am thoroughly enjoying it. I like working at my own pace in learning the lesson so I can absorb the information when I feel more refreshed than on a Monday night after working eight hours.

Each of these students exercised the online option at times during the semester, but all felt there were times when they wanted the social and instructional atmosphere of the classroom (at the local and remote sites).

The third class meeting was a required session where everyone came together and it was interesting to see and hear about the differing reactions to the online class of the previous week. With everyone present, we were able to have some interactive activities over the video system, and the 2 sides began to work together as one group. However, there was not another required in-class attendance meeting until the 9th week, and the tone of the class changed because of the attendance options.

I had told students that the lesson would go out on Sunday evening, so they would have an opportunity to determine if they would be needing to attend class in person the following evening. However, as an instructor, I found this somewhat limiting – it was difficult to change assignments when they had already gone out. So on Sunday evenings, a preview message would go out, telling what type of activities we would be having in class – then the 'real' message would go out the next day. This was still somewhat confining, though, for I did not feel able to make spontaneous changes, based on new ideas, student needs, and other items that might surface close to classtime. However, I did make some adjustments – students were generally assigned to complete a chapter quiz (available at the publisher's site for our textbook), and students who were in class were able to work in pairs to

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complete it. Other activities were carried out in groups by students in class, whereas the online students used chat sessions to meet with fellow onliners. One student, in her weekly reflection, said,

> I chose to go to class rather than exercise the online-optional class last week so that I could meet with real people concerning the scenario chat. I do not care for chatting online and find it cumbersome, slow, and difficult. I prefer to meet with others if possible; therefore, the drive to class was beneficial.

On the whole, though, students, were anxious to spend in-class time on actual hands-on assignments in the lab, and the video sessions often became a time to review the assignments and to answer questions about them. The number of online students grew slowly, but never quite reached the half-way mark, in terms of total class members.

The online optional class concept appeared to benefit students who wished to work from home, as well as the students who needed assistance (since the instructor/facilitator had fewer students with which to work during class, and could spend more time with them). There were other reasons for coming to class, though. One student said, "I like having the online optional classes, but after attending last week, I may decline online. I was able to finish most of the assignments in the lab, drastically reducing time spent on work and increasing time spent on studying." Her comments led to a discussion about time management, and what that means in online classes – and how it relates to contrasting comments – some the online folks talked about there being too much work, but the people who came to class didn't feel that was true. When people come to class, they spend a concentrated period of time on classwork, but when doing the same work online, there may be many distractions that extend the time that it takes to complete activities. Another student mentioned,

> This week activities were a little frustrating since I took the online option, and got a little behind on some activities that I did not clearly understand how to perform. but the reading was very interesting [had difficulty with assignments].

She learned to think more carefully about what she might and might not be able to do, and appeared in class more often.

Lessons Learned

The lessons learned have been many. The facilitator at the remote site asked, about half way through the course, if this didn't make double work for the instructor, and without thinking I said "Not really." However, that is not necessarily true – because the people who were online would often send comments and questions, and while I was online each evening (I'm online for one hour each evening for my online students – I was also teaching 2 totally online courses), they would send requests for chat sessions – and the questions would sometimes be about the week's assignment, despite the fact that they were to go to class if they had questions. We will set up some additional guidelines for online eligibility, and anticipate having one or more of my Master's students serve as online mentors. I will also develop more parallel activities that take advantage of the specific characteristics of the online and the video systems, and will have all student exposed to each, so that they can make informed choices.

One student summed it up, when she said,

> Although this course was part "regular" and part "distance learning", I would readily sign up for another course of this type. This course gives you options: go to class for assistance or do not go to class if you can complete the assignments on your own. This aspect of a course is the "best of both worlds".

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Consistency and Communication: The Benefits of Using an Online Course Management System in a Multi-section Introductory Computing Course

Christina M. Goode
Instructional Technology, Curriculum & Evaluation
University of Tennessee, Knoxville, TN
cgoode@utk.edu

Abstract

As the Internet evolves, more instructors are learning how to create Web pages to support classroom activities in order to communicate with their students and provide anytime/anywhere access beyond the four walls of the classroom. While this method has been a valuable resource for students, the multi-section course provides interesting challenges, especially when different instructors are responsible for each section. In this presentation, I will discuss how we use an online course management system as a tool to help us coordinate multiple sections of a required introductory computing course for all pre-service teachers at the University of Tennessee, Knoxville (UTK). I will also outline plans for expansion and discuss future initiatives for using online learning environments to support teaching and learning.

Background

At UTK, all teacher education students are required to enroll in an introductory computing course. Each semester, five to seven sections of the same course are offered, in order to keep class sizes small enough to meet the capacity of our computing facilities. Full-time instructional technology faculty and graduate teaching assistants take responsibility for different sections. In the past, though the overarching goal to help preservice teachers learn to use technology was consistent, it was not unusual to have varying sets of expectations in different sections, based on who the instructor happened to be. Although the variety of instructional methods and approaches had its benefits, students did not necessarily share a common set of skills and knowledge. When conducting a focus group session with a group of students during their student teaching internship year, it was apparent that students were exposed to different experiences although all had completed the same general course offering. Statements such as "we didn't do that" came up quite frequently as their peers recounted their technology class experiences. This type of situation cause ripple effects in other areas of the teacher preparation program. Without a core set of skills, methods faculty are less likely to be able to depend on students possessing a certain level of technological prerequisite skills from which they can continue to build.

In an attempt to coordinate efforts among multiple sections, we decided to adopt a course management tool to help us create a master template for the overall course. UTK has adopted Blackboard's CourseInfo, an online learning environment that can be customized, to provide courses with Web-based materials. The idea behind the template was to focus our efforts on providing a solid foundation that included all core skills and common requirements.

Expectations and Reality

Upon completion of the template, we were able to replicate the core site across five sections, at which point each instructor could take over and include their own additions to their own site. This method allowed us to find a good balance between consistency and flexibility, and allowed us to share resources without having to re-enter large amounts of information.

The key to using CourseInfo to enhance communication and consistency among the instructors is getting all the instructors to adopt it. This was the first and most pressing hurdle. Not all instructors adopted CourseInfo. Thus, although the course site was available to the instructor, it was not used in the course. For the instructors who adopted CourseInfo, the template worked well for both them and their students and provided a consistent look and feel to the course. CourseInfo also provided several features to enhance the overall communication and coordination of each course for and between the instructor and the students. Instructors could use their CourseInfo sites to post quizzes, assignments, and notes; record grades; post additional links to their Web site; maintain a calendar; distribute announcements; access email, chat, and discussion boards; and take advantage of a Digital Drop Box to reduce unnecessary paperwork. Students learned to check their class Web site on a regular basis, as all tools were available for "one-stop-shopping" in the same location.

Another hurdle was underestimating the space needed to replicate the course material for each section. Instead of replicating large files within each section, we discovered it was best to place a copy of the larger files on the server and allow each section to link to the files.

Conclusions

Although two sections did not adopt CourseInfo, we considered the initial approach to be a success. Future plans include expanding the use of the online communication tools to provide discussion forums and chat sessions between the sections. Also, the current bimonthly instructors' meeting can be augmented with special chat sessions as needed. Though the course is taught in a lab setting, for certain topics, plans are underway to moving more instruction online through learning modules/tutorials and videoconferencing.

Preparing Teachers for Digital Distance Education

David D. Keefe
Linda M. Koudelka
Zahrl Schoeny

ABSTRACT

Teachers today are required to integrate technology into their lessons at an ever-escalating rate. Teacher education institutions must prepare their students to teach in tomorrow's classrooms. Today's teacher education students will teach their students as they are taught in their universities today. The National Council for Accreditation of Teacher Education (NCATE) Task Force on Technology and Teacher Education, a group of educators from diverse institutions and backgrounds, was assembled to consider ways that NCATE can provide leadership and support initiatives to meet the technology challenge facing teacher education institutions. The first recommendation of this Task Force was to stimulate more effective uses of technology in teacher education programs.

Teachers in K-12 classrooms have an obligation to prepare their students for a successful transition from the college classroom into the real world of the 21st Century. The convergence of high-speed communication and Internet-based digital technologies is creating new platforms for the delivery of instruction. The University of Virginia's (UVA) Curry School of Education has developed an outstanding model for this recommendation through it's course offering entitled *Introduction to Digital Distance Education*. For the past two summers, the course has been offered simultaneously in a classroom at the Curry School, connected to a classroom at the UVA School of Continuing and Professional Studies Northern Virginia Center.

Learners in the class are increasingly able to use a wide variety of methodologies for collaborative education, such as streaming video and audio, online discussion forums, interactive simulations, and case evaluation. The course provides an introduction to these technologies for application in synchronous and asynchronous learning environments in education, business, and government. The course focuses on the proper application of these technologies to enhance the interactive learning experience of the students. The "new" role of the instructor is addressed, as the shared learning experience provided through the use of advanced digital technologies requires the teacher to become part of

the learning experience as a participant along with the students in the class. Practical examples of these instructional technologies are provided, including videoconferencing, electronic whiteboards, courseware tools, and discussion groups. Internet-based collaborative connections between UVA classrooms in Northern Virginia and the grounds in Charlottesville are used to model the process and provide practical experience for the student in the class.

Learning activities that have proven beneficial during the course include Web-Quest development, student reports applying chapter material from the text (Peloff, R. and Pratt, K. (1999). *Building learning communities in cyberspace*. Jossey-Bass), use of digital technologies for teaching the class and demonstrating through application of material in the class website (http://curry.edschool.virginia.edu/curry/class/edlf/589_idde/).

The presentation will focus on critical course development and delivery issues that the authors have discovered. Summary recommendations will be presented to help those interested in providing similar course experiences.

Technology in the Classroom:A Teaching Unit for K-12 Teachers¡¦ Professional Development

Chien-Chih Lee, Chengshiu Institute of Technology, TW

I. Introduction

According to Duhaney (2001), more than 50% of teachers feel "not prepared at all" or "poorly prepared" to integrate and use technology in the classroom. Saye (1998) stated that four general factors must be considered before teachers will accept and use technology: time, preparation for future, knowledge, and availability. One goal of this article is to create a teaching unit that teachers who participate will feel more prepared to use technology in the classroom and to integrate it into their lessons. This course is designed as a professional development course for use with classroom teachers and school personnel at K-12. The purpose of the course is to develop in participants an understanding of the importance of technology integration in the classroom. The four goals of technology in the classroom are control, empowerment, enrichment, and efficiency (Saye, 1998). Upon completion of the course, the participants will be able to integrate technology into classroom instruction and feel prepared to use technology for instructional and personal use. Bennett (1999) emphasized that better use of technology by teachers can conserve time so they can focus on educating students.

II. Using technology to enhance professional practices

Based on International Society for Technology in Education (2000) standards, teachers should demonstrate understanding of technology operation and concepts, implement curriculum plans to maximize student learning, and use technology to enhance productivity and professional practices. This unit meets these standards by teaching participants to use the Internet, Netscape Composer, e-mail, and Microsoft Office applications to teach students and for daily organizational activities such as attendance and grades. Technology benefits teachers by not only providing information, but the real advantage is that these tools can save time and energy in order to offer guidance for research and communication.

Teachers need to be able to use technology in the classroom in order to prepare students for the 21st century. According to Sefton-Green (2001), technology is empowerment for students. Computers as Tutors: Solving the Crisis in Education purports the use of technology "for the welfare of students, teachers, and society" (Bennett, 1999, p. 2). The developers believe that students who learn using technology are better prepared for society. Students who are familiar with technology are able to understand its advantages and to apply their knowledge to real life.

This teaching unit is designed for k-12 teachers' and school personnel' professional development. The unit should require 25 to 35 hours of instruction time, depending on the time constraints of the instructors and targeted audience. The developers envision the unit being taught in parts throughout the school year. Although it can be taught in 3 to 4 consecutive days, the developers do not believe it will be as effective.

III. Understanding by design

This unit may be modified for use with children by changing the discussion and writing prompts. None of the activities are too difficult for a student at or above third grade level. Also, the final research topic might be modified to one more pertinent to students than professional educators. In addition, the unit may be modified for use in a pre-service education course such as Microcomputers in Education. Modifications may include more activities or shorter lessons.

The unit is designed to meet all six facets of understanding as follows:

Facet	Evidence
Explanation	Participants will relate current research to classmates.
Interpretation	Upon learning about the Internet, participants will interpret the information to brainstorm ways to integrate the Internet into the classroom on an understanding level. Participants will interpret current research to synthesize it for classmates.
Application	Participants will search the Internet, utilize e-mail, create a web page, compose a biography paper (Word), compose a biography presentation (PowerPoint), compare student performance (Excel), and conduct and synthesize research.
Perspective	Participants will evaluate a lesson for the instructor. Participants will locate and recommend web sites for classmates. (The teachers must evaluate the sites for use by other teachers. They must take into consideration the needs of others.) Participants will determine if research information will be useful to themselves or others.
Empathy	Participants will discuss perceptions of technology (fears, failures, successes). Participants will discuss amounts of technology available in their own school

	districts.
Self-knowledge	Participants will discuss reasons they do or do not use technology. Participants will evaluate web sites for usefulness in instruction. (The teachers must evaluate the sites for use in their own classrooms and instruction. They must consider what they will and will not use and why.)

When design this teaching unit, the following issues need to be considered. The first issue is to consider what enduring understandings are required. Teachers will understand that technology can improve both teaching and learning. In addition, teachers will understand the importance of technology integration in the classroom. The second issue is to review what the overarching "essential" questions are such as what do you know about the importance of technology in the 21st century and "how can technology affect the efficiency of school personnel". The next issue is to look at what teachers understand as a result of this unit will. The purposes are that teachers will understand how to use the Internet to search, to use e-mail, to use AOL Instant Messenger and to design a class and/or personal web page. Teachers will understand how to use Microsoft Office applications (Word, PowerPoint, and Excel) to increase efficiency of classroom organizational tasks. Teachers will understand the importance of technology integration in the classroom to improve teaching and learning. The fourth issue is to consider what "essential" and "unique" questions will focus this unit. Some samples are (1) What is the Internet? (2) How can the Internet be a useful classroom tool? (3) How can Microsoft Office applications be useful to teachers? and (4) What does current educational research say about the integration of technology in the classroom? The last issue is, "What evidence will show that students understand technology integration?"

IV. Motivating teachers with activities

This activity will allow teachers to start thinking about technology integration. Though they may be aware of technology, some teachers are not aware of the benefits of technology integration. Teachers will read the article and discuss it in small groups. The article will be used to facilitate a large group discussion of technology integration.

The fist procedure is to distribute copies of the article "Computers, Creativity, and the Curriculum: The Challenge for Schools, Literacy, and Learning" (Sefton-Green, 2001). Then the participants will read the article. While reading the article, the teachers will note uses for technology in the classroom as well as barriers of technology use in the classroom. In groups of 3 to 5, the teacher will discuss their thoughts. Each group will share their thinking in a brief oral presentation. Based on the comments of the groups, a large group discussion will be facilitated. The following topics for discussion are: (1)Why do you think technology can be scary? (2) Why do teachers integrate technology?" (3) Why do teachers not integrate technology? (4) What could be done to make teachers more likely to integrate technology? (5) What differences do you see in the amounts of technology present in various school districts? and (6) How and why do I integrate technology in the classroom? Finally, the teachers will write reflectively according to the following prompt. The teachers will understand the goal of the workshop through reading and discussion and begin to think about the role of technology in the classroom.

The materials will be copies of the article, writing prompt. The instructor will read the reflection of each teacher and will be looking for positive and negative aspects of current technology integration, or lack thereof. In addition, follow-up will occur on an individual and large group basis. The follow-up will depend on changes in thinking from the first day writing prompt to the mid-unit writing prompt.

Conclusion

It was created to prepare teachers to use technology in the classroom. In order for this unit to be successful, each participant will need access to a computer, the Internet, Netscape, Microsoft Office, and a printer. The goal of the unit is to give teachers an understanding of technology uses and applications that will benefit instruction and organization in the classroom. Also, teachers will understand the importance of technology integration. Any instructor using this unit must be highly skilled in technology use. The developers recommend that a district Technology Coordinator be the instructor for this unit. Additionally, the instructor should show knowledge of current educational research concerning technology integration.

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DIGITAL TECHNOLOGIES AND CULTURES

Jimmie M. Purser
Professor of Computer Science
Millsaps College
United States
pursejm@millsaps.edu

Abstract: As part of our Liberal Studies Program at Millsaps College, which serves our entering students, I have designed and implemented a "Thematic" LS Section entitled "Digital Technologies and Cultures". This session describes the planning, implementation, and evaluation of this course.

Introduction

LS1000 employs a variety of analytical styles to examine the disciplines that comprise a liberal arts education at Millsaps. The shared experience of being introduced to the humanities, the sciences, and business leadership provides Millsaps students with both a unifying theme in their crucial first year and with the special skills they will need during their college years and beyond. The goals of the course are to teach particular competencies in critical thinking and communication and to instill an appreciation for an interdisciplinary view of lifelong learning and development.

The Course

The four units of LS1000 introduce you to several primary aspects of a liberal arts education:
Unit I: Growing in self-knowledge (Identity).
Unit II: Becoming aware of how you think when searching for the truth about something and learning to think more powerfully (Cognition).
Unit III: Learning to identify and weigh the factors involved in reaching a responsible decision in the most aware and informed way (Responsibility).
Unit IV: Presenting your work in the public community of thought and learning to assess your own thinking according to appropriate standards (Assessment).
Within the course, students write 3 Formal Essays and 2 Informal Essays (in-class).

This thematic version of LS1000 focuses on the impact of digital computing technology upon the humanities, the sciences, and business. Issues addressed will include creativity and technology ("CyberTheater", "IATH"), the effect of computers on society ("CyberCulture", the "Visual Culture", "The Technological Underclass", "Ivan Illich") , Privacy and Censorship on the Internet ("Digital Privacy", the "Electronic Frontier Foundation"), moral implications of copyright laws ("The Digital Millennium Copyright Act"), ethical uses of Internet resources ("CyberEthics" and the "Hacker Ethic"), progress in medicine with computers ("TeleMedicine", "CyberMedicine"), impact of computing technology on the global economy ("TeleCommunications", "E-Commerce"), and addictive behaviors fostered by computer technology ("Internet Addiction Disorder").

Materials

The reading materials for the course are taken exclusively from the Worldwide Web. The class meetings consist of discussions on the readings, as well as "training sessions" with technology. For more information, see the web page for the course at: http://www.millsaps.edu/~pursejm/ls18.htm

Conclusions

Student evaluations of the course have been very positive. The course has helped to spawn a project within the

Associated Colleges of the South (ACS) entitled "Digital Technologies and Cultures". For more information see: http://www.colleges.org/~dtc/

The IT Fundamentals Curriculum - Online Interactive Technology Skills Modules

Laurie Ralston, Arizona State University, US

In the face of an increasing need for improved technology skills for workers in the United States, The e-Learning Network has created the Informational Technology Fundamentals (ITF) Curriculum. The ITF Curriculum consists of highly interactive online modules, designed to represent real-world scenarios encountered by users of technology. These modules cover subjects such as Setting Up a Computer, Number Systems, Electricity and Safety, Networking basics, advanced Networking, Hard Drives, Device Cards, Peripherals, and Operating Systems.

Each module provides an interactive learning experience, which include animated demonstrations, virtual lab simulations, and video clips. The modules involve frequent user interactions, including drag-and-drop and keyboarding. Since the modules are online 24 hours a day, they truly encompass the meaning of "Anytime, Anywhere" learning. Using a "Reusable Learning Objects" approach, these modules can be utilized in any order, within a curriculum or by an individual wishing to improve his or her technology skills.

As an example, our Setting Up the Computer module teaches the user about the different cables and cords used to set up a computer. The module has original graphics and Flash animations that show close-up views of cable connectors and the ports into which the connectors plug on a computer. It has an interactive assessment with several scenarios of different real-world skill levels. The objective of this module is for learners to be able to completely set up a computer after using the module.

The e-Learning Network is part of the Technology Based Learning & Research department in the College of Education at Arizona State University, and has Cisco Systems as a major partner in development of the modules. The project is partially funded through a grant from the Fund for the Improvement of Post Secondary Education (FIPSE). As such, the ITF modules are available to the general public, free of charge. While not a primary project goal, we hope to improve the basic technology skills of pre- and in-service teachers to enable them to progress towards full integration of technology in their classrooms.

Objectives of the Session:

- Introduce the Informational Technology Fundamentals modules to teacher education and professional development audience
- Give participants methods for using the Informational Technology Fundamentals modules in their teacher education and professional development efforts
- Give participants methods for using the Informational Technology Fundamentals modules in their technology courses with higher-grade students
- Increase usage of the Informational Technology Fundamentals modules

The purpose of this session is to introduce participants to the Informational Technology Fundamental modules and discuss how teacher educators can utilize the modules in teacher education and professional development. Some of the modules can be used to give pre-service and in-service teachers an introduction to basic computer workings as a precursor to learning about technology integration. While organizations such as the National Council for Accreditation of Teacher Education (NCATE) have embedded their commitment to technology into their teacher education standards, others have noted that in general teacher preparation programs do not spend enough time teaching pre-service teachers about computing itself (Duran, 2001). Teachers who are not comfortable with the technology will not venture into attempting integration of technology into their curriculum.

The Apple Classrooms of Tomorrow (ACOT) studies revealed that teachers progress through stages as they learn how to integrate technology into their classrooms. The first two stages are the "Entry" stage, where teachers learn the basics of using computers, and the "Adoption" stage, where teachers begin to use technology as a support for traditional instruction. Often, teacher education and professional development programs skip the "Entry" stage and leap right into the "Adoption" stage, without giving participants a chance to learn informational technology and computing basics. These modules can be used for pre- and in-service teachers who are in the "Entry" stage, and approaching the "Adoption" stage of technology skill acquisition (Apple, 1995).

The ITF modules are also valuable for pre- and in-service teachers who will be teaching technology courses to students, or who are involved in programs like the Cisco Networking Academies. The modules can be used by teachers to learn the technology content and also with higher-grade students who are learning technology subjects. They can also be used as preparation for various technology certifications, such as A+, Net+, and Cisco Certified Network Administrator.

Audience

This session will be of interest to teacher educators who need an interactive and flexible method for teaching pre- and in-service teachers basic computer and technology skills. Actual pre- and in-service teachers may also be interested in using the modules on their own, since they can be accessed anytime through the Internet. Participants should have experience with keyboarding and using a mouse, as well as basic experience in using a web browser. Most interactions involve using the mouse to drag and drop, or click hyper-linked buttons. There are no prerequisites for this session.

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The Establishment of Basic Computer Literacy

> Do not confine your children to your own learning for they were born in another time. (Hebrew Proverb)

In June of 1999, the Joint Economic Committee met to discuss advances in technology at the High Summit on Technology. These proceedings included a panel of individuals from all areas of the technological industry. The event incorporated high school and college students, via teleconferencing, who questioned members of the Joint Economic Committee and members of the primary panel. One of the chief concerns for the members of the panel, according to Michael Durham (1999), included increasing the number of technologically literate workers. Bill Gates (1999) charged the school systems with this responsibility. The Secretary of Education, Richard Riley (1999) agreed but stated that there must be available government funding in order for the schools to maintain sufficient levels of technology training. Seymour Papert (1998) explained that the culture of children today was so radically different from twenty years ago. Gates (1998) agreed and advised educators not to be afraid of change but rather embrace it and let technology make the classroom for this new student culture a more habitable environment. Don Tapscott (1998) had the same opinion and labeled this new culture the Net Generation.

The purpose of this study was to establish a basic computer literacy proficiency exam for students entering university. Based on the Technology Counts 1999 (1999) report, it was believed that students were already exposed to basic computer literacy courses prior to entering higher education. The Tennessee State Department of Education (2000), through the vocational technical division, offered a technology path that included courses in the application of technology although computer courses were not general education graduation requirements.

Designing a proficiency exam for students entering a university enabled students already familiar with technology the option of exempting basic computer literacy computer courses or enrolling in computer courses comparable with their level of skill. The participants of this study were declared education majors enrolled in initial teacher education courses. This study examined the computer literacy of these students as well as argued that students should be able to test out of required basic computer courses in university if basic computer literacy skills are present. Testing out of courses enable students who have already mastered the objectives of the course to progress on to more challenging coursework. The study also compared students by year of graduation to determine if most recent graduates maintained proficient computer literacy compared to others. The hypotheses stated that students graduating in the past five years would have an increased opportunity to master computer skills compared to students graduating more than five years ago. The results of the study surprisingly did not support the hypotheses. The following questions were proposed at the onset of this study:

1. Is there a difference between the curriculum objectives required by the state in secondary education and the course requirements for basic computer literacy courses offered at Middle Tennessee State University?
2. Is there a need for a placement test of basic computer literacy at universities?
3. Is there a need for students to test out of the required basic computer literacy course at universities?

Because all of the participants were education majors, a comparison of education versus non-education major was not possible. However, this was included in further study as well as to investigate whether teachers of computer classes in high school should obtain certification in computer science. The study also found that computer courses should be required for all students as a graduation requirement.

This was an exceptional study and resulted in a fundamental web based format for testing overall basic computer literacy rather than specific computer applications. As a result of this study it was determined that pre-service teachers should be tested on their overall basic computer literacy as well as participate in courses to enhance established computer skills in an effort to be well prepared to lead a twenty-first century classroom.

Computer Science as a Discipline in Germany: the Perspective of the Professors

Esther Ruiz Ben
Institut für Informatik und Gesellschaft (Abt.I) Albert-Ludwigs Universität Freiburg

The professionalisation of Computer Science in Germany is still on its way, that means: It doesn't exist a generally accepted basis, recognised in the changing and diversified nature of the field. The lack of delimited fields of competence in the discipline, especially in software development also reflects this tendency.

Engineering, Mathematics and interdisciplinary orientations contribute to outline and define Computer Science and particularly the Software Development as its most prominent professional praxis. The analysis of self-definitions of the discipline and the praxis of Software Development will be used for examining the process of professionalisation of Computer Science and hence for eliciting the participation-chances of women, who are underrepresented in this field.

In this paper we will focus on the development of computer science as a discipline in Germany and how it is considered from the perspective of professors who represent different paradigms inside the discipline.

Peter Denning defines the computer profession as "the people and institutions that have been created to take care of other people's concerns in information processing and co-ordination through world-wide communication systems. (...) The discipline of computer science is the body of knowledge and practices used by computing professionals in their work.(...)" (Denning, P. 1998, p.1). Computing experts gain this body of knowledge and practices in the educational field and in the praxis. The process, through which the academic area and the praxis transfer their knowledge to each other and the integration of new knowledge in both fields takes place in two different levels: an intellectual one as well as in an institutional one. The representants of the discipline in teaching and research constitute the intellectual level of the professionalisation- process of computer science, while the set of associations representing the interests of the computer experts working in the praxis shape the institutional level. The struggle for power in the discipline in order to establish its orientation takes place principally in the intellectual level of the professionalisation-process.

While the institutional level of computer science is rather stable in Germany, in the intellectual level there is not an assent about the core-knowledge of the discipline and the delimitation and definitions of the relevant domains for the professional praxis. In this level we can distinguish three knowledge paradigms (Coy 1998):

- Mathematical-formal. In this paradigm logical representations as well as verification and complexity problems represent the most important measure basis for quality. A mathematical-logical educational basis is for this paradigm the most important source of expertise (Dijkstra 1989). Social responsability is seen as a question of computer programs' security and certainty (Peschek 1996). Interdisciplinarity is not well considered in this paradigm that is oriented to the delimitation of the discipline through its mathematical-logical carachter.
- Engineering. The focus of this paradigm is in the technical aspects of computer science. Methods of engineering must be combined with the optimisation of time and costs to secure optimal Software-products. Technical application and configuration of technique are considered as secondary aspects in the discipline (Broy & Schmidt 1999).
- Social-critical. In this paradigm social responsability is considered as an important aspect to be integrated in the curricula of computer science. Usability and the adequacy of computer solutions for persons as well as the consideration of computers as a tool and not at as an objective are the main characteristics of this paradigm (Keil-Slawik 1996; Floyd 1985). Interdiscipinarity is considered in this paradigm as a very important factor for the development of computer science curricula, risking the delimitation of the discipline from other competing disciplines in the IT-field (Engineering, Electronic, etc.).

These paradigms are in a constant struggle in the intellectual level of computer science to establish the orientation of the discipline. Nevertheless the three paradigms are not present in the computer science in this form, but in a mix-form with different weights in tertiary institutions.

In our study we want to analyse which of these paradigms are more present in the orientation of the discipline in the educational field as well as in the praxis of software development. Which are the main skills that professional computer specialist must gain through their educational trajectory? What role does the mathematical basis play in the development of the discipline? What is the importance of social aspects for the development of computer science curricula? How should be established the knowledge transfer between computer science education and the professional praxis? How should be organised the continuing education in computer science by the educational institutions? What role should play soft skills in computer science education? What are the main deficits of computer science specialists and how could they be solved? What role does interdisciplinarity play in the development of computer science?

These are some of the questions we want to answer in our survey considering the perspective of three relevant groups in computer science: Professors in universities and research institutions; Software Developers; and Personal Managers in Software enterprises. In this paper we will focus on the point of view of professors in universities and research institutions.

1. Methodology

A qualitative methodology has been used to analyse the professionalisation process of Computer Science: Open interviews have been used to elucidate the inner models and the self-definitions of the field as a science and as a profession in several industrial sectors. We have considered the point of view of three representative groups in computer science:

- Intellectual (Representatives of tertiary education and research institutions of Computer Science; N=6),
- *Industry/Software Development* (Software Developers in software companies in Germany; N=30),
- *Industry/Human Resources development* (Personal Manager in software companies in Germany; N=12).

The interviews have been conducted during 2000 and 2001.

2. Analysis

After the transcription of the interviews we have conducted an analysis for each group and in a further step we conducted an analysis of the three groups together comparing the different perspectives of each one of them.

3. Some results of the group of professors in tertiary education and research institutions

Computer Science is considered as an apply discipline and there fore it is very important from the point of view of the professors to include the knowledge of other disciplines into computer science. Nevertheless computer science is caractherised as a technological field that should use engineering methods.

The recognition of structures for modelling practices is very relevant in computer science and must be trained during the educational trajectory of computer science specialists. Mathematics play in this sense a basic role, since it helps to acquire this kind of structural thinking. Nevertheless, computer specialists must be always willing to gain and apply new knowledge. From the point of view of the professors this is a basic competence that computer specialists must have to survive in the praxis.

There is not a clear assent among the professors in relation to the three mentioned paradigms. Nevertheless, the importance of interdisciplinarity and the relevance of soft skills for the professional praxis is supported by all of them. Specially these skills are consideredas the main deficit of computer specialists.

Technology Skills Certificate: A Web-based Student Demonstration of Basic Technology Skills.

Allen Steckelberg, University of Nebraska-Lincoln

Technology plays an important role in facilitating teaching and learning and many teacher preparation programs have made a commitment to prepare graduates to utilize it effectively. An essential element in this process is the identification of methods that allow both students and colleges to demonstrate that prospective teachers have indeed mastered the necessary knowledge and skills. One approach utilized at the University of Nebraska-Lincoln has been the creation of a Web-based technology skills certification course. The course has evolved over a three year period and has been offered to over 250 students. This session will describe and demonstrate the development, content, delivery, and management strategies utilized in the course.

Approach/Design Issues

Several factors were considered during the design of the course:

(1) The Web site uses a project-based approach to demonstrate competencies. The emphasis is on the products that teachers create rather than a specific strategy or step-by-step approach to learning a skill. Students use the tools at their disposal to complete the projects. The projects are designed to relate to tasks that teachers perform rather that specific equipment or software.

(2) Emphasis is on both fluency with software and hardware and the integration of technology in both teaching and learning. In addition, social, ethical and professional issues are addressed.

(3) The technology available to teachers changes continuously as new tools and new ways of applying them are developed. The ability to teach themselves how to use new software and hardware is more important than the specific steps in using one particular piece of software. Resources are provided in each module as a starting place but the emphasis is on activities that encourage the use of available tools for learning the technology. These include built-in help, manuals, and Web-resources. They may also include others with technology expertise, including other members of the class.

(4) Teachers College operates under a Scholar-Practictioner Model. The class represents our efforts to learn how to use the Web to teach. We are attempting be innovative while seeking to improve. We ask for feedback on both learning and on the strategies and approaches that are being implemented and we are developing systems that allow us to continuously improve the resources and activities of the course.

Course Content

Participants must complete a series of nine modules designed to develop skills and demonstrate competencies related to the National Educational Technology Standards (NETS) adopted by the International Society for Technology in Education (ISTE). Each module contains an overview of the module, requirements for completing the module, a mastery project, and a set of resources and support for completing the project, and a reflection on the module activities. Modules are created around the following topics:

(1) Basic Computer Operations and Communication Tools
(2) Basic Productivity Tools
(3) Integrating Basic Productivity Tools in Instruction
(4) Instructional Support Tools – Multimedia and Instruction
(5) Integrating Instructional Software and Learning Tools
(6) Application of Telecommunication Tools in Teaching
(7) Technology and Assessment
(8) Social, Ethical and Human Issues
(9) Technology for Professional Growth

The session will highlight and demonstrate sample components and mastery projects from the modules.

Management Issues

Because the course is Web-based it has allowed us the opportunity to design strategies for tracking student progress, displaying student work in ways that are convenient for the instructor and the student, and providing students relevant feedback on their work. We are currently investigating strategies for implementing self, peer and instructor feedback relative to student work on the mastery projects.

A New Model for Pre-Service Educational Technology Classes

Steve Whitaker
Department of Leadership, Foundations and Policy
University of Virginia
United States of America
whitaker@virginia.edu

Mark Hofer
Department of Leadership, Foundations and Policy
University of Virginia
United States of America
mjh2k@virginia.edu

Abstract:

EDLF 345, the required course in educational technology at the Curry School of Education, is being restructured by its instructors in recognition of the fact that technology can not be used or taught out of a larger context. In the case of this class, the context is the set of methods and content-area courses that education school students must complete. Changes being made to the course include the modeling of technology-driven lessons specific to certain content areas, the requiring of student-developed projects and plans that demonstrate both technological and pedagogical proficiency, and the development of partnerships with other school of education faculty members to include considerations of technology and teaching methods in classes other than just the technology course.

As the integration of technology into K-12 classrooms becomes a standards-driven requirement across the country, teacher education programs are struggling to design courses that prepare educators to successfully incorporate computers into their classrooms. The successful pre-service educational technology class can no longer be just a training course on software use; rather, it must be a methods course that seeks to model appropriate technology use across content areas. The class, like the technology it teaches, cannot exist by itself; instead, it must be part of a larger and more meaningful context. The class must be made into a tight-fitting component of the teacher education program in which it is offered. Such a goal can only be met by changing both the technology class (it must incorporate other curricular content such as learning theories) and other methods classes (which must refer to technology use when discussing content and pedagogy). This paper describes the attempt at the University of Virginia's Curry School of Education to make such changes to EDLF 345, the required undergraduate educational technology course. Although the discussion here is limited to this one course, there are important reasons behind the changes – and consequences of them – that can be useful to any college or university with a teacher education program that wishes to appropriately offer technology courses to its students.

The restructuring of EDLF 345 ("introduction to educational technology") began with the conceptual idea that technology use in the classroom is meaningful only when the technology aims to enhance teaching or learning. Although obvious, this goal is not always the driving force behind technology and computer use in K-12 schools. At times, the pupil-to-computer ratio, the average student computer use time, or the notion of a "computer in every classroom" supercedes any real educational purposes. Because the actuality of appropriate technology use differs among the various content areas, EDLF 345 was divided into separate course sections representing these areas; there is at least one section per semester apiece for students concentrating in math and science, secondary humanities, and elementary education. Language, health and physical education majors typically enroll in one of the two latter sections and have course content modified for their particular foci. This division of content allows instructors of EDLF 345 to better differentiate the software and technology used, to decide how it is best used, as well as to model lessons that are unique to each content area.

It is this feature of the class – the teaching of appropriate technology-enhanced lessons – that is at the heart of EDLF 345. Less time is spent in class teaching the tool and more time is devoted to teaching *with* the tool – that is, modeling lessons that make appropriate use of technology. During each meeting of EDLF 345, students are introduced to a new tool or technology via their participation in a lesson that teaches content using that tool. These lessons may be developed in conjunction with content-area faculty. Students in the secondary humanities section, for instance, may learn about the effects of a region's geography and location on its seasonal temperatures through the use of the graphing features in a spreadsheet application. Instead of focusing solely on the skills involved in using such a program, students use the program to better visualize and interpreting data. They are therefore allowed to reinforce (and, in some cases, to learn) subject matter in their content areas, to see an example of a suitable lesson using technology, and still learn how to use the tool as well – the last quarter- to half-hour of each class is dedicated to an introduction to the current tool for those students who wish to remain; students are also expected to work through tutorials outside of class time.

By focusing on the content and participating in model lessons, students in EDLF 345 are perhaps better prepared for their own efforts as future teachers to enhance learning and teaching with technology. This approach also appears to have the added benefit of removing at least some of the anxiety students seem to have when approaching computer use. With the focus squarely on methods and content, and with the role of technology altered to a supporting one, many students are put more at ease in EDLF 345 than they might otherwise be in another technology class. They may also become more motivated to learn the tools when they see how those tools can immediately benefit their students and classrooms.

Another important consideration in the restructuring of EDLF 345 is the idea that students need to be taught how to be critical users of technology; the successful teacher also knows when *not* to use computers. To that end, students enrolled in EDLF 345 are asked to read various articles concerning the use of technology in the K-12 classroom. Some articles, such as a series from the *Washington Post Magazine* in September 2001, extol the use of computers in education and highlight exemplary teachers and lessons; others, such as Todd Oppenheimer's *The Computer Delusion*, are far more critical of technology use. After reading the articles, students write brief reactions to the readings, post these reactions to their web sites, and use them to begin class discussions on the benefits and disadvantages of K-12 educational technology. These discussions are held at the expense of class time, but often provide participants with new viewpoints and ideas. Students sometimes choose to revisit their initial reflections after the discussions.

With these foundations in place for a thoughtful and critical approach to technology use, EDLF 345 is designed to expose students to a wide variety of tools and methods of teaching with them, as well as the chance to explore a few of those tools in greater detail. This 'breadth and depth' perspective is accomplished in several ways. First, students are required to demonstrate their competency at a basic level on all technology used in the class. Each week, they create and turn in (by posting to their personal web sites) samples of the types of educational products that can be developed with each tool as well as a rough sketch of a lesson plan involving the tool and product. These assignments tie in nicely to students' current methods classes, which are often concurrently teaching students how to develop lesson plans in general. Elementary education students learning how to teach with database programs would be expected to create a database-enhanced lesson that they as future teachers might employ, as well as an example of the type of database their students would use of create as a result of the lesson. Such competencies provide practice for the students and allow instructors to gauge individual and class abilities. Second, in addition to their basic competencies, EDLF 345 students are required to develop a large semester project that incorporates one or more of the technologies they have used. This project may take the form of a fully-developed lesson or unit plan that teaches content in their specific areas of concentration, or it may be a technology-enhanced extension of a project for another methods course in which they are enrolled. In any form, it is designed to allow students to explore the tools that they have found most useful or interesting. As with all other work, these projects (when possible) are posted to students' web sites.

Another important component of EDLF 345 is the creation by students of a web-based technology portfolio that showcases not only their technical proficiencies but also demonstrates critical thought about the use of technology. This portfolio, due at the end of the semester, consists primarily of students' work to date for the class. Little extra effort is required for this part of the portfolio as all assignments are turned in via the web; students are merely asked to write a brief description of each competency that they include. Additional pieces of the portfolio, which students generate at the end of their time in the class, include a "technology autobiography" which describes students' experience with, and attitudes towards, technology in general and educational technology in particular; a reflection piece on a chosen learning theory focusing on its application to educational technology; and any additional work that a student has developed that includes technology (e.g., a presentation for another class). This portfolio, once in place, can be updated after a student completes EDLF 345 and can eventually be used when a graduate is seeking employment.

A final feature of EDLF 345 is its place among other education school classes. To create a relationship between the technology class and these courses, several components of EDLF 345 ask students to make connections between content in those classes and the tools being used in their technology course. In the example noted above, students are asked to consider, with specific regard to technology use, the various theories of human learning to which they are being exposed in another course. A student might, for example, choose to discuss how the use of multimedia presentation software can be made to fit with Howard Gardner's theory of multiple intelligences, or how "skill-and-drill" software is an extension of behaviorist concepts of learning. This component of the course serves to reinforce content from other education classes as well as to extend that content to a practical and useful end. Additional ties between EDLF 345 and other courses can be seen in the content-driven lessons that students develop and their incorporation of sound pedagogical and classroom management techniques into those lessons.

The description above focuses on the changes made to the technology class itself, but this is only half of the effort being made in the Curry School. These changes are the result of a dialogue that is taking place among instructors which seeks to 'cross-promote' technology use and teaching methods. Ultimately, technology classes must consider pedagogy – how to teach with the tools, and pedagogy classes must refer to technology – how to use the tools when teaching. This is a long-term process and can only be successful if all stakeholders are involved *and* see the importance of making the changes. To start the process, instructors of EDLF 345 met with content-area and methods faculty to describe the goal of altering the technology class to emphasize the relationship between educational technology and certain curricular components of the other instructors' own courses. With the first changes only affecting EDLF 345, the process required methods and content-area faculty to act in an advisory capacity (e.g., providing a standard lesson plan template for students to follow when developing their competencies) rather than restructuring their own syllabi as well. There was an enthusiastic response to this initiative, with faculty supplying their notes and texts to EDLF 345 instructors and volunteering to review the lessons being used as models.

These first steps were followed up with the joint development, by a technology instructor and a content-area instructor, of one such lesson. Each person acted as an expert for his or her particular field, and the lesson that resulted served as the prototype for the creation of a rubric that allows instructors to evaluate student-generated lesson plans for the appropriateness of technology use in those lessons. This rubric can be used by both instructors in their respective courses. Ultimately, exemplary lessons will be collected and posted to a web site. These lessons may serve as future model lessons to be included in EDLF 345, and will certainly be used as references for students enrolled in the course.

These changes mark the beginning of what will hopefully be a lasting and fruitful partnership between technology instructors and other education school faculty. Although the results to date have been promising, there is still much work to be done before the course can be said to fulfill the goals of its instructors. Although untested, future plans may serve to provide a clearer picture of those goals and will be briefly discussed here. Further changes within the technology course itself include requiring students to join the International Society of Computers in Education (ISTE) in lieu of purchasing a textbook (and at approximately the same price as a book). ISTE membership will allow students to receive a subscription to *Leading and Learning with Technology*, whose articles may provide new ideas concerning technology use and will serve to illustrate the feasibility and benefits of implementing technology-enhanced lessons in the K-12 classroom. Membership in a professional organization will also benefit students when they embark upon a job search after graduation. Other plans include having students develop lesson plans in groups, and perhaps team-teaching one of their completed lessons to the class towards the end of the semester; participating in real-time and asynchronous discussion forums to experience various systems for possible use in their own classrooms; and working with content-area graduate students to collaborative develop lesson plans. Changes to methods and content-area courses are also being considered, including the incorporation of the technology-enhanced lesson rubric described earlier; the collaborative development of additional technology-based lessons; and the incorporation of technology issues when discussing classroom management and pedagogical issues.

This paper has described the changes to EDLF 345, the required technology course at the Curry School of Education. Although these changes are specific to that class, the idea behind them can be applied to any such course in a college or university school of education. The driving force behind the restructuring of the class is the idea that a course in educational technology, like the technology it seeks to teach, must be considered within context. In the case of EDLF 345, efforts are being made to tie the content of the class to the content of methods and content-area courses – which, if successful, will strengthen students' experiences with all classes.

Can Standards be Met and Evaluated Through an Online Teacher Education Technology Course? A Case Study

Caroline M. Crawford
University of Houston-Clear Lake
United States of America
crawford@cl.uh.edu

Jana Willis
University of Houston-Clear Lake
United States of America
willis@cl.uh.edu

Abstract: The continual evolution of the national technology standards creates a continual state of flux within the world of instructional technology. However, this creative online environment offers the possibilities that may not be available within other specialization areas; namely, the opportunity to reinvent conceptual frameworks of understanding and creative endeavors. Innovative teacher education units across the United States of America are reaching for opportunities to maintain the bleeding edge of understanding and integrating technology in successful and appropriate manners, which may also lead to thoughtful reflection as to the state and reasoning behind "why we do what we do".

Introduction

Web-basing coursework has been a major focus of universities around the world for the past five- to ten-year period and has resulted in a bell-curve fallout of subject-specific quality coursework. However, the teacher education units have more carefully begun to review the positive and negative aspects associated with the possibilities of Web-basing teacher education coursework. Can standards be met through Web-based teacher education coursework? Can standards be evaluated through Web-based teacher education coursework? The simplistic answer to such questions is, "Yes!" Standards can be met and evaluated through Web-based teacher education coursework.

Since Vannevar Bush (1945) first imagined an intelligent machine that could maintain the full knowledge of the world, man has been steadily moving towards the realization of the Information Age. With the rise of and open access to the World Wide Web since the early 1990s, insurmountable efforts towards communication and knowledge dispersal has been realized. As early as 1980, Seymour Papert envisioned a computer interface that would offer access to learning environments.

> I believe that the computer presence will enable us to so modify the learning environment outside the classrooms that much if not all the knowledge schools presently try to teach with such pain and expense and such limited success will be learned, as the child learns to talk, painlessly, successfully, and without organized instruction. (Papert, 1980, p. 9)

With prophesies such as Papert's, the dawning of the Information Age, with the creation of numerous possibilities, has become a reality. However, the importance of learning environments, instructional design, learning environments and superior facilitators has become an area of utmost importance to the success of Bush's and Papert's visions. After all, "Computers are not an end in themselves. The goal of technology integration into the classroom and curriculum is not to expose students to computers and the Internet. Technology, by definition, is a tool" (Dockterman, 1998, p. 21). With such a tool in the hands of exceptional, creative persons, the ability to create learning opportunities has become a reality. Web-based courses are on the rise, with research results creating an intelligent conversation concerning both positive aspects and areas for improvement to the Web-based learning environments available today.

Cognitive Flexibility

Cognitive flexibility creates a theoretical view through which to create a conceptual understanding of the learning environment. The nature of learning is often environed within complex and ill-structured opportunities to obtain and understand knowledge. Spiro and Jeng state that, "By cognitive flexibility, we mean the ability to spontaneously restructure one's knowledge, in many ways, in adaptive response to radically changing situational demands.... This is a function of both the way knowledge is represented (e.g., along multiple rather single conceptual dimensions) and the processes that operate on those mental representations (e.g., processes of schema assembly rather than intact schema retrieval)" (1990, page 165). Additionally, one may note that cognitive flexibility "is largely concerned with transfer of knowledge and skills beyond their initial learning situation" (Kearsley, http://tip.psychology.org/spiro.html, paragraph 2). As such, cognitive flexibility is delineated towards a conceptual understanding of Web-based learning environments to support the integration and success of interactive technologies, such as a Web-based teacher education technology course.

Through this complex and ill-structured domain, the creation of a conceptual framework of understanding must arise for each learner. This is where the instructional design element is of utmost importance. Only through the careful creation of a learning environment, with all activities created and implemented appropriately and successfully, will the learner's understanding of the information become successfully integrated into the learner's conceptual framework.

Instructional Design

The instructional design process offers the standardization of materials to each of the teacher education courses; therefore, the consideration of adjunct faculty dismissing imperative knowledge and activities is no longer a consideration due to the standardization of the Web-based courses that have been designed over an extended period of time by faculty with numerous years of experience associated with the subject matter.

National Standards Integration into Web-based Coursework

As stated by the International Society for Technology in Education (ISTE), "Technology must become an integral part of the teaching and learning process in every setting supporting the preparation of teachers" (International Society for Technology in Education, 2001, paragraph 2). Further, "A combination of essential conditions is required for teachers to create learning environments conducive to powerful uses of technology. The most effective learning environments meld traditional approaches and new approaches to facilitate learning of relevant content while addressing individual needs" (International Society for Technology in Education, 2001, paragraph 1). Therefore, ISTE is one of the leading international associations that support the integration of technology into the learning environments. Taking such integration of technology a step further the learning environment may be mediated by the technology, as in the world of the Web-based course environment.

Specifically, the teacher education technology course offers the opportunity to focus upon ISTE standards for both the teachers (ISTE National Educational Technology Standards for Teachers, also referred to as NETS*T) and the learners (ISTE National Educational Technology Standards for Students, also referred to as NETS*S) so as to emulate the importance of both ISTE standards. NETS*T offers 23 indicators which are organized into six umbrella categories:

I. Technology Operations and Concepts;
II. Planning and Designing Learning Environments and Experiences;
III. Teaching, Learning, and Curriculum;
IV. Assessment and Evaluation;
V. Productivity and Professional Practice; and,

VI. Social, Ethical, Legal, and Human Issues.
(International Society for Technology in Education, 2000, paragraph 6)

Standards Evaluation

An important aspect to any educational endeavor is the evaluation of the learning objectives. More clearly delineated, an assessment of the assignment(s) that exemplify the learner's grasp of the learning objectives for the unit of study. As numerous forms of assessment are appropriate and successful within a learning environment, following are the assessment formats currently integrated into the Web-based teacher education technology course. Each of these aspects are integrated into each unit of study within the course.

- Knowledge-based quizzes;
- Project-based assignments and products, with assessment rubrics available for review; and,
- Reflective journals.

For purposes of this course, there is also a capstone project that each learner must successfully design, develop, formatively and summatively evaluate. As well, a full project expectation description and an assessment rubric is available to the learner for purposes of guidance and self assessment.

Web-based Teacher Education Technology Course

The Web-based teacher education technology course has been developed through which to exemplify and designate the ISTE NETS*T (International Society for Technology in Education, 2000) standards. As such, the following units of study have been integrated into the course:

- Internet
- Copyright/Ethics/Equity/Legal
- Hardware/Software/Networking Tools
- Software Tools/Emerging Technologies
- Software Evaluation
- Learning Theory/Assistive Technology
- Storyboarding/Project Management/Assessment
- Web Design
- Graphics
- Video/Audio/CD-Rom
- Word Processing/Desktop Publishing
- Spreadsheets
- Databases
- Presentations

Within each of the units, the following instructional design elements are implemented for purposes of flow and to develop a comfort level within the learner's conceptual framework of understanding:

- Objective
- Instructional Events
  - Readings
  - Best practice examples
  - Guided practice/tutorial
- Product Creation
- Peer Evaluation
- Discussion
  - Bulletin board
  - Chat room
- Reflection
  - Synthesis of skills and knowledge gained
  - Application of skills and knowledge gained in a learning environment

As may be concluded from the above Web-based teacher education technology course scope and sequence, the expectations for each learner to successfully complete the course are significant. As such, the teacher candidates maintain a level of technological understanding at both the theoretical and practical levels as they progress towards methods coursework within their specialization areas.

Conclusion

The continual evolution of the national technology standards creates a continual state of flux within the world of instructional technology. However, this creative environment offers the possibilities that may not be available within other specialization areas; namely, the opportunity to reinvent conceptual frameworks of understanding and creative endeavors. "The most obvious benefit of the electronic classroom is that it achieves what progressive educators could only dream of: a union of work and play.... There is no certainty that the electronic classroom will actually fulfill this promise, but it is this hope that makes the realization so attractive" (Ravitch, 1987, p. 28). Innovative teacher education units across the United States of America are reaching for opportunities to maintain the bleeding edge of understanding and integrating technology in successful and appropriate manners, which may also lead to thoughtful reflection as to the state and reasoning behind "why we do what we do".

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Training Teachers to Integrate Technology into the Classroom Curriculum: Online versus Face-to-Face Course Delivery

Jana M. Willis
University of Houston-Clear Lake
United States of America
willis@cl.uh.edu

Lauren Cifuentes
Texas A&M University
United States of America
laurenc@tamu.edu

Abstract: The purpose of this study was to determine to what extent teachers (a) alter their teaching methods and (b) integrate technology into their classroom curriculum during, and after a technology training course designed to prepare teachers to use technologies that support their teaching and student learning. Case study methods (Wiersma, 1995) were applied to gain understanding of teachers' experiences as they moved through an online (OL) or face-to-face (F2F) course designed to prepare teachers for integrating technology into the curriculum. Complementary data collection processes (Shulman, 1986) were used in eight cases to provide depth and breadth towards identifying and analyzing barriers and processes affecting the impact of the training course. Recommendations from this study contribute to the future development of an effective model of teacher training in technology integration for different types of teachers.

Introduction

Teachers must be comfortable with technology tools, be prepared to integrate technology effectively into the classroom curriculum, and be able to incorporate the new teaching methods enabled by technology (CEO Forum, 2000; U.S. Department of Education, 2000). Teachers need experience with technical skills and knowledge if they are to develop a vision for technology integration within their own individualized environment. They need models of effective teaching practices that integrate technology. They need access to resources that promote or support technology integration in the curriculum. Educating teachers in the processes of integrating technology into the curriculum must replace current practice of simply training teachers in computer applications (Brownell, 1992; Ertmer, 1999; Roblyer, Edwards, & Havriluk, 2000; Schrum, 1999; Simonson & Thompson, 1997).

In response to the challenge for preparing teachers to use technology and teach with it, campus technology teams, colleges, universities, and other organizations are focusing on technology training programs. Traditionally, teachers have been forced to attend courses at training facility or college campus to receive face-to-face (F2F) technology instruction, thus taking time away from their other duties. Many teachers are too busy in their work to participate in instruction outside of their own campus environment. Sharp (1996) reported that, "recently, higher education institutions have used distance education to reach a diverse audience that would not be accessible through ordinary traditional classroom instruction" (p. 277).

The innovation of Web-based instruction (WBI) brings courses to individuals and groups who might not otherwise have access to them (Brownell, 1992; Khan, 1997; Reeves & Reeves, 1997; Relan & Gillani, 1997). The effectiveness of training received in a traditional (F2F) classroom setting versus training delivered through distance learning is under constant debate. But as the Information Age evolves, our society is undergoing massive changes that impact our educational systems. Advances in information technology, coupled with the changes in society, are creating new paradigms for education. Teachers in these new educational paradigms require rich learning environments supported by well-designed resources (Reigeluth & Khan, 1994). While, the World Wide Web, as a medium of learning and instruction, has the potential to support the creation of these well-designed resources, the traditional F2F classroom environment should not be discarded (Khan).

Web-based instruction (WBI) brings courses to individuals and groups who might not otherwise have access to them (Brownell, 1992; Khan, 1997; Reeves & Reeves, 1997; Relan & Gillani, 1997). The effectiveness of training received in a traditional (F2F) classroom setting versus training delivered through distance learning is under constant debate. Advances in information technology, coupled with the changes in society, are creating new paradigms for education. Teachers in these new educational paradigms require rich learning environments supported by well-designed resources (Reigeluth & Khan, 1994). The World Wide Web, as a medium of learning and instruction, has the potential to support the creation of these well-designed resources (Khan).

The Study

The purpose of this study was to determine to what extent teachers (a) alter their teaching methods and (b) integrate technology into their classroom curriculum during, and after a technology training course designed to prepare teachers to use technologies that support their teaching and student learning. The course under investigation was offered in both OL and F2F delivery formats. Therefore, comparison of the impact of both modes of instruction on teacher professional development within the subject area of technology training and implementation was conducted.

Case study methods (Wiersma, 1995) were applied to gain understanding of teachers' experiences as they moved through an online (OL) or face-to-face (F2F) course designed to prepare teachers for integrating technology into the curriculum. The cases illuminated the processes of technology integration for elementary and secondary teachers possessing low and high levels of technology skill and use. Complementary data collection processes (Shulman, 1986) were used in each of the eight cases to provide depth and breadth in identifying and analyzing the barriers and processes affecting the impact of the training course. In this study, the integration of survey, interview, and observational approaches offered the researcher an opportunity to develop a complete analysis of participant behavior from a holistic perspective (Gall, Borg & Gall, 1996).

INST 6031:Applications of Technology, a core graduate-level course offered by the School of Education at the University of Houston – Clear Lake, introduced students to the tools and skills necessary to understand and operate computers, navigate the Internet and World Wide Web, and create hypermedia products. The course included educational applications of instructional and information technologies to promote the integration of technology into the curriculum. Emphasis was on the comprehensive integration and implementation of the Technology Applications Texas Essential Knowledge and Skills (Texas Education Agency, 2001), Secretary's Commission on Achieving Necessary Skills (SCANS) 2000 report (U.S. Department of Labor), and those tools that have important implications for the creation of products with the technology. The course was offered either in an OL format or in a traditional F2F setting. The OL course met for an initial orientation session prior to the start of the semester and all other interaction was conducted on-line. The F2F course met weekly for 15 3-hour sessions. Within both delivery methods, a combination of hands-on lab assignments and content material was offered through a student-centered approach. Students and faculty worked together to identify learning requirements, learning strategies and assessment criteria based on students' prior skills and areas of interest. Students gained experience in the educational use of such technologies as productivity tools, presentation graphics, multimedia, and telecomputing technologies; however, they did so by applying tools to practical problems and opportunities as the basis for understanding, developing, and demonstrating activities that enhanced both student and teacher performance.

The PK-12 teachers enrolled in all sections of the graduate level *INST 6031:Applications of Technology* course at University of Houston – Clear Lake made up the pool of 30 participants. A Computer Use Survey was administered and collected prior to any classroom instruction. The survey scores were based on a point value associated with the level of skills selected by the individual, levels 1 - 4 were given point values of 1 - 4 accordingly, no response resulted in zero points for that question. The participants were divided into two groups, which were representative of the participants' teaching grade levels Elementary (PK-6) and Secondary (6-12). The Elementary and Secondary groups were then divided by course delivery method. The two course delivery methods under investigation were OL and F2F. Therefore, the cases for investigation were selected from a sample of Elementary – OL, Elementary – F2F, Secondary – OL and Secondary – F2F. A systematic sample using circular lists, rank ordered by skill level from highest to lowest composite score, was used to ensure representation of varied technology skill levels within the grade levels. A sample size of 2 was chosen for each of the delivery methods within each of the grade levels, resulting in a total of 8 participants.

Findings

The study suggests that teachers in both groups increase their use of technology in the classroom during and after training in the process of integrating technology into the curriculum. Further, teachers do not alter their existing teaching methods as they integrate technology, but use technology in ways that support their current classroom practices or educational experiences. The study confirmed the existence of intrinsic and extrinsic barriers that interfere with teachers' abilities to integrate technology into the classroom curriculum.

When comparing delivery methods groups, this study found that the OL group began the course with a higher average skill level in all parts of the survey instrument than the F2F group. The skill level growth in Basic Computer Use (Part A) was the same for the OL and F2F delivery groups. The F2F group had higher levels of growth in Advanced Computer Use (Part B) and Teacher Internet Use (Part C). The posttest scores indicated that the OL delivery group completed the course with higher skill levels than the F2F delivery group in Basic Computer Use (Part A). The F2F delivery group completed the course with higher skill levels in Advanced Computer Use (Part B) and Teacher Internet Use (Part C).

There were noted differences between the OL section and the F2F section in their identified Stages of Concern. Both groups focused early on informational (Stage 1) and personal (Stage 2) concerns. Both groups indicated low levels of concern related to time, logistics, and management concerns (Stage 3). Both groups indicated increased levels of concern over time for the consequences of using technology with their students (Stage 4). Only the F2F section teachers indicated increased concerns about collaboration (Stage 5). Only the OL section teachers indicated increased concerns about modifications or alternatives to technology integration.

The level of use was a greater among those teachers enrolled in the F2F section of the course than those enrolled in the OL section. The teachers in the F2F section used cooperative groups more frequently than the teachers enrolled in the OL section. The use of demonstrations increased among those enrolled in the OL section. This could indicate that the F2F population benefited from the ability to see and interact with technology integration in an environment that closely resembled their own classroom settings. This is consistent with research on the influence past learning experiences have on current teaching practices because the F2F group had increased opportunity for cooperative group work and the OL section relied on demonstrations for a large percentage of their content materials (Dwyer et al., 1990a, 1990b). Both groups indicated improvements in classroom management with the use of technology.

Conclusions

Although the number of cases and the unique characteristics of each teacher investigated limits the generalizability of this study, the study provides insight into the individual experiences of seven PK-12 teachers as they participated in technology training, moving beyond the training classroom to the application of teaching methods that facilitated the integration of technology into their classroom curriculum. The success of the educational technology revolution cannot be judged like other educational innovations. It is the belief of this researcher that teachers and not technology are the driving force in the current movement. Therefore this study focuses on the experiences of the individual and not the aspects of the integrating technology.

The intent of this study was to provide developers and instructors of technology integration courses and teacher preparation programs with information that would support the future development of an effective model for training teachers and support staff to integrate technology into the classroom. This study adds to the existing literature on effective training in technology integration by focusing on the individual skills, needs, and classroom environments of those individuals involved in the training rather than the implementation of the innovation. "Cookie cutter" courses that focus on basic skills and application training will not enable the transfer of skills from the training environment to the classroom. Frequent modeling of technology-enhanced instruction directly related to the classroom environment would better facilitate transfer of technology skills and use (Studler & Wetzel, 1999). Training for technology integration must incorporate in its structure the instructional methods and classroom practices that facilitate technology integration.

If teacher educators are to facilitate technology integration for different types of teachers, they need to design and implement learning environments that (a) are learner-centered, (b) encourage collaboration, (c) promote discovery, and (d) provide activities that are engaging and relevant to the individual needs and environments of the learners. Teachers will develop visions of technology integration based on their own educational experiences. Therefore training programs must provide rich extended experiences in technology integration and model effective practices and innovative uses of technology that improve teaching and learning. Through the results of this study, instructors will understand better how to facilitate training in the integration of technology for different types of teachers. In addition, insight will be provided in differential impact of OL training and F2F training.

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Web-based Teacher Education Technology Course

Caroline M. Crawford
University of Houston-Clear Lake
United States of America
crawford@cl.uh.edu

Jana Willis
University of Houston-Clear Lake
United States of America
willis@cl.uh.edu

Abstract: The teacher education technology course that is a standard through out the teacher candidate's plan of study at the majority of teacher education institutions has become a course under a constant state of revision.

Introduction

Due to the numerous areas of growth and further understanding of educational technology over the past five year period, the growth in the hardware and software tools available for use within the course structure, as well as the inclination of university faculty facilitating methods coursework and the inclination of these faculty to integrate technology at a growing rate, the teacher education technology course must be revised to maintain the leading edge of appropriate and successful technological inclusion.

History

Over the previous three- to five-year period there has been an unprecedented growth in Web-based and Web-enhanced coursework. As an area of significance, the Instructional Technology specialization area at the University of Houston-Clear Lake has designated that the teacher education technology course be Web-based. The incremental shift in technological possibilities and support factors has introduced numerous levels of strength, as well as areas in which dedicated decisions must be emphasized to ensure the highest levels of learner support and technological inclusion within a learning environment is available. The inclusion of national technology standards are also of primary importance, to ensure the teacher candidates meet their own educational technology needs as well as the needs of the learners. Therefore, the inclusion of national technology standards for both the teacher candidate and the PreK-12 learners, instructional design that emphasizes the real-world design and development of age-appropriate and technologically infused lessons for the learning environment, and a clear understanding of the theories, philosophies and curricular elements that must be considered are integrated into the Web-based teacher education technology course.

Analysis and Design

An analysis of the teacher education technology course, whether this be the traditional face-to-face mode of instruction or a Web-based model of instruction, indicated a lack of consistency and overall structure to the course. Due to the important nature of this course as the springboard for the integration of instructional technology within the teacher candidate's methods coursework, the designation of an exemplary Web-based teacher education technology course was deemed imperative. This model course structure would become the standard through which the face-to-face, Web-enhanced and Web-based courses would focus its efforts.

The design of the Web-based teacher education technology course has been through several revisions over the previous three-year period at our university. The latest project manager and subject matter expert to oversee the design and development of the course is the latest of three persons.

Development

The development timeline for the Web-based teacher education technology course consists of a year's period, wherein one semester is allocated for design, one semester is allocated for development, and the final of the three semesters is allocated towards testing and evaluation. The course is delineated into the following units of study, which have been integrated into the course:

- Internet
- Copyright/Ethics/Equity/Legal
- Hardware/Software/Networking Tools
- Software Tools/Emerging Technologies
- Software Evaluation
- Learning Theory/Assistive Technology
- Storyboarding/Project Management/Assessment
- Web Design
- Graphics

- Video/Audio/CD-Rom
- Word Processing/Desktop Publishing
- Spreadsheets
- Databases
- Presentations

Further, there are specific aspects delineated within each of the units of instruction. The instructional elements, which are implemented for purposes of flow and to develop a comfort level within the learner's conceptual framework of understanding, are noted below:

- Objective
- Instructional Events
    - Readings
    - Best practice examples
    - Guided practice/tutorial
- Product Creation
- Peer Evaluation
- Discussion
    - Bulletin board
    - Chat room
- Reflection
    - Synthesis of skills and knowledge gained
    - Application of skills and knowledge gained in a learning environment

The units of instruction are laid out in a similar manner, so as to develop a sense of flow and comfort for the learners. Due to this level of comfort the learners can focus upon the information included within the unit, instead of focusing upon the unit layout.

Implementation and Evaluation

The Web-based teacher education technology course is scheduled for implementation at the beginning of the third semester within the development cycle. During such time, the course will be evaluated within a "live" classroom environment, wherein both instructors and teacher candidates will offer constant feedback concerning positive factors related to the course as well as areas for further consideration.

Conclusions

The scope and sequence for the Web-based teacher education technology course has been developed in order to meet the ISTE NETS*T (International Society for Technology in Education, 2000) standards. Further, the International Society for Technology in Education (ISTE) states that "Technology must become an integral part of the teaching and learning process in every setting supporting the preparation of teachers" (International Society for Technology in Education, 2001, paragraph 2). As such, "A combination of essential conditions is required for teachers to create learning environments conducive to powerful uses of technology. The most effective learning environments meld traditional approaches and new approaches to facilitate learning of relevant content while addressing individual needs" (International Society for Technology in Education, 2001, paragraph 1). As the purpose of the teacher education technology course is to aid the teacher candidates towards the integration of technology, it is appropriate to offer the most appropriate methods towards modeling the appropriate and successful integration of technology.

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EDUCATIONAL LEADERSHIP

Personality Assessment of Educational Leaders via Technology

Pamela T. Barber Freeman, Ph.D.
Michael L. McFrazier, Ed.D.
Prairie View A.M. University
Department of Educational Leadership

After almost two decades of school reform efforts in America, there are still millions of children being left behind. Specifically, the Texas Public Schools Statistic (1999) indicates that African American students comprised 18.7% of dropouts while Hispanic Americans made up 51.3%. According to research, one reason for this failure is due to the quality of leadership as well as the lack of sensitivity to the cultural dynamics within our nation (Wallace-Reader's Digest 2000; Astin & Astin 2000).

There is a critical need for educational leaders to develop a keen understanding of the challenges faced by students. Today's students' come from a variety of cultures, religions and economic levels; consequently, arriving to school at different ability levels. In addition, environmental conditions may have circumstances that challenge students' time and attention that could or should be devoted to learning. To cope effectively and creatively with these emerging trends, future leaders will need to possess new knowledge and skills as well as displaying a high level of emotional and spiritual wisdom and maturity (Astin & Astin 2000). As the public sector becomes more sophisticated, as well as impatient, critical questions are being asked and stringent limitations will be placed on institutions of higher education. Institutions of higher education play a major role in developing and shaping the quality of leadership in modern American society (Astin & Astin 2000). Thus, it is imperative that institutions of higher education begin to develop a conceptual framework to train and support leaders who will expand the variety and character of their school district's educational programs. After all, it is character, not money that fosters prosperity.

The face of our society is literally being altered due to the tremendous changes in the economic, educational, and demographic forces. The rapid change in the demographics of the United States has made diversity one of the most significant social facets of our society. Due to differential birthrates and immigration patterns, America is experiencing a major ethnic shift with increased numbers of African Americans, Hispanic Americans, and Asian Americans becoming more evident within our schools. In Texas, African Americans and Hispanic Americans youth constitute 53% of the school age population and have the highest dropout rate of any other ethnic group within the state. In postsecondary institutions enrollment of the diverse groups are declining. With the continuous increase of a diverse population, it becomes quite apparent that the dynamics of the culturally heterogeneous world have become both complex and problematic. In fact, one of the most compelling needs of our time is to reach for the "forgotten half" of our population who have the capability of leading but are being left behind by the new economy. Specifically, educational leaders do not begin to reflect public school diversity with only 12% of the nation's superintendents being female, and only 5% being people of color. In addition, leadership positions are expected to increase by 16% by the year 2008, making it the largest increase of any other major occupation (U.S. Department of Labor, 2000). Thus, creating a greater need for more inclusion of all ethnic groups who have the theoretical and methodological tools to help frame and answer questions that concern all Americans. Accepting the premise that higher education is the pipeline for developing productive citizens, academia must take the opportunity to lead the way and demonstrate to the rest of the nation how to accept and nurture a diverse community of leaders. Consequently, the question is whether institutions of higher education are up to the challenge of meeting the needs of this diverse population. Therefore, it seems practical as well as necessary for those institutions (HBCUs) that are graduating the largest numbers of diverse students to become an active and viable component in developing leaders, in reforming curriculum standards and providing training for personnel who will lead and educate America's future citizenry. Because education is a continuum (not just K-12), it is imperative that programs/institutions that educate and train pre-service and in-service leader become active with educational reform. Since HBCUs facilitate the largest numbers of diverse leaders on the educational continuum, there are needs for leadership centers on HBCU campuses to provide our nation and the world with leaders equipped with new knowledge and strategies for educational reform.

During the sixteenth century, Martin Luther is noted for stating, "…when a man knows his own heart, he knows the heart of other men." Specifically, if educators have a strong grasp of their attributes, learning styles and personality preference they become more intoned to their students regardless of ethnicity. Consequently, this research was based on the above premise in order for future educational leaders to reach their educational, professional and personal potential, they must be actively involved in developing and implementing instructional models. The primary outcome sought through this research was to promote what Franke, Carpenter, Fennema, Ansell, and Behrend (1998) call "self-sustaining, generative change." Self-sustaining, generative change is when individuals make changes to improve their methods of leadership and instruction to ensure continued growth and problem solving. To ensure that self-sustaining, generative change is on going, a personality assessment was conducted. One's personality is without question the most important driver influencing career choice, relationships, health and sense of well being (Shaughnessy, 1998). To understand the full potential of one's personality, it is critical to first measure and then gain insight into your strengths and developmental needs through examining the results of personality.

Advanced Information Technology Training for Teacher Leaders: Hong Kong Experience

Wen-Hao Chuang
Dr. Wen-Hao Chuang was a lecturer in the Multimedia Innovation Centre at the Hong Kong Polytechnic University and now he is teaching at Hong Kong City University Master of Communication and New Media Program. Address for correspondence: Department of English and Communication, City University of Hong Kong, Email: enwen@cityu.edu.hk

Abstract

This paper describes the design and evaluation of the recent advanced information technology teacher training which is a multi-millions project provided by the Hong Kong Polytechnic University for the Hong Kong SAR Government. This training program is a team project contributed by department of electronic and information engineering, department of computing, educational development center, and multimedia innovation center in Hong Kong Polytechnic University. In 1998, the Hong Kong SAR government published a document of five-year strategic planning for Information technology (IT) in education. The three domains of IT in education includes: (1) IT as a productivity tools (2) General integration of IT in education (3) subject-specific integration of IT. In this document, the HK government also defined four levels of IT competency for school teachers. They are: (1) Basic level (about 18 hours of training, focus on basic computer and IT skills), (2) Intermediate level (about 30 hours of training, focus on intermediate IT skills such as using Flash, Internet search engines, etc.), (3) Upper Intermediate level (about 30 hours), and (4) Advanced level (about 120 hours). This presentation will introduce the current status of the advanced level training, share with the audience with the course design, implementation, comments and feedback from participated teachers, and some reflection.

Building an Online Tutoring Program: A Blueprint for Success

Richard Cortell, Cortell PCS, US

Many administrative decision-makers in higher education must deal with the results of the ongoing proliferation of instructional technology systems at their institutions. The result of this dynamic technological climate and the demands of "education consumers", and the job market, is that these administrative decision-makers fall into the uncertain trap of needing to approve the expenditure of tens, perhaps hundreds, of thousands of dollars on equipment and services they may know little or nothing about. These people need accurate and useful information in order to make sound decisions. In the case of online tutoring they need at least a basic understanding of the hardware, software, delivery systems, costs, personnel, and the myriad of other items required to develop and operate such a program.

The reliability of information upon which this understanding is based is critical. It may well determine the eventual success or failure of their program. Administrative decision-makers are often faced with the prospect of having to rely upon inexperienced peers and over-eager sales people for advice and guidance when making decisions about instructional technology implementation. If this is the case, they ask, where can they get the reliable information they need to make these important decisions? Fortunately, there are other accessible sources they can use to gather needed information. These include the Internet, articles containing the recorded trials and errors of other institutions of higher education, paid consultants, workshops, and presentations like this. What is extremely valuable and useful is an understanding of the process of conceiving, developing, and operating an online tutoring program, a blueprint for success, if you will. The presenters use the examination of this process as a catalyst for thought and discussion on the topic and a means of providing education administrators and decision-makers with some insight and information that will help them better understand the issue when they are required to make decisions related to implementing online tutoring programs at their institutions.

This presentation provides a glossary of many of the terms, and an outline of the needs and activities required to plan, develop, and operate an online tutoring program. While it is not complete in every detail, it provides decision-makers with a starting point and enough information to ask intelligent questions. First, we will examine the shift from the elite to the universal system of higher education in America. Next, we will examine the role and definition of technology within higher education and how its dynamic nature has given rise to the popularity of online instruction. Then, we will examine how the development of online courses led to the addition of online tutoring. Next, we will examine the reasons it is important that administrators and decision makers within higher education need to understand basic needs of an online tutoring program before implementing their own. Finally, we will outline the major steps involved in conceiving, developing, and operating an online tutoring program.

ABOUT THE PRESENTERS

Lena Bakir is the Special Needs Tutorial Advisor of the Tutoring Center at Bergen Community College in Paramus, New Jersey. She is a doctoral student in the Higher Education Administration and Supervision program at Seton Hall University, New Jersey. She can be contacted at lbakir@bergen.cc.nj.us.

Richard Cortell is an Information Technology consultant for practitioners and administrative decision-makers in education and industry. He can be contacted at rcortell@warwick.net.

Richard Ranker is the Director of Academic Technology Support at East Tennessee State University in Johnson City Tennessee. He can be contacted at rankerr@access.etsu.edu

Contributions and Concerns of SITE Participants: A Survey of Technology Using Teacher Educators (ASTUTE)

Niki Davis and Polly Mumma
Iowa State University
Center for Technology in Learning and Teaching
Nedavis@iastate.edu , pollym@iastate.edu

Deborah Sprague & Elizabeth Riddle
George Mason University
Graduate School of Education
Dspragu1@gmu.edu

Lucretia Carter
Illinois State University
College of Education
Locarte@ilstu.edu

Abstract: It is important to know more about the potential contributions and needs of SITE participants in order to inform further developments of the society and the field. During the SITE 2001 conference 165 participants completed a survey and 38 personal interviews were conducted, with equity at the top of the list of keywords. Analysis shows that SITE participants have concerns, which include collaboration and organizational development and can contribute extensive expertise and resources to our society and teacher education. SITE is acting on this information with online forums, committee work, and a digital scholarship portal in collaboration with CILT and the TEN PT3 Project. The survey will be repeated at SITE 2002.

The Society for Information Technology in Teacher Education (SITE) is an international organization that seeks to encourage appropriate uses of information technologies in teacher education worldwide. In an effort to build a shared community of resources, a coordinated project was undertaken to establish a new collaboration between the memberships of SITE and the Center for Innovative Learning Technologies (CILT) with support from the US imitative preparing tomorrow's teachers to use technology (PT3). CILT is a distributed research center that excels in fostering community and gathering innovative research in technology for learning and instruction. It is expected that this collaboration will allow both groups to help reinforce each other's work and philosophy, with an ultimate goal of informing policy development and the reformation of teacher education and the use of IT.

Borrowing strategies from the field of Knowledge Management, ASTUTE aims to help these organizations "renew" themselves, while making fuller use of their existing resources. Knowledge Management has been defined as:

> a conscious strategy of getting the right knowledge to the right people at the right time and helping people share and put information into action in ways that strive to improve organizational performance. (O'Dell, Grayson, & Essaides, 1998.)

To meet ASTUTE's multiple goals, a needs analysis of SITE participants was conducted at the 2001 annual conference in Orlando, FL, USA. An online survey, which incorporated participant wants and needs, was administered to conference attendees. 165 individuals completed this Web-based survey. Additionally, 38 personal interviews were conducted, and a special interactive session was held at that SITE conference. The session focused on core issues for technology in teacher education, while ensuring that equity remains an integral aspect. The session introduced CILT, PT3 Teacher Education Network (TEN), and ASTUTE to the SITE community. The 2002 conference session will present survey data and debate planned developments.

An analysis of the online survey and the personal interviews revealed significant information about how members would like to participate in the IT community. Perhaps the most important was an over-arching desire of SITE members to be more involved in the organization, particularly in the area of sharing skills and resources with their colleagues. This was evidenced in both the self-identified needs and contributions of the surveyed membership. While many of the identified contributions and needs are vague, several are highly focused and show the depth of the expertise and desire to assist colleagues. A sample of the contributions SITE members believe they can offer the organization, expose the wide range of skills, abilities, and expertise. Two typical examples were:

- I can provide to SITE members mentoring in the use and infusion of technology into pre-service communities, especially diverse populations.
- I can provide SITE members dialogue and reflection on teacher leadership roles, application of quantum mechanics to field of education.

Among the most powerful contributions that members have to offer each other are online repositories and resources. These include virtual libraries, discussion and message boards, directories, and tutorials. These are being collected and will be offered to all members and the wider community.

Perhaps of greater interest are the self-identified needs. Many of these needs reflect a desire to be more involved in both the SITE organization and the profession as a whole. One member, who is attempting to develop a virtual library of resources for preservice teachers and teacher educators, identified this type of need: "SITE members can assist me by/with identifying the kinds of instructional, research and professional development contents they would most like to see made available to them via a virtual library." While the need is specific and identifies a request for information and assistance, it also reflects a desire to be more involved in, and to make a contribution to the profession as a whole.

At the same time, it appears that there is a belief among the SITE participants that the organization may not be as open and accepting of alternative perspectives and philosophies as it could be. One respondent stated: "SITE members can assist me by/with providing scholarly information and research from a variety of sources including some that may be different from the norm. Be open and more inclusive." Another member was even more specific in identifying this belief, not only as it affects the organization, but also the effect that our practices may be having on education at large: "SITE members can assist me by being more open to heavy critique of some approaches to education technology implementation and to be more willing to openly reflect on how their own practices may be contributing to the inequities illustrated by the digital divide research, because looking at this from a wider perspective, the people who have always been disenfranchised by the education system (in the US particularly) are the same folks who are being further disenfranchised by the digital divide."

Other members identified a desire for the organization to become more diverse and open in its leadership roles: "SITE members can assist me by encouraging leadership roles in its membership in a variety of forums providing a central community area with active discussions on topics as wide ranging and diverse as its membership."

Similar opinions and trends emerged from the personal interviews. One interesting trend that did emerge from these interviews is a desire to use the technology to create a shared community of skills, abilities, knowledge and interests. One individual felt that one way in which SITE could help is by providing a clearinghouse for others developing virtual expertise to be used in the classroom. They would like to see a greater practical sharing of what the technology can and cannot do. One member even went so far as to comment that they would like the opportunity to talk with others in the same predicament. A different member suggested that they would like to see the creation of a resource that would provide online access to experts and exemplary materials.

Other members felt that there is still more room for organizational collaboration. In addition to the current collaboration between SITE, CILT and TEN (in the form of this ASTUTE project), those interviewed suggested that there needs to be greater collaboration with such organizations as AECT, and AERA, as well as collaboration between the SITE journal, The Journal of Technology and Teacher Education, and T.H.E. Journal.

The first of the predetermined key words available for surveys and interviewees to assign to their responses was "equity." This was done to encourage participants to address issues of equity in their responses and promote inquiry into equity issues in IT. In addition to the points noted above many respondents seemed to be concerned about the lack of equity pedagogy in IT and as a result of their observations wanted to contribute their expertise and experience to help promote more equity-conscious practices in IT.

When asked what excites them most, the majority of participants appear to be most excited by learning. They report that they enjoy watching preservice teachers grow and learn to become not only good teachers, but to share in the excitement and love of learning. One person said that they are "looking for teachers where teaching comes first, but they are willing to take a risk to make an impact with IT."

It is expected that, as it grows, the ASTUTE project will inform actions to help fulfill many of these needs, as well as to provide an outlet for the varied contributions members wish to make. SITE, through its president, is employing techniques informed by Havelock & Zlotolow (1995) which were introduced by Niki Davis (2001) in her keynote speech at the SITE 2001 conference and developed discussed within the Preface to these proceedings (Davis, 2002). General themes and specific requests will also be passed on to the committees where appropriate. A number of web-based developments also provide potential activities:

- The TEN's project's clearinghouse, which includes a virtual library and personal learning portal (http://www.teacherednet.org)
- The Digital Scholarship Portal (Bull, Sprague & Bell, 2001)
- The SITE and AACE online forums and career center (http://www.aace.org/site/forum)

A revised survey and panel session will take place at the 2002 SITE annual conference in Nashville, Tennessee, USA. The end result should be organizations that are more responsive to and reflective of their general memberships.

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Leading Change in Utah Schools with Technology:
The T-PLUS Project

Dan Eastmond
Director of Learning Resources
Western Governors University
deastmond@wgu.edu

Marti Garlett
Dean of Teachers College
Western Governors University
mgarlett@wgu.edu

Abstract: Western Governors University (WGU), through grant funding from the Bill and Melinda Gates Foundation and the State of Utah, has developed the Technology for Principals Leading Utah Schools (T-PLUS) Project. This innovative distance program provides competency-based in-service education that enables Utah principals and superintendents to take leadership in technological change for instruction in their schools and districts. A collaborative venture, WGU is working with other universities within Utah and Arizona to provide online distance courses with embedded assessments, as well as a supervised action research project. Successful participants earn a graduate certificate in Technology Leadership. This paper presents the design of the T-PLUS initiative, its goals and collaborative delivery through the Web to administrators throughout Utah, and the results to be realized by the project.

Overview

T-PLUS is an intense, technology-rich, leadership-driven professional development program for Utah principals and superintendents. Participants who complete the program receive the Advanced Certificate in Technology Leadership from Western Governors University and earn 144 relicensure points along with eight (8) semester units of graduate credit from the Utah State Office of Education. The $2,000,000 grant allows for 70 percent, or about 670 members of Utah's 949 public and private district and school leaders, to participate in this professional development opportunity. The program is funded for three years and includes the following:

- A WGU faculty mentor assigned to provide personalized assistance and coaching to each participant, as well as guidance in assessing the knowledge and skills each participant already has when she or he comes to the program.
- Learning resources, including coursework, that help participants gain new competencies.
- Access to six distance-delivered group gatherings for connection with other participants via EDNET, the Utah Education Network's interactive teleconferencing system.

The T-PLUS curriculum is designed with a close eye on the evolving work of the International Society for Technology in Education's Collaborative for Technology Standards for School Administrators (TSSA Collaborative) and its March 2, 2001, release of proposed standards for (1) superintendency and cabinet-level leaders, (2) building-level leaders, and (3) district-level leaders for curriculum and special programs. The program also matches to the Milken Seven Dimensions and utilizes the best practices of adult learning.

The learning opportunities consist of multiple elements, including support in the form of online resources and discussion groups. T-PLUS also includes six major satellite institutes delivered throughout the State that are designed to orient, energize, and celebrate the program's completion through the awarding of a professional development certificate (WGU's Advanced Certificate in Technology Leadership) and sharing the outcomes of participants' action research projects. This combination of competency-based and distance or distributed education makes WGU a compelling and convenient choice for busy administrators to pursue advanced study in technology integration and implementation leadership. It should be noted that for administrators new to the world of technology-assisted teaching and learning, opportunities for basic skills tutelage and practice are provided through the regional service centers and other Utah state resources.

T-PLUS Goals

The overarching purpose of the T-PLUS project is to support Utah's K-12 technology goals through a well-defined, state-coordinated technology leadership initiative that, via professional development opportunities, promotes integration of technology in district- and school-wide teaching and learning and focuses on increased student achievement.

Specifically, T-PLUS is designed around four primary goals:

- *GOAL I:* Identify and critique technology-supported learning environments that address instructional or performance improvement goals.
- *GOAL II:* Oversee and manage a technology-integration project team and its process, including providing for relationships among all stakeholders.
- *GOAL III:* Develop and justify strategies and tactics for introducing and integrating new technology tools and techniques based on change theory or a change model.
- *GOAL IV:* Design and complete an action research project either individually or collaboratively with one or more other participants. The project will be field-based, data-driven, and reflective of outcomes based on a technological intervention.

Program Delivery:

The heart of the T-PLUS leadership initiative is to provide all Utah superintendents and principals an opportunity to gain competency in two domains of knowledge: Technology Implementation and Leadership with Technology. Each participant's demonstrated mastery of the competencies included in these two domains will result in the awarding of a professional development certificate entitled "The Advanced Certificate in Technology Leadership" from Western Governors University.

In addition, demonstrated ability to apply the competencies will be realized through an action research project that participants may do individually in their own school setting or collaboratively with other schools in their district or geographic proximity. This action research project is designed to accomplish two goals of its own: (1) Help participants synthesize their learning, and (2) Provide a context for ongoing growth and development in technology leadership throughout the State of Utah and beyond the life of the T-PLUS project.

The program design *contains* three basic elements:

1. Six synchronous, distance-delivered, whole-state gatherings.
2. Establishing and carrying out a professional development action plan for each program participant to demonstrate the 12 required competencies.
3. An action research project that synthesizes the competencies and provides a practical application of those competencies and that allows for expansion of the project beyond the grant's three-year life.

The design organizes building principals into regional cohort groups by Educational Service Units. The participating superintendents will comprise a cohort group of their own, wherever they are geographically situated.

T-PLUS Institutes

Six synchronous two-way interactive audio-video institutes are being delivered via the EDNET system which is developed and maintained by the Utah Education Network. The content will include a number of things, such as addressing a current issue in educational technology via an expert on the topic, a review of standards such as the Technology Standards for School Administrators (TSSA) recently set by the International Society for Technology in Education (ISTE), program information and support, and information about the types of action research projects that are occurring throughout the state. Importantly, these events also provide an opportunity to interact with participants statewide and build synergy and teamwork for ongoing district- and school-based technology projects beyond the life of the T-PLUS initiative.

These six institutes are being held at various EDNET locations throughout the state in November 2001, March and November of 2002, March and November of 2003, and March of 2004. Each program participant is required to attend at least two of these six synchronous events.

Mentoring and Courses Delivery

Mentors take the place of traditional instructors at WGU. A mentor is assigned to each student upon admission and, with rare exceptions, remains with that student until he or she completes the targeted program of study. The mentor develops collaboratively with each student the individual "Academic Action Plan" that will serve as that student's road map to completion. It takes account of the student's background, strengths and areas still needing growth, interests and goals; it identifies areas where the student may be ready or nearly ready to sit for performance assessments, as well as other areas where new learning will need to occur before attempting an assessment; it identifies courses and other learning resources the student will need for development of the necessary expertise; and it establishes timelines for accomplishing goals. The mentor helps students enroll in the courses they will take, introduces the student to WGU's online library resources, and lines up accessory readings that the student can use. The mentor answers questions, serves as coach, intermediary, and ombudsperson.

Upon completion of the online application, a T-PLUS mentor will contact each participant individually. She or he will ensure that each participant fully understands how the program works. Prior to beginning the certificate, participants will complete a skill survey, a WGU pre-assessment, and the (Taking a Good Look at Instructional Technology) TAGLIT survey. The skill survey and pre-assessment assist the student and mentor in identifying strengths and weaknesses as aligned with the T-PLUS goals and objectives. While the TAGLIT survey will inform this process as well, it will also provide the mentor and the program participant a focus for the action research project. These T-PLUS mentors will then continue to work with each participant on an ongoing basis throughout the program until its completion.

There are two options for participants. Based on pre-assessment findings, they can go directly to final assessments and take no coursework (a time effective way of demonstrating prior learning), or they can take three specified online courses through Utah and Arizona institutions of higher education that have created courseware specifically written to the T-PLUS goals and objectives. They can also do a hybrid of the above, that is, take final assessments for some of the competencies while completing the remaining competencies via instructor-led courses. Although going directly to the final assessments can be chosen as a "test-out" option for areas of the program a participant already fully understands and is competent in, the action research project will be completed by all participants either independently or in collaboration with other participants, no matter which of the above paths is taken. One of the three course options is an action research course that embeds the final project within it. The mentor assigned to a program participant, in coordination with the participant, will set up an individualized completion plan that can be tweaked as necessary during the participant's progression through the program's requirements.

Since WGU does not offer courses itself, it contracted with other universities in Utah and Arizona for the three graduate courses that support the certificate. Course development took place during fall semester 2001 so that delivery could begin in January 2002. Development entailed customizing the content of a similar course at the hosting institution to the goals and objectives outlined above and/or converting it to a format deliverable via the Web. The objective assessments for this content, consisting of multiple-choice and essay test items, were further refined by WGU from assessments used in its Master of Arts in Learning and Technology degree program. These assessments were integrated into the courses as final examinations. The courses are being delivered via the Web for six to eight semesters (spring, summer, and fall) for two and a half years. The assessments are scheduled by WGU each semester at a proctored site convenient to each student.

Program Evaluation

All programs at Western Governors University, including the Advanced Certificate in Technology Leadership, are based on the successful demonstration of competencies. Competency assessments provide a valid, reliable, and quantifiable evaluation of the degree to which the learning goals and objectives are met. In addition, WGU is evaluating program effectiveness through a series of qualitative measures. These will include surveys of participant experiences through various components of the program, such as satisfaction with WGU mentors and satisfaction with the courses and other learning opportunities provided, as well as qualitative evaluation of participant experiences in the synchronous T-PLUS institutes. In addition, participants complete the TAGLIT survey at the beginning and end of the T-PLUS program, a rich source of information for a pre- and post-comparison of whole-school improvement whose results are influenced, though not controlled, by the T-PLUS program design.

Multiple measures of knowledge, skills, and abilities not only assure that program participants have mastered the content of the certificate, but also provide rich data to evaluate the overall effectiveness of the program. The evaluation allows comparison of participant experiences against a number of demographic (i.e., age, gender, rural/urban location) and educational variables (i.e., courses taken, independent learning resources used, grade points earned). All program participants will also be asked to participate in an end of program satisfaction survey. This survey measures not only student satisfaction with program services, but includes also the relevance of competencies to their current and future positions. The assessments and evaluations of this program are being overseen by the WGU Assessment Council, comprised of nine national and international experts in assessing student learning.

Conclusion

The professional development that Utah principals and superintendents are undertaking through this initiative will allow them to demonstrate their ability to lead the technology change process in Utah Schools. The T-PLUS Project makes it possible for these educators to encourage and inspire sound pedagogy in K-12 environments via technology, providing them access to this exceptional educational experience through online courses, mentor guidance, and the opportunity to demonstrate their knowledge and skills through competency assessments.

Technology Leadership: Shaping Administrators' Knowledge and Skills Through an Online Professional Development Course

Peggy A. Ertmer
Department of Curriculum and Instruction
Purdue University
United States
pertmer@purdue.edu

Hua Bai
Chaoyan Dong
Mohammed Khalil
Sung Hee Park
Ling Wang
Department of Curriculum and Instruction
Purdue University
United States

Abstract This research examined changes in administrators' ideas about technology integration and technology leadership while participating in an online professional development course. Eight administrators, enrolled in a semester-long course, participated in 15discussion forums related to k-12 technology implementation issues. Pre- and post-course surveys indicated significant changes in ideas about technology integration as well as methods used to support teachers' integration efforts. Analysis of interview and course discussion data suggests that administrators view technology leadership as a "shared responsibility" that requires both administrative skills and technical knowledge.

Theoretical Framework

According to the SouthEast Initiatives Regional Technology in Education Consortium (SEIR*TEC, 2000) "leadership is the single most important factor" influencing the successful integration of technology within our schools. Based on their extensive work in k-12 schools, SEIR*TEC noted that the schools that have made the most progress toward technology integration are those with energetic and committed leaders. Stegall (1998) reported that this influence held true despite wide differences in schools' enrollments, locations, and operating budgets.

Few educators today would argue with the notion that the principal plays an important role in facilitating technology use in the schools. According to Crystal (2001), building administrators are the "nexus through which all issues flow" (p. 36). Yet many of our administrators are novice technology-users and have gained little experience or training in the knowledge and skills needed to be effective technology leaders. Even though administrators *understand* the importance of implementing and supporting technology use in their schools (Mehlinger & Powers, 2002), the development of technology leadership skills seems to have been left almost completely to chance. Since it is possible to obtain a principal's license without knowing anything about technology, how, then, are our administrators expected to develop these critical skills?

Unfortunately, there is very little research delineating best practices for preparing administrators to be technology leaders. Most school administrators are simply acquiring their technology knowledge and skills on the job, with occasional training provided by assorted vendors, professional organizations, and, to a lesser extent, colleges and universities. According to Mehlinger and Powers (2002), "Graduate school programs generally are doing a poor job in preparing school principals and superintendents to be technology leaders" (p. 218).

Still, colleges of education have started to consider ways to address technology needs within their school administration programs (O'Neill, 1999). Furthermore, a national collaborative has recently drafted a set of technology standards for school administrators (TSSA, 2001) that can guide the redesign and/or development of new graduate courses. Given the number of issues that need to be addressed, however, innovative approaches will be needed if administrators are to gain the pedagogical, as well as the technical, knowledge and skills needed.

Purpose of the Study

This study was designed to examine changes in administrators' knowledge and skills, related to technology leadership, as they participated in a semester-long online professional development course. By requiring administrators to *use* technology to *examine issues* of technology leadership, we hoped to support the development of administrators' ideas related to technology leadership, while simultaneously building their confidence and competence related to technology skills. Specifically, the questions guiding data collection and analysis included:

- What are administrators' ideas about technology leadership and how do these ideas change while participating in an online professional development course?
- What knowledge and skills do administrators need to affect technology leadership in their schools and to what extent can participation in an online professional development course build both knowledge and skills?

Methods

We gathered both quantitative and qualitative data to examine changes in the knowledge and skills of eight administrators enrolled in a 3-credit course, *Integration and Management of Computers in Education*, during the fall semester of 2001. This course was one of two courses that participants were required to take during their first semester in the university's cohort doctoral program in school administration. Although cohort students had been required to take this course in the past, this was the first time the course was offered completely online. Furthermore, this was the first time the course enrolled only administrators; previous offerings of the course included a mix of administrators, undergraduate pre-service teachers, graduate in-service teachers, and graduate students in educational technology. Having a homogenous audience in the course allowed for a more extensive focus on administrative leadership issues than had been possible previously.

All 8 administrators agreed to participate in the study. Participants included 2 females; 4 participants were assistant principals, 3 were principals, and one was a district-wide instructional technology coordinator. Teaching experience ranged from 3 to 18 years, with an average of 7 years, while administrative experience ranged from 2 to 8 years, with an average of 4 years. At the beginning of the course, participants had varied levels of technology skills. Although most (n = 6) indicated that they used e-mail "as an integral part of their lives," only 4 indicated previous experiences with bulletin boards or chat rooms. In general, participants described their uses of technology as being limited to "word processing and surfing the Web." None of the participants had previously taken an online course ("WebCT is completely new to me, as well as chat rooms and message boards."). Participants expressed some initial uncertainty about learning via an online approach ("At this point, I am still uncomfortable using this type of technology to communicate.").

The 3-credit course (http://tcct.soe.purdue.edu/tipdoc) was designed to help administrators gain both the competence and confidence needed to facilitate and support effective learning environments supported by technology. Participation in the course comprised a variety of virtual interactions and discussions and incorporated three primary strategies (modeling, reflecting, and collaborating) that, based on previous research, were judged to be effective in supporting teacher and school change. For example, participants observed (via the Web and CD-ROM) a number of model teachers, engaged in ongoing reflective conversations, and collaborated with each other for the completion of various course activities. As a cumulating activity, each participant created a WebQuest that they planned to implement with their building teachers during the spring, 2002.

Data Collection and Analysis

Participants completed three online surveys at the beginning of the semester. These related to 1) previous experiences with technology applications, 2) specific ideas about technology integration, and 3) current technology practices within their schools. The first survey (15 questions) gathered information about participants' current positions, previous uses of computers, and comfort with specific technology applications (e.g., chatrooms, discussion boards). The second survey (10 items) examined administrators' perceptions of how well they could conceptualize and define various components of technology integration. Survey items were presented in a Likert-style format; participants rated their level of agreement (from 1-strongly disagree to 5-strongly agree) with statements related to the possession of specific ideas regarding technology use (e.g., "I have specific ideas about how to define teacher/student roles in a technology integrated classroom."). The third survey, comprised of 44 items, examined the technology practices of both the administrators and teachers within the participants' school environments. Although this survey provided important information about the contexts in which our participants worked, not all items were relevant to our research questions. However, 13 items, representing two subscales, were particularly relevant. One subscale (6 items) examined administrators' personal uses of technology (e.g., "I use technology to support lectures and/or professional development.") while the other subscale (7 items) asked the administrators to rate the extent to which they supported *teachers'* efforts to use technology (e.g., "I give individual feedback to teachers during technology use."). On a scale from 1 (entry) to 4 (proficient), administrators rated their current levels of competence. The second and third surveys were completed again at the end of the semester in order to measure changes in administrators' ideas about, and strategies for providing, technology leadership in their schools.

In addition to survey data, all assignments (included the completed WebQuests) and discussion board postings (917 total messages) were used as data. Weekly discussions included, among other topics, administrators' reflections on their current visions for technology use in their schools; roles they play in supporting high-, medium-, and low-level technology users; strategies for supporting teachers' early efforts; incentives and barriers to technology use, and so on. Weekly electronic chat sessions, focusing on issues of technology leadership, were also recorded for analysis purposes. During the 12th week of the semester, during a scheduled campus meeting for their other cohort course, all administrators participated in an in-depth interview that was tape-recorded and later transcribed. Questions built on earlier survey responses; we examined participants' current ideas about technology leadership and probed for any changes that may have occurred during the course (e.g., What does it mean to you to be a technology leader in your school? How have your ideas about technology leadership changed since the beginning of the course?).

Data analysis began during the first week of the course and continued throughout the semester. Both quantitative (descriptive statistics and paired t-tests) and qualitative (pattern seeking) analysis methods were used to determine the extent to which the online course offered a viable method for increasing administrators' understanding of, and capacity for, technology leadership.

Results and Discussion

Perceptions of Technology Leadership

Participants were asked to define technology leadership and to describe the skills and knowledge needed by a technology leader. In general, administrators defined technology leadership as the methods they, and others, use to encourage and support teachers' technology use. Strategies such as visioning, modeling, and coaching were considered key to being an effective leader. Although 7 of the 8 administrators believed that they, themselves, played this role in their schools, most participants noted that they shared this role with others—either their technology-using teachers, the technology coordinator, or some other person in the school. As one elementary principal noted:

> I would not say I was the leader. I am more of a cheerleader. I view my role as a role model but also as a cheerleader who focuses teachers on what is the best. I have the opinion that I should not be the smartest person in the building, that it should be the teachers who are the best resources. And that, thankfully, in my school, certainly is the case.

Carr (1995) refers to this style of leadership as participatory, suggesting that power and control are shared, at least to some degree, among constituents. This participatory style was commonly discussed, and agreed upon, by the administrators in this course. Although they believed that the effort should be *started* and *supported* by them, they felt that others shared responsibility for seeing it through:

> I think it's ultimately my role ... but then we're all in this together. It's a building effort; it's something we all need to take responsibility for.

Although many of the administrators did not think that their ideas about *leadership* had changed during the semester, they noted that they had gained many ideas about technology integration as well as how to support teachers' efforts. One middle school principal described this change (posted on the discussion board):

> When I entered the class I was unclear about the proper integration of technology. I would encourage teachers to use the Internet, drill and skill software, and word processing. Other than that I did not have a good handle on the many possibilities. Since then I have really begun to better understand the use of technology in the classroom through WebQuests, research projects, presentations, etc. The second idea has been the techniques and confidence to lead staff as a technology leader in the building. It is something that I had not very concerned about prior to this class.

Perceptions of Knowledge and Skills Needed by Technology Leaders

When asked what knowledge and skills they needed to be effective technology leaders, participants mentioned the need to be models for their teachers, but were unsure if they needed to know *more* than their teachers in order to be effective. One principal suggested that a good technology leader identifies the exemplary users in his school and then "gets out of their way." However, an assistant principal disagreed, "I don't think I am going to be an effective leader ... if I am not using it myself." Another principal suggested that he "had to believe in it, had to use it, and had to model it." Certainly, the administrators agreed that they needed to have enough knowledge to hire the right people, to acquire the best resources, and most importantly, to know what good technology integration looked like so that they could encourage their teachers to continue to grow. According to one assistant principal, "these skills are just good leadership skills, not necessarily technology knowledge skills. These are people skills, management skills."

Administrators agreed that an online course, focused on technology integration and technology leadership, filled an important need for practicing administrators. By requiring them to "live and breathe technology" they increased their own skill levels as well as their expectations for their teachers. They believed that by developing a strong personal vision of technology integration they could, in turn, support the development of their teachers' visions.

Developing the Skills and Knowledge of a Technology Leader via an Online Course

Strudler and Wetzel (1999) stated, "At the core of informed leadership is a person who has internalized the complexity of effective technology integration and who exercises influence to ensure that the various enabling factors are in place" (p. 68). This suggests that technology leadership requires two sets of competencies: 1) understanding technology integration and 2) providing the necessary support to ensure that effective integration can occur. These competencies relate specifically to the knowledge and skills needed by technology-leading administrators. In order to determine the impact that this online professional development course had on the development of administrators' technology leadership knowledge and skills, pre- and post-course survey results were compared.

A two-tailed paired t-test (df = 7) indicated a significant increase in administrators' ratings of perceived ideas about technology integration (survey 2) from pre- to post-course ($t = 3.81$, $p = .007$). Average ratings increased from 3.7 (undecided-agree) to 4.0 (agree). This suggests that, as the course progressed, administrators gained ideas about what technology integration should look like, as well as how technology might be implemented within various classroom contexts (e.g., one-computer classroom; in support of content-learning). Given that administrators play a key role in establishing a technology vision for their schools, as well as evaluating teachers' efforts toward achieving that vision, it is critical that they gain specific ideas about effective technology use. These ideas, then, represent an important prerequisite to being able to both lead and support teachers' efforts.

Although no significant differences were noted from pre- to post-course ($t = 1.19$, $p = .14$) on the first subscale of survey 3 (administrators' personal uses of technology), average ratings of competency on the second subscale (administrators' support of teachers' technology use) increased from 2.0 (emergent) to 2.4 (emergent-fluent). This increase was significant ($t = 2.82$; $p = .01$). Thus, as the administrators participated in weekly discussions, focused extensively on technology support issues, they were able to identify and implement new ways to support technology use among their teachers. As one principal noted:

> Taking this course has brought technology to the forefront for me ... it's something that I discuss more with teachers ... I have started conversations with them about what they can do to help bring more technology into their classrooms. I ask them what are some of the things they need in order to accomplish the things they are

> thinking about. This course has helped me to go out of my comfort zone and to do a paradigm shift in my thinking on instructional practices in the classroom.

Ongoing discussions with the administrators suggest that this approach to professional development may be an effective way to increase confidence for, and ideas about, technology leadership. Administrators agreed that the course increased their understanding of how to support technology use among their teachers, as noted by the following comment:

> (When I was a teacher) I did not have any training on how to effectively integrate technology in my classroom. Actually this is the first course that I have had that teaches how to integrate technology. Too bad I am not a teacher anymore. At least after having taken this class I will have an idea of how to assist someone in integrating technology.

Educational Significance And Implications

Participation in an online course, focused on technology integration and leadership issues, appears to offer one means for helping administrators understand the complexity of the integration process and to find new ways to support their teachers' integration efforts. By requiring administrators to deal with technology issues as part of their ongoing course participation allows them to experience, first-hand, both the benefits and challenges of dealing with technology in a meaningful and substantive way.

According to Mehlinger and Powers (2001), "It is no longer possible for administrators to be both naive about technology and be good school leaders" (p. 218). Yet, to date, the professional development needs of the administrator, as a technology leader, have been virtually ignored. Despite the large amount of time, money, and resources being directed toward supporting *teachers'* efforts to integrate technology in the classroom, little has been done to either recognize or support the needs of the administrator. "Clearly, it is not reasonable to imagine that teachers, the "followers," are going to get very far ahead of the "leaders," their administrators" (Mehlinger & Powers, p. 213). The results of this study highlights the importance of the administrator in helping schools achieve sound technology practices, and proposes one strategy (participation in an online course) for increasing administrators' capacity for technology leadership.

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PT^3 AND T^{3}L – Teaching Tomorrow's Technology Leaders: Preparing School Leaders to Use Technology

Ian W. Gibson
Department of Administration, Counseling, Educational, and School Psychology
Wichita State University, Kansas, United States
ian.gibson@wichita.edu

Abstract: This paper describes the symbiotic relationship between school district and university personnel as they collaborate in the technology preparation of school leaders enrolled in programs of graduate study at Wichita State University. By learning to do research as they conduct research for local school districts, graduate students in these programs become skilled in research methodologies and expert in the topic of the research focus. In the example presented in this paper, graduate students conduct a full district evaluation of current information technology practices, needs, and expectations in preparation for the writing of a report designed to assist in the development of the next stage in the school district technology plan. Such a data based approach to the development of educational technology futures provides an information technology decision making platform for the target school district as well as providing a solid grounding for the future technology actions of these neophyte researchers when they assume the mantle of leadership in their own school districts. The paper describes the methodologies used, the results of the research, and the impact of the process and the findings on both the target school district and the graduate student / future school leader.

Introduction

Significant attention continues to be paid to the technology development of tomorrow's teachers and their ability to use educational and information technologies effectively in their professional practice (see U.S Department of Education, 2001, <http://www.pt3.org/>). The tendency to devote unparalleled amounts of federal, state, and local educational dollars to the technology preparation of teachers is on-going and is rarely questioned in school contexts. There is an increasing realization however, that teachers, well prepared in their use of technology, are not as effective in their technology integration efforts unless there are well prepared school leaders capable of motivating, collaborating, and supporting these technology integration efforts (Gibson, 2001; Mahmood & Hirt, 1992; Maurer & Davidson, 1998; McPherson, 1995; OTA, 1989, 1995; Rodin, 1997).

Recent action on a national level has attempted to redress this oversight through the development of a set of technology standards for school administrators (see Technology Standards For School Administrators (TSSA) Collaborative, 2001, <http://cnets.iste.org/tssa/>). Other efforts to prepare school leaders in the use of technology on a local scale are also in evidence (Gibson, 2000). Recognition of the need for continued expansion of efforts to focus attention on the technology preparation of tomorrow's school leaders is growing. This paper explores one approach designed to contribute to this movement.

The activities described in this paper focus on the collaborative efforts of school district personnel and faculty and students from a local university in a mid-western region of the United States. In this on-going project, graduate students enrolled in the doctoral program in Educational Administration and Supervision at Wichita State University in Kansas participate in a research and field based program of collaborative study designed to support the school improvement efforts of local school districts. Graduate students and professors conduct high quality research projects for participating school districts framed around local issues of relevance or need. Many of these collaborative research projects focus on technology issues.

The research described in this paper considers the symbiotic interaction of school leaders / graduate students learning to conduct research on technology issues for a client district at the same time as acquiring research skills and technology related knowledge and understanding that will benefit their own schools and districts. Further, the heavy emphasis upon a constructivist approach to teaching and the integration of information technology as a transformational element in this approach to graduate education provides a fully rounded, authentic, contextualized, and effective example of preparing tomorrow's school leaders for their central role in the integration of information technology into learning environments.

Graduate Preparation of School Leaders

In a previous paper on the topic of graduate preparation for school leaders, Gibson (2000) described the leader preparation program at Wichita State University in Kansas as a reflective and informed response to calls for reform in educational administration. This doctoral program was predicated upon the belief that a collaborative, situated, problem-based approach to instruction about leadership would generate an authentic approach to the study, replicating as closely as possible the working environment most common to school leadership in highly effective schools. Program activities focus around authentic problems of practice, explored in collaborative team settings, and generating learner-directed and setting-enhanced learning. It is believed that within these problem situations the important concepts and principles associated with the content domain are analyzed and explored and are perceived by graduate students as real problems of practice (Savery and Duffy, 1995). Within this environment, technology integration is modeled by faculty (Blomeyer & Clemente, 1997), and meta-cognitive scaffolding is provided by faculty and peers (Savery & Duffy, 1995). The core tenets of constructivism, including the ideas of cognitive dissonance and negotiation of meaning (Savery & Duffy, 1995), are integral components of this program. In addition to preparing effective leaders for schools, this program was also designed to emphasize the transformational role of technology on the process of learning.

The approach adopted for the graduate program in educational administration at Wichita State University requires the acquisition of high levels of expertise with selected program technologies designed to provide efficient and customized personal and professional productivity. In this program, students are dependant upon a foundation of technology expertise as they assume the role of participant, collaborator, colleague, leader, and follower, in a variety of learning environments such as seminar, field study, content presentation, data manipulation, research reporting, group/individual comprehensive examinations, and the dissertation. Program graduates acquire, among other things, an understanding of the impact of information technology on their roles as visionary leaders of schools of the future and experience the transformational potential of technology on their own learning process (Gibson, 2000).

Featured in a recent issue of the Journal of Critical Inquiry into Curriculum and Instruction (Vol. 2, No. 1), which publishes exemplary research products of graduate students in professional study, this program has attained both national and international exposure resulting from its unique combination of clinically oriented, field-based, applied inquiry features. The program has separated itself from traditional leader preparation programs through an emphasis upon (a)rigorous admission requirements and low enrolment, (b)release time from district employment for prospective students, (c)integration and contextualization of the curriculum, (d)incorporation of field-based research studies, (e)a collaborative, team-based approach to teaching and faculty load distribution, and (f)a cohort-based student support structure.

The remainder of this paper focuses upon one aspect of this program of graduate education in educational administration, specifically, a description of the process and product of that component of the theoretical framework of the program derived from the field of problem-based learning (PBL) (Boud, 1985; Boud and Feletti, 1991; Bridges, 1992). In this example, the focal points of field- and problem-based program processes and the recurring focus on technology come together in one significant program event extending across a full semester of collaborative field research.

Collaborative Learning, Field Research, and Professional Partnerships

In this graduate program, each semester begins with doctoral field study teams exploring potential research areas with school boards and administrative personnel from local school districts in an attempt to isolate an issue worthy of a full semester of research. Following this introductory discussion, a formal research proposal, complete with rationale, beginning literature review, methodology etc. is developed and presented to the 'client' school district for approval. Once approved, the process of exploring the topic more fully begins with each field study team, comprising students and professors, developing foundational understanding, potential research designs, research tasks, processes, data collection tools, protocols, and analysis procedures. Contextualizing the learning and the instruction in authentic problem situations, integrating the supporting curriculum, providing scaffolding though the provision of mentoring roles derived from the cohort construction of the program, and emphasizing the orientation towards constructivist learning approaches allows a natural interplay between theory, research, and practical applications to occur during involvement in the analysis of innovative projects or problem situations in the field. It is this involvement in field study applications, with meaningful participation in internet searches, literature review, field reports, data analysis, report generation, research presentations, file sharing, information retrieval, collaborative study, and sharing of research resources that allows the technology component of this program to be integrated, authentic, and meaningful. In the example that follows, the field study topic selected by the client district focused upon the issues and practical aspects related to the planning, administration, and management of technological innovation and change in the form of the next stage in an already established district wide technology plan. The site for this study was a high performing, small rural school district proud of student achievement scores, and proud of the existing level of 'integration of technology' into the educational process.

Field Study Methodology

During an introductory discussion with district leaders designed to establish the general area of concern for the research, the following statements set the scene for the field study: "How do I help my teachers effectively implement the use of technology in the classroom?", "We're asking teachers to change the way they teach", "Guide us to a new spot", "Veteran staff might make implementation difficult", "We would start a process that will go on", " Teachers are going to be asked to re-think how they deliver instruction", "Most of the kids are going to be way ahead of the staff", "This is a very competitive district – they want to be perceived to be ahead of everyone else", "What kind of activities can we involve teachers in that will improve their skills and usage", "Focus on the pedagogical use of technology in the classroom."

Following this lengthy discussion with teachers, technology coordinators, administrators and board members of the district, it was determined that the need for additional guidance on the next step of the district plan for effectively integrating technology as a tool in the instructional environment was necessary. A decision was made to make those issues related to curriculum and instruction the focal point of the study. The purpose of the study was therefore to provide guidance to the district regarding strategies related to effective integration of technology into the instructional environment. The study team developed three research questions as a guide for the study:

1. What does district data convey about the status of technology use within the instructional environment?
2. What are students', teachers', and administrators' perceptions regarding the technology needs within he instructional environment of the district?
3. What would improve the integration of technology within the instructional environment of the district?

The study team chose a qualitative paradigm for the study's design. This design allowed the team to obtain rich, descriptive data from students, teachers, administrators, and technology coordinators. These data provided a thorough description and understanding of the technology usage in the district at the time of the study. The documents reviewed by the study team provided further data relative to district technology use.

The research design allowed the study team to triangulate data from various sources to determine findings. Patton (1990) stated, "A multi-method, triangulation approach to fieldwork increases both the validity and reliability of evaluation data" (p. 245). Triangulation of various data collection techniques permitted the team to combine the strengths and correct the weaknesses of any one source of data. In using triangulation as a method of data analysis, "the researcher seeks out several different types of sources that can provide insights about the same events or relationships" (Patton, p. 115).

The study team used multiple research methods to explore the three research questions. The research methods included focus groups with students and faculty, interviews with administrators and technology coordinators, and an analysis of district documents. The combined data were subjected to a process of constant comparative analysis (Lincoln & Guba, 1985) and resulted in the findings presented below. Following further analysis, conclusions were derived from the findings. Recommendations were then formulated to assist the staff in the revision of the district technology plan, and the conclusions and recommendations proffered were supported by the review of literature conducted during the process.

A Study of the Integration of Technology into the Instructional Environment of a Rural School District – Context and Findings

The small rural school district forming the focus of this study supported technology using a variety of funding mechanisms. The general fund budget for technology had increased over the last several years with the largest increase during the 2000-2001 fiscal year. This most recent increase was over 100% from $40,000.00 to $93,000.00. Funds from the general fund also supported staff development specifically designed for technology. Teaching and support staff perceived that they received support from technology coordinators, colleagues, and students. Technology coordinators at each building provided limited but beneficial support. Student volunteers provided support during the semester. The number of computers and other technology available to district staff had increased in recent years. One hundred and four computers were available in the district for teacher and student use. Every teacher had ready access to a computer. Some computers were networked and some had Internet access. Other technology reported as available by staff and students included DVD players, digital cameras, scanners, a mobile lab of wireless iMacs at the secondary level, a classroom set of Alpha Smarts at the elementary level, and super disk drives. Students, staff, and administrators reported that the district had implemented a student information management software package. This package afforded students and parents access to grades and assignments. Teachers and administrators reported using this software to manage grades, take attendance and lunch count, schedule classes, track discipline issues, and maintain current student demographic information. Administrators expressed optimism and satisfaction with the capabilities of the district's new student information management program, appreciating the efficiency it afforded their jobs. They also indicated that communication had improved with the online capability of the district. Parents had access to this student information via the Internet and this access was considered beneficial to students and parents.

However, staff reported that support in the form of in-service was not adequate. Many faculty members reported their life had changed as a result of the integration of current technology. Some openly expressed a reluctance to use technology because of a lack of knowledge on how to proceed. Apparently, some students had noticed this discomfort, suggesting that, "Except for the computer teacher and librarian, the rest of the teachers know only as much as we do or less."

Teachers reported they used technology most for student information management. The district purchase of the online student information management program changed the way grades, lunch count, and attendance were compiled and reported. This information was online so that students and parents could communicate with teachers or view the student information. Teachers also had the capability to communicate with students, parents, and each other through e-mail.

The faculty maintained that one of the best uses of technology at their fingertips was the Internet. Teachers and students used the Internet primarily for research and for development of lesson plans. This finding was consistent with the results of the faculty survey, given in May 2000, showing that "teachers used the Internet most often to do research for classroom projects, bookmark sites for student use, and supplement curriculum."

Current student technology use was managed by Board of Education Policy and a set of Guidelines for Student Technology Use contained in the student handbook, and the Acceptable Use Guidelines for Technology booklet, which stated acceptable and non-acceptable student uses of technology. Students, as well as their parents, were required to sign the agreement contained in the Acceptable Use Guidelines for Technology before students were allowed to use the Internet in the district schools.

In addition to the findings related to current support, parent usage, administrator usage, teacher usage, and student usage described above, other findings related to perceived needs and proposed support. For example, most respondents reported a desire for more opportunities to use technology for research, and both students and teachers indicated that technology should be more fully integrated into the curriculum and instruction. Teachers and administrators agreed that more effective training was necessary for successful implementation and suggested that additional training in how to use technology appropriately in the classroom was necessary as was the need for a full-time technology director and technicians to address technology issues. They also agreed upon the need for additional time to learn about and use technology. Some teachers were unaware of a long-term vision, or district level planning for technology use.

Conclusions and Recommendations of the Field Study

Following the description of the findings from this study, a picture of the state of the art of technology usage in this school district appeared, and a clear response to the first research question, "What does district data convey about the status of technology use within the

instructional environment?" was achieved. The study team then condensed the findings of the study as described above into the following categories of conclusions:
Current Support, Parent Usage, Administrator Usage, Teacher Usage, Student Usage, Perceived Needs, and Proposed Support.

This restatement of the findings into conclusion statements confirmed the response to the first research question and provided a more concise response to the second research question, "What are students', teachers', and administrators' perceptions regarding the technology needs within the instructional environment of the district?" A response to the final research question, "What would improve the integration of technology within the instructional environment of the district?" was provided by the study team in the form of recommendations which were derived from an analysis of the findings and a synthesis of the literature review and the technology experience and expertise of the members of the study team.

The study recommendations for the integration of the technology into a small rural school district follow:

- All stakeholders should be involved in all phases of the technology visioning and planning processes.
- A district-wide, shared vision should be developed collaboratively with stakeholders to guide technology use.
- The district technology plan should be updated to focus on integrating technology, student-centered activities, and targeted staff development.
- Formative evaluations of the technology plan should be conducted yearly.
- The allocation of funds for technology should continue to increase.
- Funding should be provided for full-time technology coordination / technical assistance throughout the district.
- Resources (personnel, financial, facilities, time, equipment) should be available to support the district plan.
- Access to the Internet should be made available to all students and staff.
- Training should be provided to all stakeholders for effective use of the student information management system.
- Staff development should be targeted to increase awareness of the potential of technology to transform the learning process to focus on student-centered activities.
- Student-free time should be regularly scheduled to assist professional staff in learning about technology.
- Results-based staff development for technology integration, should be targeted to learner skill levels.
- Support / encouragement should be provided all staff integrating technology into the learning environment.
- Emphasis should be placed on innovative ways to integrate the Internet into the learning process.
- Specific resources (websites, professional library, examples of lesson plans, network contacts, site visits, expert colleagues) should be made available to assist teachers to integrate technology into the instructional environment.

Conclusion

Several goals were achieved as a result of conducting this field study. Initially, the partnership between school districts and the local university was maintained and supported by achieving the mutual goals established during the development of the symbiotic relationship designed to foster shared responsibility and collaboration in the preparation of school leaders. Further, the internal goals of the school district were achieved through the development of a new orientation to an established technology plan. With this goal being achieved, the school district has been able to use the process and the report developed by the study team to provide direction for technology improvement efforts throughout the district, and has further used the report to motivate a process of teaching renewal in the district based upon the study recommendations. This district has also re-considered its approach to strategic planning and visioning for school futures to incorporate a more inclusive orientation to these activities, based upon the results of this field study.

Finally, the process of learning to do research during the process of conducting research has provided the graduate students in this program of leader preparation with the research skills necessary to conduct their own research whenever the need arises. Further, because the topic of the field study related to the integration of technology into the many learning environments of a school district, these future school leaders were provided with first hand experience of the intricacies of supporting a district wide approach to planning for effective technology use through participating in a full district evaluation of current information technology practices, needs, and expectations in preparation for the development of the next stage in an existing school district technology plan. Such a data based approach to the development of educational technology futures provided an information technology decision making platform for the target school district as well as providing a solid grounding for the future technology actions of neophyte researchers / graduate students / future school leaders when they assume the mantle of leadership in their own school districts. Unfortunately, the opportunity for future school leaders to experience such grounded technology based experiences in their leader preparation programs are few and far between. To increase the possibility for more of the future leaders of America's schools to experience targeted technology training similar to this, a national funding initiative is necessary. While it would be inappropriate to ignore the need to provide funds for the preparation of teachers in technology use, it would be equally inappropriate to ignore the need for funding opportunities for the teaching of tomorrow's technology leaders.

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NCATE Electronic Document Center and Beyond...

Bob Goeman
Technology Coordinator
University of Nebraska – Omaha
United States
bgoeman@mail.unomaha.edu

Neal Topp
Teacher Education – Associate Professor
University of Nebraska – Omaha
United States
ntopp@mail.unomaha.edu

Paul Clark
PT3 Grant Coordinator
University of Nebraska – Omaha
United States
pclark@mail.unomaha.edu

Abstract: With the changing of the Standards in the NCATE process, in addition to looking at the outcomes of the program, the University of Nebraska – Omaha has created an electronic document center that bridges the gap between hardcopy documents and electronic documents using the web. This presentation is based on the experiences and timeline that took place leading up to and during the site visit in the fall of 2001. As well as the information for NCATE, the document center has created a wealth of information that goes well beyond the site visit. Nevertheless, the document center is and will continue to be a valuable center for all faculty, staff, students, alumni, and the community to gather information. Come and see some of the information presented and also visit us online at: http://www.unocoe.unomaha.edu.

Introduction

Technology is a driving force behind many of the activities that occur in the College of Education at the University of Nebraska at Omaha. This short paper will review the technical aspect of the NCATE (National Council for Accreditation of Teacher Education) visit that occurred in November 2001. Three areas using technology were concentrated on for the NCATE visit. These areas involve: preparing for the document center, creating the document center, and using the document center.

Preparing for the document center started approximately a year in advance of the NCATE visit. The administration of the College met and discussed the unit standards of the institutional report. A draft of the institutional report was created and distributed to the administrative team for input in all areas including the overview and conceptual frameworks, as well as the six standards. Once the report was close to final form, the electronic document center began to take on a first draft look. The first electronic version of the document center was put together by linking certain key words in the report to web pages that supported that word or phrase. Upon watching this technique develop, it became very apparent that so many words were being linked to additional resources that it was becoming difficult to read and hard to pick out each individual link. Even though there was a space between the underlined words, it was very hard to distinguish between two separate Internet links.

After discovering that the first method was not very successful in creating an atmosphere that was comfortable in navigation, a new look had to take place. There was a direction but the team needed to step back and look at the overall picture of what was needed with the electronic document center and how it should really be organized. At this point, a decision was made to create an index of what related documents support each section and not link directly from the report to the supporting documents. Some of this decision came from past experience of the people that had been involved in being able to easily locate materials according to a hardcopy index. Next, an electronic index was starting to be put together according to each unique section. Some of the documents were referred to in more than one section because it related to more than one section.

The electronic document center was produced and published online. We used a combination of web creation applications to facilitate the making of the page. We used a blend of simpletext and notepad with occasionally Claris Homepage, Adobe PhotoShop, Adobe Acrobat, Macromedia Dreamweaver, and Microsoft FrontPage. Different people created documents that were placed into the electronic document center and then my staff converted them to be web readable. Even though some pages were already in existence from having an ongoing web page, many more pages had to be updated or created for support of the documentation. We also linked to pages outside of our College. Therefore, we had to communicate with people at remote sites and verify that their information was updated and correct.

While the electronic document center was taking shape, one challenge was brought to the forefront. Given the list was getting very long, could the list be broken up to make it more manageable? A second challenge included a discussion that all documents may not be appropriate or practical to be online. Both challenges were brought to the administrative team for discussion and decision-making. As for the first challenge, we decided to have the index in two places. The first index would be a full index from the home page of the NCATE site and the second place an extracted version included at the end of each individual section of the report. This idea worked well also with the report itself. The whole report was available as a single long document, but it was also broken up into each individual section concluding with the extracted index that was referred to from the electronic index.

The second challenge was also overcome. A decision was made to not have everything online, but instead to categorize each document in the electronic index. The document could either be electronic only, paper only, or both. We would also duplicate the electronic index and include it with the hardcopy document center that was located in the NCATE team meeting room while they visited our institution. We also went a step farther and included a search engine that would only search the institution's local domain web pages. Many large search engines offer a University search that can be included in your site and indexed by their search engines. We decided to use the Google University Search engine to be included within our institution's web page. This was a critical piece that brought the index of the document center together with the website of the college. Many people have since used the search engine not just for NCATE purposes, but also for general day-to-day business that is conducted within the college.

Now that the document center index and report were close to their final stages, the college team discussed how best to get the information to the NCATE team. Our first discussion involved the use of the Internet and making sure that is continues to be updated and functioning. The NCATE team could always come to our website at any time and see all of the information that was in the web form. But, we know that not everyone can be connected all of the time. Many members of the visiting team have other jobs and other responsibilities, so we burned a CD (Compact Disk) for them to view our website from any computer that can read a CD. This allowed them to not have to be connected to the Internet, yet still be able to browse the documents that would give them some background to our institution prior to their visit. The downsides to this technique were the inability to get to other referenced websites and the search engine was automated and must be connected. Also, the CD was burned at a certain date, so any new and updated information was not included on it.

All three areas allowed our institution to have a successful visit from the NCATE team. Of course, there was more to the visit than aforementioned information, but it was a great learning experience using technology for communication and documentation for both the college team and the NCATE team. Feel free to visit the website to view some of the above-mentioned information at any time.

Web Publishing Policies: Ethical and Legal Issues

Gerrie Johnson, Southeastern Oklahoma State University, US

As a result of the interest exhibited by individuals at SITE 2001 to the information presented in my session 101 Reasons to have a Classroom Webpage, I have continued delving into the legal and ethical issues surrounding the publishing of students' work on the Internet. A questionnaire sent to a random sample of public school districts gathered data on current web publishing policies. The data will be examined during the poster session.

The poster session examines how the Family Right and Privacy Act, which establishes standards for student privacy in public education, impacts the use of Internet activities or projects. What caution must teachers take when publishing work created by children in their classroom? Do they have to be aware of more than simply not identifying students by personal information, such as, their first and last name, and addresses? Is this information addressed in their district web publishing policies? Is it an accurate assumption that all public districts now have web publishing policies?

The participants in the session will also have the opportunity to compare several web publishing policies in place this academic year. There are those that protect the students, teachers, and district without placing a burden on the teachers. Then, there are those web publishing policies that are so stringent that teachers feel it is not worth the effort to showcase their students' work. In some cases, the district's directive stating what can be on a teacher's web page and the policies for publishing students' work are intertwined. In those cases, one must examine the district's criteria for a teacher's web page in conjunction with publishing students' work.

The participants in the poster session will have the opportunity to assist in drafting a model web publishing policy for public school districts.

Computer Database Model to Teach Legal Issues in Principalship Program

Lawrence T. Kajs
School of Education
University of Houston-Clear Lake
United States
kajs@cl.uh.edu

Linda Grim McCormick
Alvin High School
Alvin ISD
United States
Lmccormi@alvin.isd.tenet.edu

John M. Decman
School of Education
University of Houston-Clear Lake
United States
decman@cl.uh.edu

Abstract: Principalship programs need to utilize technology in preparing school principal candidates in legal issues, since technology provides the benefits of acquiring, developing, and storing information in an effective and efficient manner. This paper describes the use of a computer database model and the Internet by principal candidates to study school law. Using the Internet, principal candidates developed a computer database model to better understand the legal and ethical issues in school settings. Technology assists future principals to advance their knowledge and application of school law; thus, addressing NCATE (National Council for the Accreditation of Teacher Education) Guidelines, ISTE (International Standards for Technology in Education) School Administrator's Standards, and Texas Principal Certification Competencies.

Introduction

Principalship programs need to prepare principal candidates with a strong foundation in school law. This is especially critical today given the litigious nature of society, the number of state and federal mandates in education, and the complexities of a pluralistic society. The NCATE (National Council for the Accreditation of Teacher Education) Curriculum Guidelines for Advanced Program in Education Leadership and the Texas Principal Certification Competencies directly address the need for principalship programs to prepare principal candidates in the knowledge and application of education law. Also, the ISTE (International Society for Technology in Education) Technology Standard 6 entitled "Society, Legal, and Ethical Issues" for School Administrators http://cnets.iste.org/tssa/view_standards.html highlights the need for preparation in relevant legal issues. Principalship courses like School Law, Administration of Special Programs, and Administration of School Personnel, are points of preparation in education law issues. Various types of pedagogical techniques, e.g., case study, are used in coursework. With the availability of computers and the Internet, another pedagogical approach can serve to develop principal candidates' knowledge and application of school law. This student-centered approach has principal candidates produce a computer database model using the Internet in a discovery process to study legal issues in school settings. This short paper will first present the features of the computer database model. Secondly, it will describe the implementation of the model, using a case study approach. Thirdly, it will discuss benefits in using the computer database model as well as suggestions for improvement, based on case study results.

Computer Database Model

The computer database model takes the form of a "matrix" or table of legal topics. The physical component is a Microsoft Word table, which is saved as a file on a floppy disk or other readable storage devise. The table serves as a graphic organizer of legal information. The table is designed with columns of legal sources and rows of legal topics. The columns display those legal sources a principal should consider investigating in regard to a specific legal question. These columns could include federal and state statutes, federal and state regulations, and district (campus) policies, as well as appropriate forms/letters. The rows list the legal topics, and will vary from program to program. For instance a course entitled "Administration of Special Programs" could include special education, bilingual education, and gifted and talented education, to name a few. (See Table 1: Computer Database for Laws and Policies.) The next step in developing the computer database would be to create "links" to separate Word files of relevant education law content in the appropriate cells where the columns and rows intersect, using information from the Internet. For instance, the relevant state statutory law for discipline in Texas would include a citation from Chapter 37 of the Texas Education Code located at www.capitol.state.tx.us/statutes/edtoc.html.

Development of a Computer Database on Education Law and Policies: A Case Study

During summer 2001, thirty-nine principal candidates, who were enrolled in the graduate course entitled "Administration of Special Programs" at the University of Houston-Clear Lake, participated in using the Computer Database Model. In the computer lab, principal candidates were provided an instruction sheet for building the database table. Instructions were given for both Word 97 and Word 2000 since instructions did differ between the two versions of Word. This activity provided verification that participants possessed the proficiency in Microsoft Word to develop the database. With the construction of the database table, principal candidates were ready to research education law and policies to be appropriately placed in the cells of the matrix. The text in the "cell" was limited to a few words to identify the Word file containing the saved legal information. They could not simply place the substance of a Word file in the "cell" because it would swell the table in size to unmanageable proportions. They had to place a "link" in the "cell" to a related Word document. Participants "double-clicked" the "link" in the "cell," which opened the "linked" Word file containing the saved information in its entirety. Within this Word file, they could also add "hyperlink" web site URLs. As class discussions moved from topic to topic, the instructor provided principal candidates key Internet references. Participants were given websites containing text of the United States Code, the Code of Federal Regulations, and the Texas Education Code. Participants were also responsible for searching (discovering) other appropriate Internet sources, e.g., school district policies, to be placed in the database.

Benefits of Using the Computer Database Model

The pedagogical use of the Computer Database Model produced benefits to the principal candidates in the "Administration of Special Programs" course. The search or discovery process along with typing and cutting/pasting information provided an opportunity to actively engage principal candidates, in contrast to the lecture and note taking style of instruction. During this process participants realized that much pertinent legal information could be accessed on the Internet. They gained computer technical skills using Microsoft Word in constructing the database, which provided an electronic collection of legal information. Through the process of developing the computer database, principal candidates had a better understanding of legal concepts from federal and state laws and legislation to school policies. In one exercise, the class traced the evolution of a legal concept from a Supreme Court case, to federal regulations, then to state administrative guidelines, and finally to school district policy. The concept traced was special education's "child find." Participants followed its development from the *PARC* case (*Pennsylvania Association for Retarded Children v. Commonwealth*, 334 F. Supp. 1257 (E.D. Pa. 1971), 343 F. Supp. 279 (E.D. Pa. 1972), to federal legislation, then to state legislative and administrative directives, and finally to the school district's policy statement on "child find. Moreover, a discussion arose regarding the consequences of noncompliance and the possible litigation by advocacy groups. This process created the opportunity for participants to discuss differences between statutory law and regulatory law, both at federal and state levels.

Area for Technical Improvement of the Method

Complications arose when participants attempted to store the database on one floppy disk. Some of them were creative and divided the table into parts and saved them on different disks. Another technical solution would have been to save the database on a CD, but not everyone had access to a CD burner. A better solution would have been for participants to be selective in choosing pertinent information, instead of copying and pasting whole chapters of regulations and statutes. The value of the exercise in developing the computer database was not the amount of material collected, but in the knowledge gained regarding legal topics affecting educators and in the skills achieved in accessing those legal sources on the Internet.

Table 1. Computer Database for Laws and Policies

Legal Issues	Federal Statutory Laws	Federal Regulations	State Statutory Laws	State Administrative Guidelines	School District (Campus) Policies	Forms/Letters
Special Education	Federal Legislation on Special Education.doc	Federal Regulations on Special Education.doc	State Legislation on Special Education.doc	State Administrative Guidelines on Special Education.doc	School District (Campus) Policies on Special Education.doc	Forms/Letters for Special Education.doc

Preparing School Administrators to be Technology Leaders

Don Knezek
ISTE's National Center for Preparing
Tomorrow's Teachers to Use Technology
University of North Texas
United States
dknezek@iste.org

Abstract: This paper discusses the connection between leadership for technology in schools as documented in the Technology Standards for School Administrators, and accepted wisdom for leading systemic educational change. The information is of particular interest to programs designed to prepare school and district administrators.

Using technology well across a school system is, in itself, significant systemic reform. When technology is appropriately integrated system-wide, work is different and who does what work changes. With the infusion of technology, tools change, learning resources are different, and learning environments are transformed dramatically. Supported by modern information technologies, communication changes, and decisions are made very differently. Educators and school leaders who understand technology and its roles in schooling and in society establish new priorities, and they highly value new learnings.

The single most important element for success and sustainability of systemic change in education is effective leadership. Evidence gathered from study of organizational change in general, and change within schools specifically, is consistent and very clear on this fact. Effective leadership of school change is the essential condition to successful change.

It is a tiny leap of logic and faith, then, to conclude that effective leadership for technology in schools is critical to success and sustainability. In fact, direct evidence arising from major systemic technology initiatives serves to confirm the important role of leadership. And it is precisely this observation that attests to the incredible importance of the administrator standards projects of the Collaborative for Technology Standards for School Administrators and of the ISTE National Educational Technology Standards (NETS) Team.

Within a framework of effective change characterized by:
- a shared vision and clear expectations,
- support strategies and essential conditions,
- ongoing, broad-based assessment and evaluation, and
- meaningful and substantial response to assessment and evaluation findings,

ISTE National Educational Technology Standards for Administrators, or NETS*A, present a rich package of guidance and support well positioned to return optimal educational benefits on our technology investments.

Effective technology leaders understand the roles technology plays in schools and in society. They establish a shared vision among all stakeholders that succinctly captures the expectations of the school community for a focus of technology use in the enterprise of schooling. Through an emphasis on standards and benchmarks, the administrator clearly and frequently reminds all involved of the expectations of them related to technology.

System conditions related to access and connectivity, supportive policy, modern infrastructure and technical support, expectations of continuous improvement, standards-based curriculum, student-centered learning activities, and community support are priority concerns of the administrator committed to providing necessary system support to achievement of technology expectations.

Using a wide array of sources, strategies, and measures to assess and evaluate achievement of the shared vision for technology within a system of schools, the technology leading administrator keeps both self and colleagues-in-leadership in touch with an authentic picture of progress. The administrator leads staff and stakeholders in collaborative review and interpretation of data and information pertaining to technology use and school effectiveness.

Finally, in the fourth critical phase of this cyclic formula for leadership of educational change, the effective technology leading administrator guides an inclusive process of establishing and executing responses to assessment and evaluation findings.

So, the bottom line? The picture for leading effective integration of technology is coming into sharp focus, and our best guide is knowledge we already have in our grasps about successful and sustained systemic change in education.

Teacher Change Processes and Student Products of Exemplary Technology Integration Sites in Kansas

Marilyn May, Brenau University, US

Research Abstract

Accountability for public investment in educational technology has been reported in terms of quantity of equipment and infrastructure ["1st generation"], not in terms of classroom technology curriculum integration with teachers as stakeholders ["2nd generation"] (Milken, 2000). Level of teacher use is key factor in evaluating effectiveness of technology on student learning (ISTE, 2000; US Dept. Ed., 1999; CEO Forum, 2000), yet no studies to date have focused on practitioner use with standardized national frameworks used for data analysis.

Research consensus concludes that technology curriculum integration is needed, as is stakeholder involvement in planning, implementation, documentation, and assessment (Hansen, 1995). Lewis (1998) and others call for more empirical research on actual instances of curriculum change, with school districts, schools, and teachers as units of analysis.

The purpose of this study was to increase contextual knowledge of integration of technology into individual school classrooms by examining teacher-identified classroom change processes and products brought about by technology used in exemplary schools. Qualitative naturalistic inquiry using the grounded theory, issue-based approach (Guba & Lincoln,1989; Stake,1995) provided data, which was reported in a case study format. Interviews, documents, and records were used to develop contextual knowledge (Yin, 1989). A panel of state experts both defined exemplary technology integration and identified model sites for participation. Criterion sampling allowed stakeholders to identify exemplary peers for the study. Bloom's taxonomy, the STEP model, the ISTE Technology Foundation Standards and Milken's Seven Dimensions of Progress Technology Evaluation Frame were used for theme analysis.

Constant comparative analysis and open coding of a variety of information from "elite" interviews allowed for thick identified-site descriptions and theme emergence. Cross-case analysis developed key themes which emerged from the data. Meta-analysis provided a basis for naturalistic generalizations and assertions. Naturalistic generalizations can then be used for extrapolation to similar circumstances and reflection in relationship to established frameworks.

Cross-site analysis identified levels of technology integration development within the exemplary models and a greater connection of higher levels of development to teaching teams and supportive mentoring than to funding per student. The ISTE framework identified assessment/curriculum, teaching methodology, and classroom structure to be areas of change present at any level of technology integration development. Findings supported the need for more effective district wide planning and teacher training that incorporates the use of team mentoring for support.

Levels within data were indicative of technology integration demonstrated progress along a continuum comparative to the Seven dimensions of progress (Milken, 2000). As progress was made toward higher levels of technology integration, hardware and software moved from center of process focus to a support position for the content activity and issues of equity of access became critical (meta-assertion).

District technology coordinators were found to be key resources in the development of effective technology integration programs. Organizational support for coordinators needed to be directed toward providing access to resources, current literature, and training opportunities (meta-assertion).

Findings analyzed using the ISTE model of classroom change exhibited discrepancies in terminology and pedagogy, which emphasized the need for more effective teacher training. Emerging themes support the meta-

assertion that defines the needs of staff development to provide ongoing technology skill training, distribution of current literature shaping technology integration in education, and demonstration of effective integration models with mentoring or cadre teams to support change. Teachers were enthusiastic about technology integration but frustrated with limitations of time and training necessary to maximize the potential of technology as an effective educational tool.

Time and funding needs increased as technology integration improved (meta-assertion). "Time factors" included not only time to plan and experiment with technology applications but also the added time needed for students to accomplish in-depth assignments that utilize technology. Student work time leads to the issue of funding needed to supply equity of access. The greater the level of technology integration the greater the need for student access. Technology resources shape classroom activities and ultimately the learning opportunities available to students. Resources must be available and directed toward providing equity of access for students.

All reference to changes in student products failed to include a reference to standards, assessments, or scores. Lack of student achievement data indicated a great need for alignment of content and technology standards with outcomes and assessments. Without this connection it is impossible to validate improvements in learning that teachers believe is produced by technology integration. Research findings support the meta-assertion that alignment across all sites between technology and content standards, district outcomes, and assessments needs to be addressed by curriculum and technology planning to provide student achievement data.

Technology planning is critical to all aspects of implementing an effective program. Although formal Technology Plans exist, evidence has identified this as an area of constant change creating the need for improvement. Effective planning must incorporate information collection and distribution representing administers and teachers. It should provide direction, pinpointing areas of need from physical resources such as hardware and software, to curriculum and instructional goals that integrate technology standards with content standards and outcomes (meta-assertion).

Developing a Relevant Technology Course for Administrators

Barbara K. McKenzie, Department of Media and Instructional Technology, State University of West Georgia, United States, bmckenzi@westga.edu

Nancy G. Mims, Department of Education Leadership and Professional Studies, State University of West Georgia, United States, nmims@westga.edu

Abstract

The design, development, and evaluation of a technology course for school administrators and instructional technology leaders is presented. This paper reviews two years of course design stages including the content changes, teaching/learning modifications, more and less successful teaching practices and student requirements. Design considerations, future directions and future research are presented.

Introduction

Integrating technology into the school's curriculum require teamwork in order to infuse it seamlessly into the curriculum (Brooks, 1997). While significant efforts have been made towards improving technology training for teachers across the nation, administrators have not received the same attention (Hope, Kelley, et.al 1999; O'Neill, 1999). Despite this lack of emphasis school administrators must make sound decisions when it comes to providing leadership of their school's technology plan.

Several studies indicate that administrators knowledge in technology make a positive difference when supporting technology use in schools. (Anderson & Pigford, 1987; Thomas, 1999; Virginia Department of Education, 1998). Costello quoting Mergendollar (1997) stated, "The role of the principal is crucial in promoting school technology use. For technology to become diffused across a district, leadership by the central administration, especially the superintendent, is critical." (58). In a previous study Mims & McKenzie (1995) also found that administrators knowledgeable in technology were more inclined to support instructional media (1995). Technology training is important if principals are going to have the necessary knowledge to administer and oversee the school's total technology program (Mohr & Evans, 1999). This includes developing a school technology plan, purchasing hardware and software, providing technology support, offering curricular integration training programs, and overseeing the school's technology assessment.

The Educational Leadership Department at a medium sized southeastern university began the planning process for adding a master's level component in technology to their administrative program. Some courses did include technology, however, not to any great extent and the department decided to add Administration of Instructional Technology Programs to its required courses.

The class was a collaborative effort between the departments of Media and Instructional Technology and Educational Leadership and Professional Studies. The course was designed for students who were working on a M.Ed. in the Educational Leadership and a M.Ed. in Instructional Technology.

Because many non-traditional students are working full time, many traditional classes are disappearing from this campus. An increasing number of students want classes delivered through online technologies either as a course supplement or a full course. This format offers many advantages to students seeking to continue their education. These advantages often include access to their course at any time /any place so individuals determine the hours of working online, the pace in which to complete work, and control of their learning environment. Knowing the students' schedules and their need for flexibility and access, the planning team designed the initial course 52% online.

The Design and Implementation of the Course

The research team redesigned and implemented the first course for technology leaders in the school (principals, teachers, instructional technology trainers) fall of 2000. One member of the team was a faculty member in the Educational Leadership and Professional Studies Department who had extensive experience in instructional technology, and who was familiar with the needs of the master's level students in Educational Leadership. The other member was in the Media and Instructional Technology Department, taught the class, and was an instructional designer. Since a similar course was in place for instructional technology master's level students, the two faculty members examined the existing course objectives, activities, evaluative measures and teaching strategies.

The course designers considered students' needs in both disciplines, reviewed accrediting standards in technology for administrators and instructional technology leaders, reexamined course content and evaluation techniques used in the course, and modified many of the teaching and learning strategies to better meet the needs of all learners. Some of the initial changes included providing more hands-on technology training, increasing the technology software covered, adding several new content areas such as grant writing, state and federal laws and funding.

The course delivery was changed from a face-to-face class to a 52% on-line course delivered though the WebCT platform. The course designers wanted to prepare students for the future by exposing them firsthand to distance technologies. Nine of the 17 class meetings were online and 5 were face-to-face. During the first class students were given an introduction to WebCT, shown the course tools, and how to access the course. The other face-to-face meetings were used for presentations from experts in the field and/or the instructor, hands-on training sessions with selected computer applications, and student's research presentations. The online classes provided students with weekly assignments, course content, opportunities to use the web for searching for technology related material, posting assignments in the class bulletin board, and taking exams.

The online content section contained a wide variety of information such as the weekly assignments, student research topics, instructor presentations and training tutorials that included PowerPoint, Excel, Access, laserdisc, overhead production, analog video, web page design, e-mail.

The fall 2000 course introduced the educational leaders to a variety of technology topics. The research team believed that the more familiar students were with technology, the more they would be able to model its use and oversee effective integration into the schools. The major course components included some of the following: knowledge of the use of computers and related technologies in the schools, hands-on training with software programs addressed by In-Tech, school technology plan, staff development, integrating technology, technology resources, grant writing, fundraising, and technology for special needs students.

During the course students were required to participate online and complete class assignments by posting their work or their group's work on the bulletin board. They were required to do research in technology on selected topics and make two presentations using multimedia, develop an instructional manual based on class materials, and take two online exams. The grade breakdown was as follows: attendance and participation = 10%, research project on IT issue = 20%, group research and multimedia presentation = 25%, IT manual = 25%, and tests = 25%.

The course offered every semester during the past year and a half has varied in utilization of distance technology. Spring of 2001 the course was 71% online. During the summer the class was reduced to 64% online. Fall of 2001 the course increased its use of distance technologies to 65% online as a result of using two distance platforms, WebCT and Epic Learning.

As the technology standards for school administrators have emerged, Technology Standards for School Administrators (TSSA) and the International Society for Teacher Education (ISTE) standards for teachers and technology leaders developed, the research team made course modifications to reflect the new standards. Course objectives were revised and additional content was added to the course. Some of the changes were:

- Adding more hands-on technology training opportunities to keep technology leaders up to date. This included more training sessions in class, distributing handouts, and posting tutorials on the class web page (i.e., digital cameras, digital video recorders, filtering software, track star, scanner, smart board, web page design and creation, web quest). One of the researchers was taking her second In-Tech class and scanned and posted the In-tech handouts for the class.
- Adding more technology/ leadership content (i.e., social, legal and ethical issues; distributive learning; assessment of technology integration in the schools; assessment tools for technology, teaching with a one computer classroom, DSL, and filtering devices)

From the fall 2000 to the present time, the Administration of Instructional Technology class has been revised based on the research team's observations, formative and summative evaluations from the instructor, the university, the Distance and Distributed Learning Office, and the changing student needs and attitudes toward technology. The advances in telecommunications have also had an impact on the course design. Technology training needed to be up to date and prepare the students for new and emerging types of technology as well.

Findings from the general university course evaluations revealed the mix of students favorably received the course. The most frequently occurring suggestions for improvements were:

- Reduce the amount of course content presented
- Reduce the number of required online postings for class assignments
- Use Epic Learning for more classes to increase student/ instructor interactions online
- Increase the weight given for student attendance and on-line participation in class
- Do not require so much collaborative work
- Change the book. The online resources are much more up to date and informative.

The evaluative data from the Distance and Distributed Learning Office for fall of 2000 and spring 2001 also revealed the Administration course was effective in its delivery. Students, volunteering to take an online course evaluative survey at the end of the course, were supportive of distance technology being used for this course as shown in table 1 below.

Statement	SA	A	U	D	SD
At the beginning of the quarter my attitude was positive	6	2			
At the end of the quarter my attitude is positive	6	2			
My instructor was positive about the online component of this course	7	1			
I found WebCT easy to understand and utilize by the 2nd week of class	3	4		1	
I now find WebCT easy to use and understand	6	1		1	
Having the flexibility to contribute to class discussions outside the classroom on my own time was valuable to me	7	1			
I feel more comfortable participating in class online that I do in a face-to-face setting		2	4	3	
The Distance Learning Help line was helpful	2	1	4		
I would like to take classes in the future that are mostly on-line	6	3			
I would like to take classes in the future that are completely on-line	4	3	1		

Key: SA = Strongly Agree, A = Agree, U = Undecided, D= Disagree, SD = Strongly Disagree

Table 1 - Student Evaluations from the Distance and Distributed Education Office (fall 2000 and spring 2001)

Table 2 summarizes student comments made about the likes and dislikes of the course. Students appreciated the convenience and flexibility the courses offered them but felt there were too many required weekly assignments.

Likes	Dislikes
• Not having to drive a long distance to class • Allowed for better time management • Provides an educational opportunity for those who work and have a home life • Provides an opportunity to hear from all classmates • Easier to communicate with the instructor and class • Time to prepare for the face-to face-discussions • Ability to revisit prior discussions on WebCT • Convenience of taking classes at home	• Too many weekly assignments • Occasional problems posting weekly assignments to WebCT • Too much information too fast

Table 2 – Students likes and dislikes with the course (fall 2000 and spring 2001)

Design Observations

In preparing future technology leaders in this course the research team is aware of the following important points.

1. Teaching through distance technologies is an effective way of delivering the class as long as there are ample opportunities for students to interact with other one another and the instructor. This can take place through chatrooms, bulletin board posting, private email, and using the Epic Learning's platform for synchronous presentations and enabling students to use two way audio.
2. Students enhanced their technology skills and expertise as a result of the taking the course. Many students were highly motivated to continue their professional development after the course was completed.

3. Participants in the class gained a better perspective of instructional technology and where it is headed in the future. Information on new and emerging types of technology was of high interest of the students.
4. Students with little technology background have difficulties with online platforms initially and must be monitored closely to ensure they succeed and have the support as needed. Help lines, virtual office hours for the instructor, handbooks on how to use the system, and the class bulletin board or e-mail are helpful in student problem solving.
5. Due to students' diverse learning styles, they need to be given options in collaborating with other students in class. Permitting students to work independently or in small groups when completing assignments was well received.
6. Class participation should be at least 20% of the grade. Since most of the assignments were online students spent a substantial amount of time searching for information, problem solving and posting their assignments and/or e-mailing their classmates. The weight of the class participation aspect of their grade needs to match the amount of time the student put in to the course.
7. Timely feedback is essential when doing online classes. Students need to have access to the instructor and receive timely feedback on class work. Posting online office hours or listing the days and times the instructor will check the class is helpful to students.
8. The creation of student PowerPoint's at the beginning of the course to introduce themselves (along with a digital photograph) was an excellent way for students to get to know one another.
9. Posting rubrics used in evaluating assignments was an effective method of informing students of the expectations on major assignments. Students used this as a checklist for self-assessment purposes.
10. After completing the class students saw themselves as role models and were eager to serve as leaders in integrating technology into the curriculum.
11. The mix of multimedia used by the instructor provided students with an opportunity to see technology use modeled in the classroom as well as present timely information in instructional technology (i.e., textbook, handouts, instructor produced videotapes, and online resources).

Future directions

Spring of 2002 the class will be delivered 70% on-line and a printed textbook will continue to be used. WebCT will be discontinued and Epic Learning used to distribute class information to students online. This platform is more user friendly and enables students to access course information from a single page instead of going back and forth in the course web pages. The blended learning approach provides increased interactivity between students and between students and the instructor.

From the weekly schedule of events students will be able to access information on their assignments, go to websites connected to the topic, review weekly assessment procedures, participate in selected web based tutorials (i.e., PowerPoint, Excel, Access, Word) and view archived presentations. Students will also be able to see when asynchronous class sessions are scheduled for class chats or real time PowerPoint presentations.

During the real time PowerPoint presentations delivered by the instructor using the Epic system, students will be given a wide variety of tools to use. This includes the polling of student responses to instructor-designed questions (i.e., student background, class pace, content related questions), students typing questions during the presentation and sending them to the instructor for feedback, students verbally asking questions of the instructor through the use of a microphone, and small group e-mail discussions between students and/or the instructor when seated in the same row. The platform also will enable students to use seat colors in the presentation room to indicate their readiness for the presentation and/or to identify problems as they emerge. If both students and the instructor have microphones, two way audio communication will take place between students and the instructor.

The instructor's control of the learning environment is greatly enhanced through the use of the Epic platform. During live presentations the instructor can push web pages to students to have them explore and problem solve. Instructors can also deliver team taught classes through the use of multiple computers by releasing control back and forth. A white board can be posted and used by students and/or the instructor to display information to the group. Other useful features include student tracking of course activities and a variety of presentation enhancement tools to highlight selected course information within the PowerPoint slides.

During summer of 2002 all online resources will be used for the course given the rapid changes in instructional technology. Students have reported they enjoyed their online readings and learned more from them than the class textbook. The timeliness of the materials, the no cost factor, and accessibility have been the predominant reasons given for this preference.

A more extensive student orientation program is in the process of being developed. This will include a more thorough needs assessment at the beginning of the course plus moving student verbal and electronic self-introductions to the first and second nights of class. This may increase student-to-student interaction during the course and reduce the number of times students report to the instructor. The number of postings on the bulletin board should be reduced in the future. At the end of the fall course students read over 750 postings. They reported this was too much to read plus keep up with the other required course assignments. More controlled topics for bulletin board discussions and added emphasis on student-to-student interactions on weekly assignments may better meet students' needs. In addition, students will be placed into collaborative learning groups, randomly matched by the computer. Groups of 3 to 4 will be formed so students can share their ideas with the group, problem solve and post their collective thoughts to the bulletin board.

The research team continues to keep abreast of the changes in instructional technology and student needs in order to make further course revisions. Wireless computers, virtual reality, and e-learning will be addressed in more detail in the future so that as effective leaders students will be familiar not only with the existing types of technologies in the field, but the new and emerging technologies.

Future Research

Informal formative evaluation techniques that obtain feedback from students in this course and assessing the effectiveness of this course after technology leaders are working in the field will be valuable.

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Understanding the Role of School Leaders in Realizing the Potential of ICTs in Education

Thomas L Otto
Department of Education, University of Southern Queensland, Australia, otto@usq.edu.au

Peter R Albion
Department of Curriculum and Instruction, Purdue University, USA, palbion@purdue.edu

Abstract: Although Information and Communications Technologies (ICTs) are now widely available in schools they appear not to have been integrated into teaching and learning either as widely or as thoroughly as was hoped. One influential factor, which may not have been given the attention it deserves, is the role of school leaders. Relatively little is known about how the beliefs of principals influence the uptake of ICTs in their schools. This paper attempts to describe a conceptual framework for understanding that role and an exploratory research project based upon that framework. It opens new lines of enquiry about the crucial roles of school leaders in the adoption of ICTs.

Information and communications technologies (ICTs) are now widely available in schools. The level of equipment available and its quantity vary widely but there is both wide support for, and considerable progress in, deployment of ICTs in schools. In 2001, USA schools were reported to have one computer for every 5 students on average and around 60% of those were connected to the Internet or had multimedia capabilities, although there were substantial variations by state and other factors (Education Week, 2001). In Australia, 40% of schools report having a computer for every 10 or fewer students (Meredyth, Russell, Blackwood, Thomas, & Wise, 1999). An international survey conducted in 26 countries during late 1998 and early 1999 found ratios ranging from 7 students per computer in Canada to 238 in Bulgaria but with the most common values around 15 (Pelgrum, 2001). The same study reported evidence that, for most countries, the availability of computers in schools had increased from 1995 to 1998 suggesting a continuing commitment by education authorities to support the adoption of ICTs. Nevertheless, "insufficient number of computers" remained the top ranking obstacle to integration of ICTs although its prevalence was considerably less in those countries with the most favorable student/computer ratios.

Integration of ICTs in Education

However, mere deployment of ICTs in schools is not sufficient to make an educational difference. For that to occur the ICTs must be used purposefully. Even where access to ICTs is comparable there are variations in both the kind and frequency of use to which the equipment is put. In the USA, computers are reported as being used weekly for language arts in 26% of classes at Year 4 and just 8% at Year 8 with the respective state to state variations reported as 8% to 74% and 2% to 20% (Education Week, 2001). The same report describes similarly wide variations in usage by teachers for other purposes. Internationally, on a composite measure of skills acquisition during secondary education, the reported variation was from 21 to 70 on a 100 point scale (Pelgrum, 2001). The application of ICTs to teaching and learning has been aptly described as "patchy" (Galligan, Buchanan, & Muller, 1999).

Various reasons have been offered for the failure of ICTs to produce widespread changes in education. It has been argued that developing teachers' technical competence with ICTs is not sufficient in the absence of building knowledge about how to apply ICTs to teaching and learning (Oliver, 1994). Even the effects of such knowledge may depend upon attitudinal factors. It has been suggested that teachers' self-efficacy for teaching with computers (Albion, 1999) and their visions for integrating technology in their teaching (Ertmer, Johnson, & Lane, 2001) are factors which may influence the uptake of ICTs for teaching and that these are issues which should be attended to in teacher development programs. Becker (2000) examined Cuban's claim that computers are incompatible with the requirements of teaching. Using data from a study of 4000 teachers in 1100 schools across the USA, Becker concluded that computers have not transformed the teaching practices of a majority of teachers but that, where teachers have the necessary computing skills, some freedom in the curriculum, convenient access to equipment and personal philosophies which support constructivist pedagogy, computers can be a valuable instructional tool.

Australian policy lists two goals for ICTs in schools, namely that students should exit as "confident, creative and productive users of new technologies" and that schools should integrate ICTs to "improve teaching and learning" (Toomey, 2001). The same report expresses the hope that ICTs may act as a catalyst for whole school reform. However, there is evidence to suggest that, rather than ICTs catalyzing educational change, the adoption of ICTs by teachers is most likely to occur where school culture provides support for such changes (Dexter, Anderson, & Becker, 1999). These findings are consistent with studies of exemplary computer using teachers, which identified the importance of contextual factors including support from peers and administrators (Becker, 1994; Hadley & Sheingold, 1993). Further evidence may be found in studies on factors influencing teachers' adoption of computers based on which Marcinkiewicz (1996) concluded that the most influential factor was "subjective norms" or the perception within the professional environment that computer integration is expected. He argued for the importance of modeling by administrators, colleagues and other significant persons in establishing this expectation.

The Role of Leadership in ICT Integration

ICTs can be a valuable instructional tool where the appropriate conditions prevail (Becker, 2000). Many of those conditions, including professional development opportunities to build skills, convenient access to ICTs and freedom to innovate in the curriculum are subject to the influence of principals and other leaders in the schools. For teachers, developing a coherent vision for integrating ICTs into their practice while attending to various other imperatives represents a significant challenge, especially if the school culture is not supportive of such change. In Britain, the National Grid for Learning (NGfL) project has recognized that achieving its long term goal of fully integrating use of ICTs into all aspects of the school system will require a cultural shift in the way schools approach ICTs and that this, in turn, may necessitate "a considerable change in the roles that school leaders and managers will be expected to play in their institution's use of technology" (Selwyn, 2000, p 410).

Recent studies of successful school reform point to the importance of cultural leadership in schools. Consideration of the leadership dimensions associated with successful innovation in an Australia-wide study of school innovation led to conclusions which indicated the importance of an holistic approach, in which innovation is aligned with school-wide vision and shared pedagogy so that it meshes with school culture, and where leadership incorporates the contributions of both administrators and teachers (Crowther, Hann, & McMaster, 2001). A study involving 40 public school teachers in Ohio found a positive correlation between leadership style exhibited by the school principal and teacher attitudes towards integration of technology as an instructional tool (Hughes & Zachariah, 2001). Teachers who perceived their school leadership as democratic were much more likely to have positive attitudes towards technology integration than teachers who experienced authoritarian leadership.

Another report based on data from the study described by Becker (2000) examined the proposition that "technology leadership" drives "technology outcomes" in schools (Anderson & Dexter, 2000). The "technology outcomes" investigated were evidence of teachers integrating technology into teaching, network and Internet utilization and student use of applications. "Technology leadership" was conceived of as a characteristic of the school rather than an individual and a measure was synthesized from data about eight organizational policies or actions present in the school. These included existence (or not) of a committee and budget for technology, principal involvement in technology use and planning, district support and staff development. The study found that overall technology leadership was stronger than infrastructure as a predictor of technology outcomes and that leadership and student to computer ratio were the only significant predictors of the three outcome variables. It concluded that, although infrastructure is important, leadership is the critical element in establishing technology as a part of school culture.

Recent efforts by a broad collaborative in the USA have resulted in the development of Technology Standards for School Administrators (Knezek, Rogers, & Bosco, 2001). Listed first among the six tasks in the framework is "Leadership and Vision". The remaining tasks include learning and teaching; productivity and professional practice; support, management, and operations; assessment and evaluation; and social, legal, and ethical issues. Clearly the capacity of school principals to develop and articulate, in collaboration with their school community, a vision for ICT integration is seen to be a critical element in the process.

The Role of Principals' Beliefs in Leadership for ICT Integration

Even if "technology leadership" is a characteristic of the school community rather than an individual such as the principal (Anderson & Dexter, 2000), a strong case can be made that principals' beliefs and understandings are crucial in the development of a school culture that will support creative integration of ICTs for teaching and learning (Otto, 2001). Understanding the nature and origins of principals' beliefs may be the first step towards assisting principals to work more effectively to develop appropriate school visions for the integration of ICTs. Prior research, including self-efficacy theory, provides a useful starting point for developing a framework to guide such research.

Bandura (1997) defines self-efficacy as the "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). In the context of this paper, "beliefs in one's capabilities" refers to the confidence a principal has in his or her beliefs about teaching with ICTs, and "courses of action" refers to the effectiveness of the principal as a visionary and agent for change. Non-teaching principals have few opportunities to test their beliefs in a classroom over extended periods of time. While a principal may have read about teaching with ICTs and observed teachers teaching with ICTs, personal classroom experiences may be limited to print based pedagogy. Principals with low self-efficacy for leadership in respect of ICTs may be less willing to advise teachers, and their evaluation of teaching with ICT may be limited to comparisons with print based pedagogy. However, at some point, pedagogical principles for teaching with the new technologies depart from print-based learning, otherwise teachers will use the technologies in the same way they use print. This is one of the problems identified by educational commentators such as Luke (2001).

In their study of the relationship between self-efficacy and willingness to act, Dimmock and Hattie (1996) concluded that high self-efficacy is not only a factor in creating conditions for change, but also reduces principals' stress levels and enables them to cope with unfamiliar situations and challenges. As well, high self-efficacy is linked to school reform because the principal has the confidence to take advantage of new opportunities. Self-efficacy is an element of empowerment, that is, 'taking charge of ones own growth and resolving ones own problems' (Ghaith & Shaaban, 1999, p. 495). Furthermore, principals with high self-efficacy are more likely to assume collaborative leadership styles and allow participative decision making, while maintaining confidence in their influence as leaders (Dimmock & Hattie, 1996).

Planning a Way Forward

A study is proposed to develop an understanding of critical factors and identify key variables as they relate to the 'beliefs and understanding' principals hold in relation to ICTs and teaching and learning generally. Based on consideration of the literature the following research questions have been identified.

1. What beliefs do principals hold about teaching with information and communication technologies?
2. What factors appear to be significant in the formation of those beliefs?
3. How confident are principals in rationalising and articulating the educational value of teaching with information and communication technologies?

The researcher, who himself is a principal, will be one of three principals to participate in the study. This is to account for beliefs that the researcher brings to the study (Miles & Huberman, 1994). The focus is on understanding the cases (Hammersley & Gomm, 2000) rather than making statistical generalisations to the population although that might follow in a later phase. A story for each 'case' will be developed during a series of structured and semi-structured interviews, or episodes, that draw on a range of research techniques. Contact will be made with the principals over approximately one month, during which leads will be followed, interesting concepts pursued and perceptions checked and rechecked. Care will be taken not to force a view on the principals, nor to introduce terms that give clues to answers. Narrative research techniques will be an important feature of the episodes. According to Mattingly (1991), narrative accounts focus on the changes that occur through the actions of people, and that "Simply asking practitioners to reflect on the stories they already tell can provide a natural bridge to a serious enquiry about the very deepest layers of value and belief that under gird the decisions they make" (p. 255).

Biographical research techniques will be applied in the first episode to investigate factors in the principal's development of knowledge and skills in pedagogy and ICTs. Questions modified from an Australian national study will center on pre-service training, teaching experiences, lesson observations and in-service development (Meredyth et al., 1999). Additionally, there will be questions about home use of ICTs as this is another important area of experiences. Each principal's responses may be compared with national data.

During one of the episodes, questions will relate to scenarios of traditional and constructivist teaching practices (Ravitz, Becker, & Wong, 2000). In another episode, the principal will be asked to react to statements made by teachers talking on video about their experiences in teaching with ITC. The video was produced by Gibson and Albion (1999) as part of a computer file package to support pre-service teachers, and depicts classroom scenes and issues familiar to principals of Queensland schools. "Through reflection, (the principal) can surface and critique the tacit understandings that have grown up around the repetitive experiences of a specialized practice, and can make new sense of the situations of uncertainty or uniqueness which he may allow himself to experience" (Schön, 1983, p. 61). Even if the principals are aware of related theories and techniques, they may find it difficult to explain reasons for their judgments of teaching, including the statements made by teachers on video. To assist the principals in the process, Schön recommends that questions focus on noticeable features, criteria in making judgments, procedures enacted in performing the skill and framing of the problem that is to be solved.

Additional data will be collected from school documents including the Annual Operation Plan, Management and Learning Technology Plan and Equipment Replacement Schedule. The principals will be asked to highlight features in the documents, not only as a reflection of their beliefs in practice, but also because principals with high self-efficacy are more likely to be aware of the potential of school planning and policy making in developing their schools (Dimmock & Hattie, 1996).

At the conclusion of each episode, the principals will rate their confidence in discussing their beliefs on a five point Likert scale. The procedure relates self-efficacy to confidence and assumes that principals are conscious of their self-efficacy (Dimmock & Hattie, 1996). To improve honesty of answers, they suggest the principal be assured the information is confidential, and the situations presented include a range of tasks with positive and negative aspects and differing levels of difficulty.

During the course of the study, the process of collecting data will itself become a factor. The subjects themselves will become researchers as they reflect on their beliefs and activities in their schools (Mattingly, 1991). In the relatively new field of teaching with ICTs, principals "handle situations for which there are no techniques. They must develop their own kind of artistry, involving reflecting in practice in the midst of intense activity without interrupting the flow" (Schmidt, 2000). Participation in the study will provide the principals with an opportunity to reflect on their beliefs without the distraction of school routines. They will consider scenarios in various forms and make comparisons with practices in their schools, and for a period of a month their attention will focus on one topic. By being aware of this effect on the principals, the researcher may detect changes in beliefs not only as a feature in the data, but also as a record of the potential of the process to assist principals in their development.

It is anticipated that the data obtained from the study will open up new lines of inquiry about the crucial roles of school leaders in the adoption of ICTs. Schools are in the transition of re-culturing to accept teaching with information and communication technologies. Education Queensland, for example, is undertaking curriculum reviews that oversee major changes in approaches to teaching and learning. Unless schools begin to address change now, they will soon be left behind. Principals are the on-site educational leaders who shape and communicate visions of teaching and learning within their schools, and by their action or inaction influence school activity. An evaluation of the beliefs, understanding and self-efficacy of principals will contribute to decisions about future developmental needs because more will be known about their preparedness for change. The contextual information about existing processes for developing skills and knowledge in pedagogy and information and communication technologies will further contribute to those decisions.

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Disinformation, Academia, and the Web: The Anonymous Battleground

Thomas Rakes, The University of Louisiana, US
Glenda Rakes, The University of Louisiana, US

Disinformation, Academia, and the Web: The Anonymous Battleground

Introduction

Before the Internet, much information spread as one friend told something to another. Although not very efficient by today's standards, it was powerful because the source had credibility. People tend to put more faith in the opinion of a friend or than in the pronouncements of any anonymous source.

Now that email and the Web are everywhere, the change in the speed with which word of mouth communications travel is nothing less than amazing. Expending less energy than was previously required to convey information one-to-one, a message can now be transmitted, with little to no cost and instantly, to enormous groups of people. With a very basic Web site, almost anyone can instantly post a cyberspace billboard that can be viewed by the world. Message boards, online forums, discussion groups, and chat rooms also allow nameless messages. And that anonymous person can feel like an instant friend with all the credibility of a fraternity brother.

Companies felt the sting of anonymous Internet communications early. With the growth of online communities, such as Geocities, Xoom and Angelfire, offering free Web pages to members, it has become increasingly easy for anyone with a grievance to reach a worldwide audience.

Attacks on Academics

With increasing frequency, anonymous attacks are being directed toward the academic world. A profile of the type of individual who engages in this type of activity will be provided. The academic victims include individual faculty members by way of "evaluation" Web sites posted by students and entire institutions attacked by students (Claremont McKenna College), faculty (The University of Louisiana), and alumni (Columbia University). Examples of each type of attack will be provided.

Legal Issues

An overview of the legal issues surrounding anonymous Web sites or "cybersmearing" will be provided, including a discussion of defamation, libel, and malice along with summaries of recent court decisions. In general, victims of such attacks have had little success in court, with attackers protected by the First Amendment. Although each case has its own individual issues, generally speaking, a number of criteria must be met before an anonymous Web posting can be considered illegal. First, statements must be presented as fact rather than opinion. Second, the statements of fact must be false. And third, the victim must show that the Web site posting was made with actual malice (that is, with reckless disregard for the truth).

Protecting Reputations

A good reputation is important to success; it deserves the same attention given physical, financial and intellectual assets. Reputation influences a university's ability to attract quality students and faculty, and to earn and keep the support of other stakeholders in the community and among alumni. Reputation is equally important to the successful career of an individual. Reputation has a direct impact on how well any organization or individual succeeds..

Four suggestions are offered for dealing with the increase in anonymous Internet-based attacks on the reputations of individuals and institutions in academia.

1. Know the Internet World

Search the Web regularly. It is time consuming, but any organization or individual that is not monitoring the Web could find serious trouble because of slanted, malicious, and libelous information. What an organization or individual does not know can hurt. Go to a site like DejaNews (www.dejanews.com) and use the UseNet search. The results might provide quite a surprise.

Know the Internet audience. Be aware of the places where this type of communication might occur. Understand the "netiquette" required to make the correct response to anonymous attacks.

2. Analyze your communication skills.

Stakeholders need to feel comfortable sharing both positive and negative feedback. If they do not, a communication skills audit may be in order. Actively encourage criticism. Criticism as an early warning system: it is better to hear it from your stakeholders directly than from an anonymous attacker on a Web site. Ask for feedback often enough that people take such requests seriously. Make it easy for people to provide the information. This can be done at regular meetings, at one-on-one meetings, or through requests on a Web site. Ask for feedback and then allot enough time in the meeting for people to really speak their minds. Thank them for their critical comments.

3. Prepare a Web disaster plan.

If an institution becomes a target for disinformation, a Web disaster plan should be in place. It might be advisable to have the infrastructure of a public relations Web site sitting on the server in case it is needed. Some organizations purchase potentially negative Web domain names such as "ihate...com" or "...sucks.com" as a preventive measure.

4. Negotiate.

Try to get to the source and negotiate some kind of compromise. Use legal action only as a last resort. Besides the difficulty in proving such a case, suing can be a very bad idea, giving the owner of the negative Web site even more attention. If the suit is lost, the individual or organization bringing the suit to court can look even worse.

Conclusion

It is increasingly important that individuals and institutions in academia understand the potential threat of anonymous Internet attacks. Supreme Court Justice Louis Brandeis wrote almost seventy-five years ago that the best answer to evil speech is more speech. Today, the Internet makes it possible for anybody to say anything. Instead of trying to silence someone on the Web, being proactive and speaking up in the same arena may be the best defense.

Implementation of Information and Communications Technologies in Australian Schools: The Perspective of the Principal

John Schiller
The University of Newcastle
NSW, Australia
john.schiller@newcastle.edu.au

Abstract: This paper will report on initial analysis of baseline data gathered from a survey of all elementary and secondary principals in the coastal Hunter region of New South Wales, the most populated state of Australia, in terms of their use of, and concerns about Information and Communication Technologies (ICT). Findings indicate that although most principals in the region are over the age of 40 and have been principals for more than 6 years, there are marked variations in their perceived competencies and use of ICT. Staff development, availability of technical support and maintenance assistance, and funding are major concerns. Interviews with selected elementary principals indicated greater familiarity with administrative uses of ICT than teaching and learning applications.

Introduction

Computers, the Internet and other information and communications technologies (ICT) can alter how schools are led, how teachers teach and how children learn. State governments in Australia have invested millions of dollars to prioritise integration of these technologies in schools; where the principals are major decision makers. Research has identified the principal as a key factor in successful adoption and implementation of change, yet little is known about the principal's role in implementation of Information and Communications Technology (ICT) in schools.

Background to the study

Recent Australian government priorities recognise that ICT plays an important role in schools, but without support of school leaders, particularly the principal, the educational potential of ICT may not be realised . Principals are expected to make complex decisions about how to integrate ICT into learning and teaching and assume a major responsibility for initiating and implementing school change through use of ICT but are themselves unsure of how to cope with these issues .

Educational change literature identifies factors in early and late adoption of educational change and points to the principal as a key facilitator in implementing educational change and school improvement (Fullan, 1996). Moreover, an 'Initiator' change facilitation style leads to greater implementation success (Hall & Hord, 2001).

There is also a growing field of literature on guidelines for school leaders about integrating ICT into schools (see Mauer & Davidson, 1998; Picciano, 1998). The role of the principal in supporting IT integration is seen as critical (Hoffman, 1996) but there is limited research to substantiate how these implementation strategies actually work (Michael, 1998; Riffel & Levin, 1997) and little Australian research on the role of the principal in the implementation of ICT although integration of ICT is current government policy. Finally, although examples of 'best practice' in ICT include a key role for the principal (Michael, 1999) there are no established criteria against which Australian schools can be compared.

Results of preliminary investigations

Research in the Hunter area of NSW, Australia by the author has shown that implementation of ICT in schools is complex and fraught with difficulties (Schiller, 1997). Identified issues of concern of school leaders included: access to and maintenance of appropriate hardware and software, apprehension about personal computer use, providing appropriate staff development programs, and coping with strategic planning processes required to integrate ICT into teaching, learning and management practices. Concerns about these issues have increased recently in terms of pupil and teacher access to the Internet (Schiller, 1997) and as a result of government priority for increased ICT use.

Further, the Change Facilitation (CF) style of the principal (that is, the combinations of interventions they use), has been identified as a key factor in successful implementation of ICT (Schiller, 1997). Successful CF Styles of 'Initiator', 'Manager' or 'Responder' have been identified where 'Initiator' principals have greater success with innovation adoption and teacher success in change can be directly correlated with their principal's CF style. This style is located on a continua according to their 'concern for people', 'organisational efficiency' and 'strategic sense' (Hall & Hord, 2001).

However, findings from this research are limited by a small sample size, a focus solely on 'early adopters', a lack of comparative data, and lack of currency of some of the data due to rapid changes in ICT and recent changes in government ICT priorities (For example, by the end of 1999, all principals in NSW government schools were required to be familiar with computerised school reporting systems and to use a personal email address provided by the NSW Education and Training Department).

The preceding arguments lead to the following research study which is the focus of this paper. The following question guided this investigation. *How do principals facilitate the implementation of information and communications technologies (ICT) in their schools?* Specifically, What is the extent of principal use of and concern about ICT in elementary and high schools? How do elementary principals facilitate 'best practice' in ICT to improve teaching, learning and management processes in their schools?

This study is the first in a series to examine the influence of the principal in determining 'best practice' in using ICT in Australian schools. It was conducted in two phases involving quantitative and qualitative research methodologies. First. baseline data on the extent of elementary and secondary principal's use of ICT and their concerns about ICT, in the Hunter area of NSW was established. Second, the nature and impact of interventions of selected elementary principals in ICT implementation were examined..

The study

Phase One: Mapping the extent of principals' use of, and concerns about ICT in schools.

To determine the extent of principals' use of, and concerns, about ICT in their schools all principals in four local area School Districts of the NSW Department of Education and Training (n=288), the Maitland Diocese of the Catholic Education System (n=61) and the Independent schools in the Newcastle area (n=20), were invited to complete a questionnaire. This questionnaire provided baseline data to determine the extent of personal use and concerns about ICT by principals in one geographic area and allowed for comparison between groups of principals on criteria such as age, gender, school context, experience and perceived levels of computer competency.

The questionnaire has a variety of components including a Competency Rating Scale to determine use of ICT. All principals rated themselves on a series of competencies such as use of word processing, databases and spreadsheet applications, knowledge of educational and management software, and use of the Internet. Competencies were determined using a 4 point Likert-type scale ranging from 'not at all competent' to 'highly competent'. Responses to a series of statements about implications of ICT on management and learning styles were also explored using a similar Likert scale. Open-ended responses were sought to add 'richness' to the data. In addition, demographic data were collected.

This questionnaire was posted to the principals with pre-paid return postage. Follow-up letters and phone calls were used to improve the response rate. Competency data were analysed through SPSS statistical processes focussing on analysis of variance using a number of independent variables such as age, sex, experience, and size and type of school in relation to subcategory data from the questionnaire.

Phase Two: Mapping implementation strategies of elementary principals leading to 'best practice' in ICT
Current implementation strategies used by primary school principals were examined as follows. Audiotaped interviews with District level Technology Advisors in government and non-government schools identified examples of 'best practice' in ICT and established a short list of elementary schools regarded as 'early adopter' and 'late adopter' in terms of ICT. The Technology Advisors rated the implementation success of each school. From this list of schools, a sample of 12 elementary schools was selected to provide 'early

adopter' and 'late adopter' schools so that examples of government/non-government, size and location of school, and initial/established use of ICT could be examined.

The principals of these schools were interviewed (on audiotape) using a semi-structured interview schedule piloted in preliminary studies (Schiller, 1997). This interview identified the extent and nature of principal interventions used to implement ICT in their schools, and focussed on; (a) initial use and current practices, (b) overcoming 'computer phobia', (c) perceived benefits/impediments, (d) changes in roles and responsibilities resulting from use, (e) policy and planning processes used, and (f) anticipated future implementation strategies.

From transcribed interview data, factors such as ICT access rate, leadership potential, ICT planning, staff development, and technical support, which are measurable indicators from the model of 'ICT Best Practice' (Michael, 1997), provided a framework for analysis and comparison between schools. This paper will report on preliminary findings from this Australian study.

Findings

Despite the length of the survey (11 pages) 217 principals (62%) responded. Many principals also included comments. This willingness to elaborate seemed to be in contrast to requests for information from principals several years ago when only a small proportion of principals commented on their role in ICT. In this study 66% of the respondents were male. Only 3.7% were below the age of 40 and 65% had been principals for more than six years. Most principals (93.5%) used computers at home and school. Most computers used by principals (88%) were PCs with 86.6% of all principals' computers connected to the school's network. Interestingly, 45.2% of principals use a laptop computer at work. Principals spend a lot of time working at a computer with 56.7% indicating more that 5 hours per week on their work computer and 60% indicating more than 3 hours per week on their home computer. Although 30% indicated slow typing speed, 60% stated that they could type 'reasonably well' while 10% stated they could type 'very rapidly'. The majority of use of both their work and home computers was in word processing, sending and receiving email and accessing the World Wide Web while construction of spreadsheets, databases and presentations (such as Powerpoint) was either 'never' or 'occasionally' used, either at home or at work. Only 20% of principals stated that they read spreadsheets 'frequently' at work with 40% indicating occasional use. 30% indicated that they had never read a spreadsheet. Many principals (35%) indicated never having used a digital camera or scanner but 58% indicated frequent use of WWW search engines.

As all principals in government schools have been provided with an email address in the last 18 months, it was not surprising to find that 51.6% receive more than 20 email messages per week and that the receipt of attached files is high with 45.6% indicating 25-50% of email messages with attached files and 20.7% indicating more than 50% of their email messages having files attached. Feedback during interviews indicated that this management of electronic information is becoming a major issue of concern to principals as they try to determine whether to save printed versions of attached files, who should take responsibility for filing them and where to locate them for appropriate and easy access.

Table 1 indicates responses to the question "how competent do you regard yourself in undertaking the following tasks?" and demonstrates wide variation of perceived competencies.

	Not competent	Basic competence	Reasonably competent	Highly competent
Use basic word processing	-	8	50	42
Use advanced word processing	13	22	36	29
Read and interpret a spreadsheet	7	34	40	19
Send email messages	2	8	47	43
Send attached files	13	21	30	36
Arrange email messages in folders	22	27	23	28
Use an URL to locate a WWW page	17	22	31	30
Create a Powerpoint presentation	41	26	20	13

Table 1: Perceived ICT competencies of principals

In response to the question "how have you learned about computers?" 86% stated that experimenting (or playing) with a computer at home was 'very useful' while 70% said that playing with a computer at work was 'very useful'. 86% of principals stated that getting help from a colleague was very useful in helping them learn about computers. In contrast magazines and books were regarded as either 'useless' or of 'low usefulness'. Assistance from Technology Advisors at the District level and participation in workshops were both viewed by 60% of respondents as being 'very useful' whereas undertaking a course in computing was only seen by 39% as 'very useful' while 43% regarded courses as low in usefulness with 18% regarding them as 'useless'.

From a list of 15 concerns raised by principals during preliminary investigations for this study, five areas of concern were ranked highly. Staff development for effective use of ICT was the highest ranked concern with 89% of principals indicating concern. Availability of technical support and maintenance assistance was of concern to 85% of principals while funding for ICT (75%), the impact of ICT on changing approaches to teaching and learning (74%) and time for the principal to acquire new skills in using computers (73%), were also of high concern. Although not of the same level of concern, issues such as rapid obsolescence of hardware and software, how to facilitate implementation of ICT in the school, deciding on appropriate hardware/software and infrastructure, using ICT for management and leadership, equity and access to ICT, and appropriateness of ICT for teaching and learning, also ranked highly with approximately 54 – 63% indicating concern. When asked to nominate areas of ICT to be addressed over the next 12 months, the most frequently listed concerns of principals were staff development, technical support and coping with the impact of ICT on teaching and learning.

When asked to indicate extent of agreement to a series of 20 statements about ICT in schools on a 5 point Likert-type scale ranging from 'definitely agree', 'tend to agree', 'neither agree or disagree', 'tend to disagree' to 'definitely disagree', four groups of statements resulted in common patterns of agreement. In the first group there was strong agreement about costs being a barrier to effective implementation of ICT, that ICT has applications in all subjects, that a comprehensive school ICT plan requires regular updating and that the principal expected teachers to create a classroom environment where ICT is an integral component. In the second group of statements there were wide variations in the principals' levels of agreement. For example, there was a wide range of views on the adequacy of maintenance and technical information to support ICT in teaching and learning, on the availability of professional development being adequate for the needs of teachers, and whether the role of ICT in teaching and learning had been clearly identified at the school. The third group of statements about which there was strong agreement focussed on the principal. Principals strongly agreed that data re finance, student and staff records, timetabling etc must be available on their desk computers, that reading and responding to email as well as using ICT generally has increased the principal's workload but that personal use of ICT has helped them become more effective as principals. The fourth group of statements did not reflect any consistent levels of agreement in that a wide range of responses was indicated. The statements about the principal for which there was no agreement included 'I am sufficiently informed regarding incorporating ICT into the curriculum and into my role as principals', 'the role of ICT in administration has been clearly identified in this school', 'I have resources to effectively integrate ICT into my work as principal', 'I dread having to deal with ICT related problems' and 'using ICT saves me time'.

Interestingly, when asked to indicate the current stage of development in teaching and learning at their school on a five stage model starting at 'entry', and moving through to 'adoption', 'adaptation' (where ICT is integrated into traditional classroom practice), 'appropriation' (which focuses on cooperative, project based work using ICT as a tool where necessary) and 'invention', most principals classified their school at the 'adoption' stage (33.6%) or the 'adaptation' stage (49.3%). On the other hand they classified their schools' administrative use of ICT as at the 'adaptation' stage (44.2%) or the 'appropriation' stage (30%), with 7.4% indicating their school that their school was at the 'invention' stage of development in administrative uses of ICT with spread sheets and databases being used to simulate growth projections or digital images being used in projects which combine multiple technologies. The interview data also indicated that the 'early adopter' principals tended to explore a wider range of administrative uses of ICT including newsletter production, analysis of student and staff data, planning analysis, student outcome analysis and preparation of student reports.

Conclusion

Although these data were gathered from only a small geographic area of Australia and nothing can be determined about the 38% who did not respond to the survey, this study gives useful material for professional associations of principals to reflect on and for District personnel to consider. The data clearly demonstrate a major concern of principals about staff development of their teachers and of themselves in issues relating to greater use of ICT in their schools. In addition to the quantitative data demonstrating this concern, initial analysis of the qualitative data from interviews with 12 elementary principals in the second phase of this study clearly indicates a major concern that principals have in facilitating greater use of ICT at all levels in their schools. In interview, principals highlighted staff development issues. While stating that all teachers in their schools used ICT, they expressed concern about the wide variations in classroom use. They also commented on their own need for greater input and that more time and effort was needed to assist teachers integrate ICT into their classroom practices. They recognised that the support, recognition and expectations that they conveyed to their staff were critical in facilitating change. Preliminary analysis of data suggests that 'Initiator' principals, that is, those principals who intervene in ways that demonstrate their concern for people while focussing on organisational efficiency and exhibiting a strategic sense (Hall & Hord, 2001) are more likely to facilitate greater implementation success with ICT in their schools.

This study has demonstrated that principals in Australian schools now recognise the critical role that they play in facilitating the implementation of ICT in their schools to improve teaching, learning and administrative processes. However, the study has also demonstrated that there are enormous variations in their use of ICT, in their perceptions of their own competencies in ICT and in the challenges they see in facilitating greater use of ICT in their schools. There is no single factor to indicate which principal is likely to be more successful in implementation of ICT than another. But specific strategies for improving principals' understanding of their role in ICT are evident. Encouragement to explore ways of using ICT, for example, devising more appropriate file and data management strategies for principals, creating support networks among groups of principals and highlighting the critical nature of the principals' role in implementation of ICT in schools will all assist. Further analysis of data collected for this study will include analysis of variance between groups based on independent variables such as age, gender, experience, size and location of school. However, this study demonstrates that more research is needed to more clearly determine the extent and nature of the critical role of the principal in effective implementation and integration of ICT in schools.

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The School Administrator in the Technology Rich School: What New Roles and Skills Are Needed?

John Thompson, Ph.D.
Assistant Professor
Computer Information Systems
225 Chase Hall
Buffalo State College
1300 Elmwood Avenue
Buffalo, NY 14222
716.878.3531
thompsjt@bscmail.buffalostate.edu

Executive Summary

As technology is infused into schools, challenges are created for school leadership. Such challenges include understanding the total cost of ownership (TCO), ergonomics, Internet filtering, data warehousing, online learning, authorized use policies, and technology competencies for school administrators, to cite only a few. Administrators need to be aware of such challenges to ensure a proactive, not reactive, response. However, many school administrators have little, if any, knowledge about such issues and associated questions as:

- Digital divide. How can administrators reduce the digital divide within a school? Within a school district? Is there a single "right" way?
- TCO. What is the true cost of having technology? Does it impact on continuing to have Macs *and* PCs?
- Ergonomics. What is it and how does it impact on technology use in classrooms and offices? How is it connected to TCO?
- Internet filtering. What are the pros and cons of installing filters on your Internet access? What are the requirements of the CIPA legislation?
- Data warehousing. How can student assessment data be turned into information for decision-making and improving instruction? Why is the data already available not being used?
- Online learning. Is online learning (distance education) a coming force in K-12 schools? Is it already here? How can online learning be used for staff development and student learning?
- Technology planning. Who is involved in the planning process, and why? What is the purpose of such planning? Does it really make a difference?
- Technology integration. How can school leaders make certain that technology purchases will result in technology integration in the classrooms? What has to be done so that teachers, and other administrators, will actually use, and use effectively, computer technology in their daily routines?
- Technology competencies. What technology competencies should school administrators possess? How can school leaders acquire such skills?

Too many school administrators are unaware of these and other issues and attendant questions concerning technology in schools until the issues become problems. Once at the problem level, employee efficiency and morale, community support, and the school's educational mission can be adversely affected. Future expansion of computer use can be thrown into doubt. The first step in preventing the occurrence of

problems associated with technology infusion in schools is to gain awareness of the issues involving technology and then to learn simple methods to deal with such issues.

The main objectives/goals of paper include:

1. Identifying many of the issues that arise from the introduction and use of technology in schools.
2. Learning measures that can be taken by school administrators to deal with issues presented by computer technology in schools.

The overriding challenge for school leaders is making certain that all the new technology actually makes a positive difference on student performance. This difference can be realized either directly at the student desk or indirectly through increased efficiencies so that cost and timesavings fall through to the educational bottom line – classroom performance.

The workshop will consist of a PowerPoint presentation with active audience participation throughout. As a former building and district administrator, the presenter has personally experienced these technology challenges...and survived to tell the tale. Learn from his observations and experiences in introducing computers into school districts. Avoid letting technology challenges becoming issues and then problems for school leaders.
My qualifications and experience include being an Assistant Professor in Computer Information Systems at Buffalo State College where I teach graduate courses in educational technology. My computer experience dates from the early 1980s and includes leading efforts to overhaul technology in several school districts as a building principal, curriculum coordinator, and school superintendent. I have 20+ years of computer experience in K-12 and higher education, beginning with a Timex Sinclair computer and an early Apple computer. I also have chaired a technology committee of 20 school superintendents, taught a graduate course ("Computer Applications for School Administrators") at the University at Buffalo, and currently teach an online (Internet-based using Blackboard.com) course ("Computers for Educators") for the University of San Diego.

While a school superintendent, I was responsible for receiving a successful grant for a Goals 2000 award ($103,000) to upgrade teachers' instructional technology skills, develop a professional teacher training network, and educate teachers and administrators in New York State's Learning Standards. We also obtained a New York State Learning Technology award ($50,000) to integrate desktop videoconferencing in the classroom to restructure the teaching/learning process. Also, I directed a computer training facility for corporate clients at the University of Buffalo's School of Management, which trained 9,000 people in six locations over three counties in all aspects of personal computer use.

I have presented computer-related workshops at state and national conferences. In addition to my background with computers, I have enjoyed a wide-ranging career in many other aspects of education and training. My K-12 career included being a school superintendent, principal, curriculum coordinator, and special education, elementary, and secondary classroom teacher in urban, suburban, and rural school districts. My government experience included being the director of training for Georgia and Illinois State governments (70,000 employees each), leading the implementation of a total quality management (TQM) initiative in a 1,100-employee state agency, and facilitating strategic plans for another state agency and a municipality. I also operate my own consulting and training business.

My professional memberships include educational organizations such as the International Society for Technology in Education (ISTE), New York State Association for Computers and Technologies in Education (NYSC&TE), Association for Educational Communications and Technology (AECT), Computer-Using Educators (CUE), and American Association of School Administrators (AASA). I also served on the New York State Board of Regents Task Force on Technology and Infrastructure.

Project Management: From the Perspective of a Graduate Student

Ling Wang
Department of Curriculum and Instruction
Purdue University
United States
Wang23@purdue.edu

Abstract: This article is about the project managing experience of the author with the VisionQuest© Project in the Educational Technology program at Purdue University where the author is pursuing her doctoral degree. The article contains three sections: (1) a brief description of the VisionQuest© Project, (2) project management methodologies adopted by the author in the position of project manager, and (3) from the perspective of being a graduate student, the benefits and challenges of this experience for the author, as project manager.

Project Background

Technology integration is not achieved by merely providing teachers with access to technology. Research (Marcinkiewicz, 1996; Albion, 1999) has shown that availability and access are not the sole determinants of technology integration. The use of technology may be associated more with teachers' beliefs about teaching and the value teachers assign to particular uses of technology. The purpose of the VisionQuest© Project is to help current and future educators envision and achieve technology integration by providing access to electronic models of technology-using teachers. As an extension of the VisionQuest© CD-ROM and as the second step of the VisionQuest© Project, a Web-based course was developed to engage in-service teachers in conversations about technology use. In this course, teachers are brought together as an electronic community to mentor and mutually encourage each other by talking about their pedagogical visions, aspects of classroom organization, and assessment practices.

When the author assumed management of this project, the project team was in the middle of designing the on-line course format for VisionQuest©. Some course lessons needed to be designed from scratch while other lessons needed to be revised. The tasks included the following:

Task Orientation	Potential tasks for the current stage of the project; likelihood that the tasks will be completed by the end of the current semester; tasks from the previous stage of the project to carry over and be given extended deadlines and provide rationales.
Task Selection	Determine the final list of the tasks to be completed by the end of the current semester; set a deadline for each task; estimate hours to be spent on each task.
Human Resources Relocation	Staff the tasks and name a contact person for each task; ask the contact person for each task to distribute the deadline information and estimated hours information to members working on the same task and collect feedback from them; meet with contact persons and revise deadlines and estimated hours.
Organize Meeting Sessions	Set up meeting locations; inform project members of the time, location, and content of each meeting session; prepare agendas for each meeting session; chair the meeting sessions and see to the completion of the planned tasks on agendas.
Checking Progress	Revisit the deadlines as they approach; check the progress with contact persons; analyze problems if any; re-set the deadlines, if necessary (after consulting with the two directors); assess the completed tasks.
Reporting & Projecting	At the end of the current semester, write up a report to evaluate the progress, the teamwork, and working environment; project tasks for next semester.

Table 1. The Project Manager's Tasks

Project Management Methodologies

Effective project management is the key to the success of a project. In order to accomplish the role of project manager in a satisfactory way, effective methodologies of project management are crucial. When managing the VisionQuest© Project, the author has adopted two specific methodologies: a. Goal-Oriented Project Management (Ami, 2000), and b. Just-In-Time Project Management (McDowell, 2001). The following are the benefits of this project from the two methodologies.

- Clear and fast identification of the project's weak links, i.e., those potential for improvement.
- Focusing management efforts in a way that would best contribute to the project's overarching goals.
- Allowing system integration and improving the information flow among project units.
- The project's decision-making process was well-structured and based on complete information.
- Risks and problems were detected during early stages of development and production.
- "Control center" assimilation enabled a significant reduction in "time-to-market", i.e., marketing the VisionQuest© CD-ROM and the on-line course.

Benefits and Challenges

The involvement in the VisionQuest© Project in the role of project manager has been very beneficial to the author. First and foremost, this project gave the author a sense of what "real-world" management is like. Because it is a real project in progress, every step the team made eventually played a significant role in the project outcomes. In addition, this experience is a good component to enter the resume and will increase the opportunity to "sell" the author well when the author pursues a career search. Specifically, this experience is critical to and helpful in the development of the following skills:

- Written and oral communication skills
- Instructional design skills
- Technology skills
- Teamwork skills
- Time management skills
- Organizational skills
- Problem-solving skills
- Decision-making skills

On the other hand, the amount of work of project management is overwhelming. There was a large amount of work involved at the stages of task analysis and selection as well as coordinating with members on their individual task assignment. What made the work seem more time-consuming is the fact that the author had to figure out solutions whenever a likely problem came up. The author found herself jotting down things whenever they occurred to her and communicating with members whenever she needed to disseminate information to them or collect information from them. It was by no means a job that you can put in a certain time slot of a week and get it done for the week during that time; it was like a job "haunting" you 24 hours and 7 days a week? .

Conclusion

In managing the VisionQuest© Project, the author saw herself grow in abilities to coordinate tasks and team members and make quick responses to and decisions on problems whenever they arise. The implications of the author's experiences for other graduate students would be that, before graduation and stepping into the real world, it is very beneficial to locate an opportunity in which they can exercise some of those "required" skills in order to well prepare themselves for future career pursuit.

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SECTION EDITOR:
Helen C. Barrett, University of Alaska

> An innovation of the early 1990s, an electronic portfolio combines the use of electronic technologies to create and publish a portfolio that most likely will be read with a computer or viewed with a VCR [or DVD player]. (Barrett, 2002)

There were more than 40 sessions selected under the category of Electronic Portfolios. This exploding quantity, and the content covered, represents the current state of the art of electronic portfolio implementation in Teacher Education in 2002. An analysis of these papers, roundtables, poster sessions and tutorials, shows a variety of purposes and different tools used to construct electronic portfolios, and represent levels of program implementation that closely follows the normal stages in the adoption of innovations. It is also clear that NCATE 2000 has been a major motivator and the federal PT3 program has been a major benefactor in the implementation of electronic portfolios in US. Teacher Education.

It is important to emphasize that the electronic portfolios that most of these papers describe are, first and foremost, portfolios in the classic definition of the term, which just happen to be developed with a variety of technological tools and stored in a variety of electronic containers: "purposeful collections of work that demonstrate efforts, progress and achievement." The components of good portfolio development have been addressed in many of these papers, including purpose, collection, selection, and reflection on work demonstrating achievement of standards, and some papers focus on the role of the portfolio in ongoing professional development.

Purpose of the Portfolios

There are many purposes for portfolios, which can be for learning, formative or summative assessment, and employment. Most of these papers describe electronic assessment portfolios used primarily for demonstrating student achievement of teaching standards, with the INTASC principles most frequently mentioned. One secondary purpose often described was the demonstration of technology competency as described in ISTE's National Educational Technology Standards (NETS). One paper (Levin) provided an in-depth description of the process their students use to reflect on their work, based on the North Carolina Public Schools' model of self-assessment. The five-stage reflection cycle describes a well-grounded support system to guide students through this often difficult process.

Tools used for Development and Publishing

At this stage of electronic portfolio implementation, these papers described variations on two approaches:

1. Using common software to construct hyper-linked portfolios (i.e., WWW pages created with a variety of templates and authoring tools was most often mentioned; other software included PowerPoint and other Microsoft Office software, and Adobe Acrobat);

2. Using WWW-accessible databases to collect the evidence and provide an online structure for the portfolio.

Several papers discussed the role of digital video in a student's portfolio, and one paper (Cunningham) explored the emerging use of DVD-R to store this video. One paper discussed how and where to store the portfolio. Another raised issues of privacy and confidentiality in portfolios published on the Internet.

Types of Presentations

Most of these papers are case studies of implementation decisions and strategies in a School, College or Department of Education. A few Roundtable sessions propose to explore these strategies with interested participants. Only three of these papers reported on data collected and analyzed about electronic portfolio development, beyond the exploration of implementation issues.

Levels of Program Implementation

A majority of these papers have described implementation strategies that closely follow the Phases of Instructional Evolution in Technology-Intensive Environments outlined by Dwyer et.al. in the ACOT Research: Entry, Adoption, Adaptation, Appropriation, Invention. Many of the papers represented case studies of entry and early adoption of electronic portfolios in teacher education programs, including a description of the decisions made regarding the technology tools to be used for "electronic" component of these portfolios. A few papers document the process of adaptation and appropriation (widespread use) of the electronic portfolios. At least one program has changed the choice of technology tools based on their experience and further development (invention). There is very limited data collected and reported about the efficacy of electronic portfolio development and publishing. One paper (Barrett) reported on student responses to a preliminary survey, with an invitation for more widespread data collection across education programs nationwide.

Issues

One study (Carney) raised issues about how the tool chosen for authoring (WWW pages) afforded and constrained the portfolio author in representing and communicating teacher knowledge, revealing a tool-related personal revelation dilemma. As she states, "Teacher education programs ought to be aware of this dilemma and take measures to ameliorate preservice teachers' concerns about exposing problems of practice to potentially critical portfolio readers." Another paper reported similar issues with publishing portfolios on the Internet. In the two studies that reported on surveys of teacher education candidates, there is evidence that the skills gained in the process of developing electronic portfolios would be useful in classroom instruction. There is another issue that emerges when addressing the technology skills gained from the process of constructing these portfolios: Do students provided with a static template or a dynamic web-based database develop the same technology skills as those students who must create their own structure with common software tools?

Conclusions

Some interesting issues appear in these papers. In the history of human development, our tools have often shaped the outcomes of our tasks and, while many programs require WWW-based portfolios, Carney suggests a problem with that tool limiting the openness of the reflections, which Levin points out is the most important purpose of this process.

While visiting Alverno College, I heard about Dr. Mary Diez' three metaphors for thinking about portfolios: mirror, map, and sonnet. Based on these metaphors, some questions come to mind. When the portfolio is highly structured (the sonnet), often as in an online data base to meet the organization's need for uniformity in assessment data, does it lose the creativity of expression that has been a hallmark of paper portfolios for years? Where is the sense of ownership of the portfolio creator in constructing their own paths through their work (creating their own map)? What are the trade-offs between scaffolding the development process with templates or highly structured data bases, and students gaining the knowledge that can result from the process of constructing their own hyper-linked portfolios (seeing their work in new ways— the mirror) while linking and reflecting on their work? Also, at the risk of editorializing, should these online assessment management systems really be called electronic portfolios?

There is a need for more data collection and longitudinal research on the perceptions of teacher candidates and faculty on the value and purpose of electronic portfolios, and whether the benefits extend to the classroom and enhance student learning. The question of efficacy of effort must also be addressed: only one study included here compares paper-based and digital portfolios. The time is right to move beyond implementation issues to research and evaluation.

What is the Perceived Value of Creating Electronic Portfolios to Teacher Credential Candidates?

Valerie Amber
School of Education
National University
United States
vamber@nu.edu

Brenda Czech
School of Education
National University
United States
bczech@nu.edu

Abstract: This session presents research findings from a study designed to determine the following: a) the ways in which, and b) to what extent preservice teachers value the experience of creating an electronic portfolio. With the new focus on technology's standards for teachers, this research is an initial attempt to determine what motivational factors encourage students to create an electronic portfolio for a teacher education credential. The process of developing electronic teaching portfolios can document evidence of teacher competence and guide long-term professional development (Barrett, 2001). Its ability to provide teacher candidates with an opportunity to become reflective practitioners is evidenced to be one of its greatest advantages (Barrett, 2001). The research findings from this study will contribute to the knowledge base in regards to creating electronic portfolios, which will be useful for the planning and implementation of teacher training programs.

Introduction

During the past decade, the curriculum for preservice teachers has had to respond to the changing demographics in our student populations. As a result instructional methods for cross-cultural language and academic development was emphasized. Now, as we begin this new century, our curriculum needs have converged on yet another focus: technology integration into classroom learning. National and state standards regarding accountability in technology, cross-cultural language, and academic development have become a catalyst for preparing our teachers and America's youth for the new millennium.

Electronic portfolios have gained an accepted position to improve the interrelationship among technology, multicultural education and instructional theory and practice. It is evidenced in the products of learning that the process of creating a portfolio enhances the ability of each student teacher to articulate these ideas. In keeping with our commitment to model fair and equitable learning environments for all students, the faculty felt a need to include the preservice or newly in-service teachers into the planning and implementation of the electronic portfolio requirements.

Purpose of the Study

This session presents research findings from a study designed to determine the following: a) the ways in which, and b) to what extent preservice teachers value the experience of creating an electronic portfolio. With the new focus on technology's standards for teachers, this research is an initial attempt to determine what motivational factors encourage students to create an electronic portfolio for a teacher education credential.

The process of developing electronic teaching portfolios can document evidence of teacher competence and guide long-term professional development (Barrett, 2001). Its ability to provide teacher candidates with an opportunity to become reflective practitioners is evidenced to be one of its greatest advantages (Barrett, 2001). The research findings from this study will contribute to the knowledge base related to electronic portfolios, which will be useful for the planning and implementation of teacher training programs.

Theoretical Background

Research (Milman, 1999) has found that the student teachers' experience of creating electronic portfolios allows them to develop technology skills as well as reflect upon their coursework and collaborate with peers. The development of an electronic portfolio, if begun early in the teacher candidate's program, will allow for the growth of technology skills throughout their coursework. Findings indicate that by infusing technology throughout the program it is more likely that the candidate will use technology in their K-12 classroom when they begin to teach (Lawless et al., 2000). By creating electronic portfolios student teachers will be given opportunities to demonstrate their strengths in teaching skills, their understanding of instructional theory and application of instructional methods and their ability to use a variety of computer generated media. Graphics, sounds and animation can be included in their portfolio that can allow future employers to view the person in a richer context and aid them in gaining a better understanding of the student teacher's ability to apply theory into practice. Since the electronic portfolio allows them to express themselves in ways previously not possible, the electronic portfolio becomes a valuable tool to help them secure a teaching position in a district of their choice. This medium allows the student to learn more because it will encourage collaboration with peers and develop reflective practices. Its ability to provide teacher candidates with an opportunity to become "reflective practitioners" is evidenced to be one of its greatest advantages (Barrett, 2001). The inclusion of scanned pictures, teaching videos, reflection pieces and other artifacts allows the student teachers to evidence mastery of the NCATE technology standards as well as state teaching performance standards (Swain & Ring, 2000).

Methods

Teacher credential candidates enrolled in technology courses were given an opportunity to view several electronic portfolios. After the completion of this exercise they were administered a questionnaire.

In order to address the above issues a pilot survey was administered to teacher credential candidates (N=23, Age X=29) enrolled in a computer course to answer the following quantitative questions:

1) To what extent do teachers value the creation of electronic portfolios as a means to improve their technology skills?
2) To what extent do teachers value the creation of electronic portfolios as a professional development tool to enhance their ability to transfer instructional theory to solid, effective teaching practices?
3) To what extent do teachers report that an electronic portfolio would increase their employment opportunities?

To gain a better understanding of these teacher candidates' expressed attitudes the survey was followed up with a personal interview to answer the following qualitative questions:

4) In what ways do teachers value the creation of electronic portfolios as a means to improve their technology skills?
5) In what ways do teachers value the creation of electronic portfolios as a professional development tool to enhance their ability to transfer instructional theory to solid, effective teaching practices?
6) In what ways do teachers report that an electronic portfolio would increase their employment opportunities?

A questionnaire was administered to teacher candidates enrolled in a teacher credential program. This instrument checked for attitudinal measures by asking them to rank order seven outcome statements concerning their perceived value of the experience of creating an electronic portfolios. These outcomes were then evaluated statistically and clustered into the following three variables:

1) value for importance of improving technology skills,

2) value for importance of improving teaching abilities, and

3) value for importance of securing employment.

One male and female was selected from each of the above three groups to participate in an interview. The number of times each individual stated they valued the electronic portfolio for improvement in one of the following areas was recorded each of the following: 1) technology skills 2) teaching abilities 3) job marketability.

Data Sources and Analysis

This quantitative/qualitative study employed a dual-based research approach. A survey was used to examine beginning teachers' perceptions of the value of the experience of creating an electronic portfolio. The survey questions were analyzed statistically in SPSS 10.0 using descriptive statistics. The data from the qualitative interviews were transcribed and coded into a Perceived Value Matrix.

Findings and Discussion

The statistically analysis revealed that preservice or newly inservice teachers were more likely to value the process of creating an electronic portfolio for their ability to *improve teaching* practices (X = 3.84) and specifically that it would provide an opportunity for them to participate in *reflective teaching practices* (X = 4.11). Furthermore, they indicated that they believed they would be *more likely to be hired* (X= 4.21) by a potential employer if they demonstrated advanced technology skills through the use of an electronic portfolio. The statistical analysis also implied that these teacher candidates believed that they would gain skills that would be *useful in classroom instruction* (X= 3.63).

This analysis indicates that teacher candidates perceive two of the most valuable outcomes of participating in the process of creating an electronic portfolio is: 1) that an electronic portfolio would provide them with feedback that would allow them reflect upon their teaching and "become a better educator," and 2) that they would be more likely to be hired since they would be demonstrating proficiency in technology that is assumed to be sought by potential employers.

At press time both the quantitative and qualitative data is continuing to be tabulated and analyzed. More detailed results will be available Spring 2002. Interested parties should contact the authors for further information: vamber@nu.edu or bczech@nu.edu.

Significance

An important outcome of this research is that it will enhance methods and techniques for the integration of technology in classroom learning, both at the teacher training level and in the K-12 classroom. Additionally, these findings will aid in the strategic planning and implementation for both the faculty and preservice teachers participating in teaching training programs.

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Development and Use of Electronic Portfolios in Preservice Education

Shirley P. Andrews
Department of Middle Grades and Secondary Education
Valdosta State University
United States
spandrew@valdosta.edu

Adele Ducharme
Department of Middle Grades and Secondary Education
Valdosta State University
United States
ducharme@valdosta.edu

Carolyn Cox
Department of Adult and Career Education
Valdosta State University
United States
ccox@valdosta.edu

Abstract: This paper is a report on the development process and use of electronic portfolios in the teacher education program at Valdosta State University. Students entering the program begin the process of developing electronic portfolios in an introduction to education course. As they progress through their teacher preparation programs, students add narratives and artifacts to their portfolios to demonstrate and document their knowledge, skills, and dispositions within the undergraduate framework. The development of these portfolios is considered a continually evolving process. As preservice teachers move from the preservice teacher level to the student teaching level and on to the inservice teacher level, the goal is for these teachers to continue to demonstrate progress throughout their professional careers, through these or other portfolios.

Use of Portfolios

A professional portfolio is a collection of artifacts, evidence, and reflections documenting what one knows and is able to do in a professional field. The use of professional portfolios has become increasingly popular in the field of education, becoming a method for creating avenues for reflection and documentation of personal and professional growth and development for both preservice and inservice teachers. Teacher education programs are now considering portfolio development as a valuable process for documenting teaching performance (Costantino & De Lorenzo, 2002). According to Campbell, Cignetti, Melenyzer, Nettles, and Wyman (1997), portfolios are organized, goal-driven, and may be used to document professional growth and teaching competencies. The development of portfolios helps preservice teachers set goals for learning and review goals periodically throughout their teacher preparation programs.

Portfolios may also serve as an instrument for gaining a better understanding of preservice teachers' abilities by examining artifacts (tangible evidence of knowledge gained and skills mastered) they have chosen to use to document what they know and are able to do. Through portfolio documentation, different dimensions of a preservice teacher's preparation program may be elaborated to provide indicators of progress that can be measured. National, state or district standards may be used as a guide for deciding on the areas of assessment. As students near the completion of their teacher preparation programs, the portfolio becomes a tool for them to market themselves to potential employers. After graduation, the portfolio helps novice and veteran teachers continue in their professional growth as educators (Campbell et al., 1997). Lyons (1999) purported the process of developing portfolios helps beginning teachers articulate their teaching philosophy and develop their teaching techniques. Van Wagenen and Hibbard (1998) determined that inservice teachers, through the portfolio construction process, developed many effective strategies for studying student work and discovered important connections between teaching and learning. Similarly, Danielson (1996) stated teachers could use portfolios as a method for self-reflection and analysis, as a process to support mentoring and coaching relationships, and to strengthen a resume.

Electronic Portfolios

Similar to a paper-based professional portfolio model, an electronic portfolio is a carefully selected collection of exemplary artifacts that allows demonstration of one's best work and accomplishments. Electronic portfolios in a teacher education program provide an efficient method for displaying preservice teachers' work that meets high standards and documents growth throughout the program (Costantino & De Lorenzo, 2002). Electronic portfolios may exhibit benchmark performance measures for preservice teachers by allowing for the evaluation of the effectiveness of teaching strategies. Preservice teachers may also use artifacts that are similar in nature to show their progress towards meeting the standards of their programs. Electronic portfolios have several other advantages. Unlike using paper-based portfolios, the use of electronic portfolios is a multimedia approach that allows preservice teachers to present teaching, learning, and reflective artifacts in a variety of formats, such as graphics, audio and video, and text (Costantino & De Lorenzo, 2002). Artifacts may be easily inserted as a file, scanned, or uploaded to the portfolio. Also, electronic portfolios are easily accessible, can store multiple media, and are easy to update.

Using electronic portfolios also allows for cross-referencing of artifacts. The creation of meaningful links between all artifacts is possible, therefore documenting a preservice teacher's achieved competence in teaching at the end of his or her teacher preparation program. Ongoing documentation in the electronic portfolio contains the preservice teacher's best work and gives a portrait of his or her professional competence that can be built upon in the inservice field. According to McKinney (1998), teachers who demonstrate their competence in technology through the development of an electronic portfolio are more likely to incorporate technology into their own classrooms. Similarly, Goldsby and Fazal (2000) indicated student teachers must learn to effectively use technology in their preparation program because teachers with little or no experience with technology are less likely to incorporate its use in their classrooms.

Portfolio Development in Preservice Education

Portfolio development in the teacher education program at Valdosta State University (VSU) began as a pilot program in fall 1997. Using a paper-based model, students enrolled in the introduction to education course (the first education course for students) developed a notebook portfolio using a framework based on standards established by the Interstate New Teacher Assessment and Support Consortium (INTASC). The INTASC standards were chosen because they serve as the basis for VSU's College of Education's Conceptual Framework. The standards are generally applicable for teachers of all disciplines and all levels and are aligned with National Board for Professional Teaching Standards (NBPTS). To infuse additional technologies into the teacher education program the paper-based model was changed to an electronic format in fall 1999. Continuing to use the INTASC standards as a framework, a template was developed in Microsoft's FrontPage 2000. Currently, students enrolled in the introduction to education course use the template to begin the development of their electronic portfolios. The process begins in labs conducted during class meeting times. To gain access to the portfolio template students are provided a login name and a password. During labs faculty members who teach the introduction to education course provide basic instruction in FrontPage 2000. Portfolios at this level of development are identified as working portfolios in which faculty members require assignments that will be used as artifacts. Required assignments include a current resume and reflective writing activities, such as a philosophy of education and education dispositions. Students are encouraged to perceive their portfolio, not as a file of course projects and assignments, but a professional portfolio organized to document their professional growth and achieved competences in teaching. For viewing and grading purposes faculty members have access to their students' portfolios which are posted on VSU's College of Education website. Faculty members do not have access to students' passwords and may only view the portfolio, not open a student's web page folder. Portfolios are graded using a standard rubric.

As students continue to progress through their teacher preparation program they begin to include narratives and artifacts that may be assigned by faculty members who teach courses in their particular program or artifacts may be self-selected. Students are required to select artifacts that demonstrate evidence of an achieved goal or the attainment of particular knowledge and skills. Then, as students complete coursework and program requirements, they begin to revise and expand their portfolios as they identify and select artifacts from coursework and field experiences that document their knowledge, skills, and dispositions in relation to a particular standard and what they will know and be able to do upon completion of their program. Students are informed that artifacts will be self-selected for final development during the student teaching experience, reflecting students' individuality and autonomy as well as providing tangible evidence of the wide range of knowledge, dispositions, and skills they have developed and achieved as a growing professional. At this level the working portfolio becomes a professional portfolio containing a student's best work, providing a portrait of the student's professional competence, and can be used for assessment purposes. Portfolios at the student teaching level are graded using a standard rubric.

Students are encouraged to revise and expand their portfolio and use it as a teaching portfolio as they become professional educators. Reasons for this encouragement include the following: (a) many school systems who hire VSU's graduates are now requiring teachers to develop and maintain teaching portfolios; (b) students who are enrolled in VSU's graduate teacher education program are required to develop an electronic portfolio or continue their portfolio development initiated in their undergraduate programs if they are a graduate of VSU; (c) a requirement for National Board Certification is portfolio development and submission; and (d) some states require beginning teachers to submit portfolios during the first year or two as part of a state mandated induction program or to obtain teacher certification, whereas, other states, including Georgia, are considering implementing induction programs requiring submission of portfolios for certification purposes.

In VSU's teacher education program the development of a portfolio is considered a continually evolving process. As preservice teachers move from the preservice teacher level to the student teaching level and on to the inservice teacher level, the goal is for these teachers to continue to demonstrate progress throughout their professional careers, through these or other portfolios. The ability to reflect upon teaching practices and seek opportunities for professional growth are lifetime teaching goals that can possibly be achieved through maintaining a professional portfolio.

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The Integration of the Portfolio-based Intel "Teach to the Future" Model to Enhance Pre-service Teacher Education Program

Dr. Maria Bhattacharjee
Dr. Irene Chen
Ms. Susan S. Paige

Department of Urban Education
University of Houston Downtown
Houston, TX 77002 USA
bhattaharjeem@uhd.edu
cheni@uhd.edu
Paiges@uhd.edu

Abstract: Around the nation, school districts and teacher education programs have received the Intel "Teach to the Future with Support from Microsoft" grants and as a result, have participated in workshops to learn how to implement the portfolio-based modules into current curriculum. The Intel "Teach to the Future with Support from Microsoft" grant from Intel Corporation has also reached the teacher education programs in other countries. In spring 2001, four professors from the Department of Urban Education at the University of Houston Downtown received this Intel grant. In fall 2001, ten more faculty members from the department attended another Intel workshop offered at UHD. This training is having a positive impact in the way we prepare pre-service teachers as well as in the delivery of instruction. We hope our experience benefits other school districts and teacher education programs that may already be or may become involved in this grant project.

Introduction

University faculty members are at different levels in implementing technology to deliver their courses and prepare the students for the technology age. This situation is of primary importance in teacher preparation programs. Faculty in these departments must be leading the way in the use and teaching of technology since they are in charge of training teachers. The Intel "Teach to the Future with Support from Microsoft" grant has allowed the Urban Education Department at the University of Houston Downtown to continue training its faculty. This paper will include a general description of the Intel training, a brief description of the modules from the Intel binder, the team work of the professors in Urban Education Department to teach the modules, a showcase of some student work and electronic portfolios as artifacts of the grant implementation, and the monitoring of the imp lementation of the technology component in teachers' classrooms.

Description of Intel Training

In spring 2001, the Department of Urban Education at the University of Houston Downtown received the Intel "Teach to the Future with Support from Microsoft" grant. Four faculty members, each representing the math education program, the language arts and social studies education program, the technology education program, and the bilingual education program, participated in an intensive workshop held in Seattle, Washington. The training focuses on the integration of technology in the teacher education curriculum. The days were very well planned. The first day was a Friday. The meeting started at 8:00 a.m. and ended at 7:30 p.m. The group covered module 1. The team had the opportunity to discuss the technology initiatives in their universities over dinner. It was an interesting discussion since the people were from a variety of universities in the USA. The second day began at 8:00 a.m. with a continental breakfast and ended at 7:30 p.m. with a required dinner. During the dinner, the discussion was about the role of students' sample works in the pre-service program. The participants went through modules 2, 3, and 4 during this day. The third day opened with a continental breakfast at 9:00 a.m. and ended at 4:00 p.m. The team covered modules 5 and 6. The last day began at 8:00 a.m. and ended at 4:00 p.m. The group covered modules 7, 8, 9, and 10. The afternoon was spent in showcasing the participants' work. Several forms were used to give feedback to each other. Some of the participants exchanged samples of their products to be shared with their students. The last 30 minutes were used for a general assembly where participants gave feedback about the training. The Intel trainers were very open to suggestions but the general opinion from the participants was that the training and the materials were excellent. It was the general consensus that it was a great addition to the curriculum for training teachers. One of the professors who attended the Seattle training from the Urban Education Department took upon herself the responsibility to organize an Intel training for the rest of the faculty in the department. This training was conducted in December 2001. Ten professors from the department participated as well as some professors from other universities in the USA. The Intel grant provides the Intel binders at no cost to the students in the programs for the term of the grant.

Brief Description of the Intel Binder

The Intel binder includes information for locating resources for electronic portfolios, creating student multimedia presentations, creating student publications, creating student web sites, developing plans for implementation, putting together electronic portfolios, and showcasing the electronic portfolios. The binder has ten modules. Each module has activities and homework. Module one is "Getting Started". It includes a general description of the Intel grant, creating a program folder, beginning the planning process for a unit, creating a multimedia presentation, and sharing a multimedia presentation with the class. The homework activities consist of exploring copyright laws related to computer and software use, locating curricular resource materials, and creating a works cited page. This last one will help to locate Internet addresses more easily and to cite the sources properly. Module two is "Locating Resources for Unit Portfolios". The activities include using directories and web search engines, locating Internet resources, and locating resources using Microsoft Encarta. The homework is evaluating resources on the Internet. Module three is "Creating Student Multimedia Presentations". The activities are creating a multimedia presentation, reflecting on the sample presentations, and revisiting the plan for the unit. The homework is creating an evaluation tool for the multimedia presentation. Module four is "Creating Student Publications". The activities are creating a publication, reflecting on the student publications, and revising the unit plan. The homework is creating evaluation tools for the publications. Module five is "Creating Unit Support Materials". This module helps with the use of Microsoft Word, Publisher, and Internet Explorer. Activities are creating unit support materials and revising unit plans. The homework is planning student web sites. Module six is "Creating Student Web Sites". The activities are the creation of web sites using publisher, reflecting on the web sites, and revising unit plans. The homework is the creation of web sites tools. Module seven is "Creating Teacher Support Materials". This module presents ideas for using email as classroom projects. The activity is creating teacher support materials. The teachers could create a multimedia presentation, a web site or a publication to introduce or support the unit. The homework is revising the unit portfolio. Module eight is "Developing Plans for Implementation". Activity one is the development of a timeline for both when and how the events are going to happen before, during, and after the implementation of the unit. Activity two is creating management documents. These documents would assist the teachers with the logistics in the management of the equipment and the classroom. The homework is modifying the unit portfolio. Module nine is "Putting Unit Portfolio Together". Activity one in this module is revising completed units, and activity two is putting unit portfolios together. This module allows for final revision of all the components in the portfolio. There is a strong emphasis that all unit components to comply with copyright law. Homework one focuses on locating additional Internet resources for educators, and homework two is the completion of the unit portfolios. Module ten is "Showcasing the Unit Portfolios". The participants have the opportunity to show their products to each other. They receive feedback and suggestions. The participants evaluate the training and make suggestions not only for the implementation of the training but also in the way the binder is organized. The binder also includes a CD-ROM. This is a valuable tool that shows concrete samples of all the components in the binder. It also provides additional Internet links, and useful

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information to assist in the planning of the portfolio units. It is important to point out that during the training there was no need to look for any other additional materials. The CD-ROM and the Internet proved to be the ideal tools for this planning.

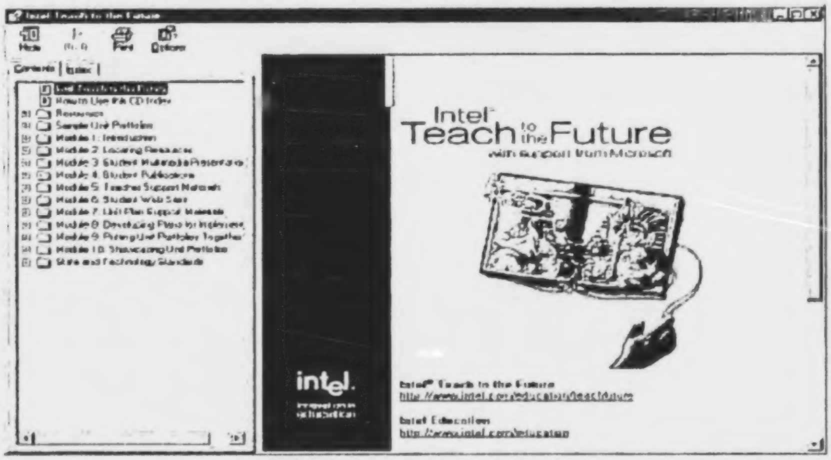

Figure 1: Intel Binder Table of Contents

Team Work to Implement the Modules

Faculty members at the Department of Urban Education, UHD see the Intel project as an initiative and source of ideas to incorporate technology into the teacher education courses. Extensive discussions among the faculty members have been done to divide the modules into several courses the students are going to take in different semesters, so that by the end of their studies they could cover all components. The nature of the Urban Education Program is very conducive to this teamwork. The programs in elementary, bilingual, and secondary run in blocks of three courses for each block The students have to complete three blocks to finish their degrees. The professors teaching the courses in a block have to do careful planning among the members of team. The students produce combined assignments. They receive the same grade in all the courses in a block. This dynamic interaction of the courses makes it possible to plan and deliver the Intel module in a more effective way. The students in the bilingual Block II for example focus on modules three, four, six, nine, and ten. These students are expected to have covered the rest of the modules in the ETC course. This is a technology class that all the students take before the blocks. The pre-service teachers as well as the PB seeking certification are also expected to have mastered several software programs such as Power Point, Excel, Publisher, and Words before entering the blocks.

The faculty teaching the blocks is constantly assessing the delivery of instruction. After the first implementation of the Intel Teach to the Future curriculum, there were some issues that needed to be addressed. For instance, the access to computer equipment was critical to the students. More than 90 % of the students enrolled in the courses did not own a computer. They depended on the university computer lab to complete their assignments. Since all the assignments had technology components, the students had to expend endless number of hours in the UHD lab and even had to miss work to complete the assignments. The department is fully aware of this situation. Therefore, as part of the Unit Plan the department is hoping to have a wireless lab dedicated exclusively to the Urban Education students. It is also exploring ways to assist the students in purchasing computers. As we move further into the technology age, the need to have a computer is becoming a necessity. However, until this problem is

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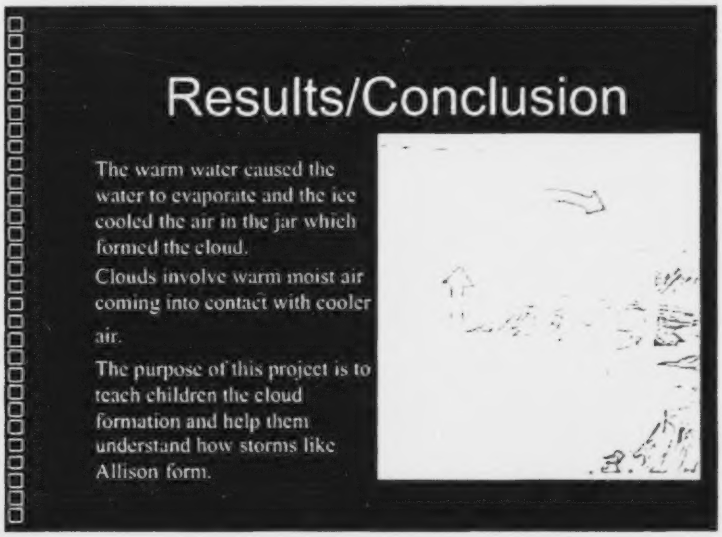
addressed, the number of assignments related to technology may be reviewed in the blocks as well as the re-distribution the Intel modules. The Urban Education Department will continue its emphasis in technology as long as the school districts want to hire teachers proficient in technology.

Students' Works and Electronic Portfolios

The students presented their electronic portfolio at the end of the summer semester 2001. This particular group of students is very unique. Some of the students were PB getting certification and were enrolled in the Master in Teaching program. They came to class for nine weeks. They were enrolled in Block II. They took Teaching Reading and Language Arts in Spanish, Curriculum in Bilingual/ESL, and Assessment. As part of the assignments for the block, this bilingual group of students focused on developing an interdisciplinary unit, a science project, an evaluation kit, and a case study. They were asked to include a multimedia presentation, a brochure or a newsletter, and a web site as part of the interdisciplinary unit for bilingual students. The students could choose a partner for the projects. They could also pick the grade level and the topic for the unit. All the objectives for the interdisciplinary unit had to be at the levels of analysis, synthesis, and evaluation. The students followed the guidelines from the Intel binder for their projects. Two weeks of class time was dedicated to work in the assignments. The students indicated that the binder was very helpful in the completion of their work. There were several products of a very high quality. The students felt that they had learned a great deal, but the work was very intensive. Some samples of their work follow.

Diana and Octavio's interdisciplinary unit was the Water Cycle. They used Microsoft Power Point to do the multimedia presentation of their science project. The presentation was about the formation of clouds.



Results/Conclusion

The warm water caused the water to evaporate and the ice cooled the air in the jar which formed the cloud.

Clouds involve warm moist air coming into contact with cooler air.

The purpose of this project is to teach children the cloud formation and help them understand how storms like Allison form.

Figure 2: Slide from Student PowerPoint Presentation

Ana and Rafael chose Earth Day for their interdisciplinary unit. Their unit was based on the following essential question: How can we as inhabitants of the planet Earth better the environment for the future? One of their activities was to produce the flier below.

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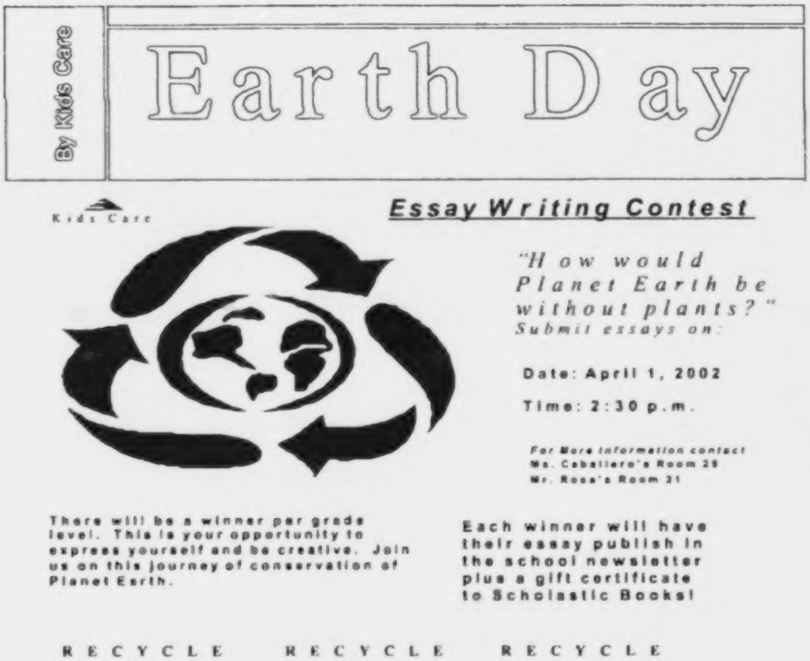

By Kids Care

Earth Day

Kids Care

Essay Writing Contest

"How would Planet Earth be without plants?"
Submit essays on:

Date: April 1, 2002

Time: 2:30 p.m.

For More information contact
Ms. Caballero's Room 29
Mr. Rosa's Room 21

There will be a winner per grade level. This is your opportunity to express yourself and be creative. Join us on this journey of conservation of Planet Earth.

Each winner will have their essay publish in the school newsletter plus a gift certificate to Scholastic Books!

RECYCLE RECYCLE RECYCLE

Figure 3: Flier from Student Presentation

Conclusion

In conclusion, we hope our experience will benefit other school districts and teacher education programs that are participants or are going to be participants in the Intel "Teach to the Future with Support from Microsoft" grant. Technology is a powerful tool for the twenty-first century. Universities and school districts will not be able to produce curriculum or students that are at the cutting edge unless they have the community and the business support. The support provided by the Intel grant allowed the University of Houston Downtown, Department of Urban Education to take one step ahead in the preparation of teachers with a strong component in technology. This support is greatly appreciated since our mission is to prepare teachers for inner-city schools. We hope other institutions will take advantage of this program sponsor by Intel. They will be hosting twenty-four training sessions around the country in 2002. The contact person is Cynthia Reed at Cynthia.d.reed@intel.com

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Creating Meaningful Learning Environment Using ICT

Madhumita Bhattacharya

mitab@nie.edu.sg
Instructional Science
National Institute of Education
Nanyang Technological University, Singapore

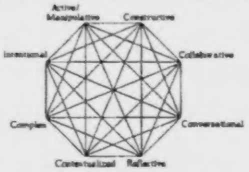
ABSTRACT

This article describes the process of creation of meaningful learning environment (MLE) following a three-dimensional process of activity-artifact-reflection cycle and recording the process of learning in the form of digital portfolios. Production of quality MLE and learning through MLE has been assured by following a method of feedback and evaluation, which consists of self-evaluation, peer-review and teacher-feedback in an integrated manner through various activities, e.g., online (synchronous and asynchronous) discussion, classroom group discussion and presentation; and feedback by the peer and the teacher. The present study is based on author's own practical experience of designing project-based activities. The activities are carried out using ICT and the students created digital portfolios during the course of their study. The learning takes place through individual learning and collaborative learning through interaction with the team members and the teacher.

What is Meaningful Learning?

In order to effectively integrate technology into a meaningful learning experience, we must have a clear understanding of what a meaningful learning experience is. Meaningful learning occurs when learners actively interpret their experience using internal, cognitive operations. Meaningful learning requires that teachers change their role from sage to guide. Since students learn from thinking about what they are doing, the teacher's role becomes one of stimulating and supporting activities that engage learners in thinking. Teachers must also be comfortable that this thinking may transcend their own insights. Meaningful learning requires knowledge to be constructed by the learner, not transmitted from the teacher to the student. (Jonassen, 1999). According to Jonassen et al. (1999), meaningful learning is:

- **Active (manipulative)**. We interact with the environment, manipulate the objects within it and observe the effects of our manipulations.
- **Constructive and reflective**. Activity is essential but insufficient for meaningful learning. We must reflect on the activity and our observations, and interpret them in order to have a meaningful learning experience.



Attributes of Meaningful Learning

- **Intentional**. Human behavior is naturally goal-directed. When students actively try to achieve a learning goal they have articulated, they think and learn more. Articulating their own learning goals and monitoring their progress are critical components for experiencing meaningful learning.
- **Authentic (complex and contextual)**. Thoughts and ideas rely on the contexts in which they occur in order to have meaning. Presenting facts that are stripped from their contextual clues divorces knowledge from reality. Learning is meaningful, better understood and more likely to transfer to new situations when it occurs by engaging with real-life, complex problems.
- **Cooperative (collaborative and conversational)**. We live, work and learn in communities, naturally seeking ideas and assistance from each other, and negotiating about problems and how to solve them. It is in this context that we learn there are numerous ways to view the world and a variety of solutions to most problems. Meaningful learning, therefore, requires conversations and group experiences.

To experience meaningful learning, students need to do much more than access or seek information. Moreover they need to now how to examine, perceive, interpret and experience information. In this course the student-teachers experienced the process of meaningful learning by progressing through various activities for creating meaningful learning environment (MLE) using ICT.

Steps in the Creation of MLE

In the introductory courses in Instructional Technology for Teacher Education Programme the trainee teachers were assigned to create MLE by considering all the attributes of meaningful learning as described above. The student-teachers worked in groups particularly in pairs.

Developing an Idea Map using Mind mapping Tools

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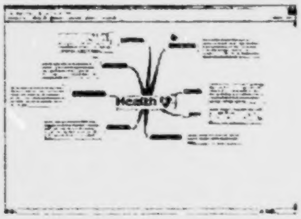
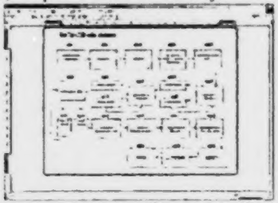
Student-teacher decided on a topic and did brainstorming on how to include various attributes of meaningful learning in the creation of a learning environment for their students. The student-teacher then represented their ideas in a visual format using the "mind mapping tools" (http://www.mindjet.com).



Another two groups of student-teacher (i.e., two pairs) then reviewed each of these Idea Maps. The feedback was provided to the creators online using the "discussion forum" "Blackboard" delivery platform (http://www.blackboard.com). Based on the feedback received through peer-review the student-teacher then made changes and modifications. Also student-teacher wrote their reflection on how they have found these set of activities useful.

Creating the Flowchart of Activities
Cognitive psychologists have known for decades that most people can only hold about four to seven discrete chunks of information in short-term memory. The goal of most organizational schemes is to keep the number of local variables the reader must keep in short-term memory to a minimum, using combination of graphic design and layout conventions along with editorial division of information into discrete units. The way people seek out and use information also suggests that smaller, discrete units of information are more functional and easier to navigate through than long, undifferentiated units.

Student-teacher then involved in sequencing the activities where they have used the flowcharting techniques. They were introduced to various types of flowcharting such as Grid, Web, Sequence and Hierarchy.



Trainees selected the structure according to their own requirements for developing a student-centered learning environment. Trainees followed four basic steps in organizing the information and activities. These are: to divide the content into logical units, establish a hierarchy of importance and generality, use the hierarchy to structure relationships among chunks, and then analyze the functional and aesthetic success of the complete system. After sequencing the activities the trainees started working towards the detail design of individual screen for display in the form of storyboard.

Designing the Storyboard
Storyboards are a visual representation of what an interface (CBT, Web, Movie, Book, etc) is supposed to look like. It is a sketch. Three key items were considered by the student-teachers when drafting the storyboards:
Navigation - What and where will it appear on each page? What technology will be used to implement it?
Identification Info - Each page needs some type of identification information such as (title, menu link, home link, etc) and
Content - What should be visible on a particular page?
Before creating the storyboard the trainees learnt the techniques and strategies of searching information on the Internet. They also learnt about evaluating the resources. They searched information relevant to the chosen topic for MLE.

Developing the Meaningful Learning Environment
Student-teachers finally used the MS Powerpoint application software for developing the MLE. Trainees concentrated on three aspects for creating MLE: Context (creating a real-life, complex and authentic scenario), Activities (designing activities for collaboration, sharing, decision-making and knowledge construction) and Tools (providing tools for searching, thinking, reflection and creativity). Student-teachers learnt and used the advanced features of the MS Powerpoint software. They also concentrated on media selection for maximizing the learning effectiveness. . Student-teachers' also made the workstation presentation of their final artifact of this project, the MLE. Peer-evaluation was conducted for feedback for making modification and changes before final submission.

Integration of ICT in Education
Trainees learnt to use different learning technologies during the process of working towards the final product of MLE. The process of completion of this project through a set of learning activities of designing and developing artifacts, taking part in online (synchronous and asynchronous) discussions, reflecting on various tasks were represented in the form of a learning portfolio on the web. The

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evaluation was done using different rubrics for different activities. A rubric for the evaluation of student-teachers' reflections on various activities was also created (Bhattacharya, 2001).

The integration and link among the different activities performed by the students in a course is very crucial for understanding the connection and integration of in this process students can visualize the learning as a whole and not as bits and pieces of task to complete (Bhattacharya and Richards, 2001). The author's purpose for introducing of eportfolio is to assist students to better understand and be able to articulate their learning as they developed their personal professional knowledge and skills about IT in education. The electronic portfolios show a more complete picture of student progress and achievement than traditional approaches to assessment. Students can demonstrate a variety of competencies, take greater responsibility, and became skilled at self-evaluation by developing electronic portfolios.

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Electronic Portfolios in Pre-service Education– Distinguishing Between Process and Product

Dr Christine Anne Brown
Faculty of Education
University of Wollongong
Australia
christine_brown@uow.edu.au

Abstract: This paper explores the use of electronic portfolios in the Faculty of Education, University of Wollongong, from 1997-2001, through the lens of ICT integration. Three subject cases are described noting the purpose of the portfolio, the degree of infrastructure support, the lessons learned and the issues that are informing our future program-level decisions. Electronic portfolios are not a uniform entity or a magic solution. Hartnell-Young and Morriss (1999) describe three types – formative (developmental), summative (assessment) and marketing. These translate simply into either a process emphasis (long term, foundational and iterative) or a product emphasis (short term, polished and highly audience specific). Students developing electronic portfolios require sound information management skills to support a sustained process, and clear understanding of target audience and assessment criteria for individual products. Without faculty level support via infrastructure and course level planning the true benefits of a process/product balance will not be realized.

Introduction

Lifelong learning, reflective practice, professional development and integration of ICT (information and communication technology) can all be addressed in pre-service teacher education through the use of electronic portfolios. Students have to demonstrate their technical, creative, organizational and reflective abilities to varying degrees, enabling them to explore multiple forms of expression and develop information literacy skills to equip them for greater use of electronic information sources. Lecturers gain the experience of handling bulk electronic material, dealing with issues such as collection, collation and distribution for marking, debating on-screen versus print format for reading, and determining various mechanisms for effective student feedback (Brown 1998). But electronic portfolios are not a uniform entity or a magic solution. They can be used inappropriately, or used to the exclusion of simple and practical alternatives. This paper explores the evolution of their use in the Faculty of Education, University of Wollongong, Australia over the period 1997-2001, through the lens of ICT integration.

Doctoral studies (Brown 1997) identified new activities for the teacher and learner in a constructivist classroom environment. The teacher is a process facilitator, a designer of tasks or cognitive tools, a resource organizer and a source of metacognitive support (strategy sharing, modeling and apprenticing learners as problem solvers). The learner is a producer of resources who needs to learn to organize those resources, share strategies, and work collaboratively and cooperatively with fellow learners. Collectively, the reciprocal actions of teacher and student are at various times active, reflective, individual, collaborative, cooperative, creative, expressive and most important of all – flexible. The background was there for the emergence of electronic portfolios.

Three subject cases are discussed (Tab.1) to illustrate a shift from subject to program-level thinking that now influences the purpose of each portfolio activity. Hartnell-Young & Morriss (1999) describe three types of electronic portfolio – formative (developmental), summative (assessment) and marketing. These translate simply into either a process emphasis (long term, foundational and iterative) or a product emphasis (short term, polished and highly audience specific). Each subject case is explored in relation to the purpose of the portfolio, the degree of support and infrastructure required, the lessons learned, and the issues that are informing our future program-level decisions.

Class Examples	1999	2000	2001
Example A. Undergraduate Multimedia Electives (Primary Program 3-4 yrs)	Formative portfolio – reflective, skill development with different ICT multimedia tools *Other tasks*: web site, HyperStudio activity and essay.	Summative portfolio – assessment of skills; teaching strategies to support group project *Other tasks*: group project and resource database or concept map/essay.	Marketing portfolio– geared to employer for interview; drawing on past subjects. *Other tasks*: client profile, design statement and group project for client.
Example B. Compulsory ICT Subject in first year (Primary Program 3-4 yrs)	No portfolio *Tasks*: Exam, assignments, skill tests)	Formative – skill development aligned to roles (learner, manager, designer, researcher) (14 options) *Other tasks:* online discussion for exam preparation and skill tests.	Formative – skill development aligned to roles - options based on 2000 cohort choices. (8 options) *Other tasks:* pedagogical application of skills, software demonstration and online discussion analysis.
Example C. Compulsory ICT component of Pedagogy (GDE Program 1 yr)	No portfolio *Tasks:* Exam, skill tests, assignment)	No portfolio *Tasks:* Exam, skill tests, assignment)	Summative – Report, Formative - teaching resources, activities and student work *Other tasks:* pedagogical application of skills and online discussion analysis.

Table 1: Focus of electronic portfolios and nature of accompanying assessment tasks in three class examples for 1999, 2000 and 20001.

Example A: Undergraduate multimedia elective

The undergraduate multimedia electives provided the test-bed for electronic portfolios within the faculty and it was the success of the first student electronic reflective "portfolio" in 1999 that drove a desire to adapt it for subsequent groups in different programs. From 1997 two multimedia electives were available for students in the fourth year of the primary (elementary) program – students who had barely touched a computer since a compulsory introductory ICT subject in first year. Electives were run as weekly three-hour workshops that aimed to help students develop technological fluency and problem-solving skills as they used a range of cognitive tools and experienced multimedia construction to support learning. Through 1997-1998 the lecturer was responsible for collating and archiving all assignment work so students could obtain a CD-ROM of the class collection of resources for teaching. By 1999, influenced by cognitive flexibility theory (Spiro, Feltovich, Jacobsen & Coulson 1991) that suggests you "criss-cross the landscape" to gain understanding of complex or ill-structured knowledge domains (in this case multimedia construction), activities were designed to "flip" students from one multimedia construction tool and task to another. They were then asked to: "Create a portfolio to demonstrate what you have learned in this subject, and illustrate your skills in information technology. You should link to your web site, describe your HyperStudio project, list strategies for classroom use of the web site and HyperStudio stack, and also present a collection of web sites you have identified as useful resource collections or sites for student use." Many were shocked by how quickly they forgot the mechanics of web site construction, as they proudly finalized their HyperStudio projects. Tools impacted on the way they processed information, but tools were evolving, so students had to move beyond reliance on a particular product to a deeper awareness of general principles of multimedia construction.

The purpose of this portfolio was to prompt students to reflect on what they had learned, demonstrate their skill development, relate their projects to classroom application and archive their work for the subject. Course structures evolve, and by 2000, these two electives were replaced by a flow of four more specialized electives that either emphasized one style of construction tool (such as web authoring or card-based multimedia presentation) or an aspect of production such as resource management or working with a "real" client. The portfolio task was retained as the final activity in each subject, and its purpose was re-oriented towards assessment, with a heavy emphasis on more specific and in-depth skill demonstration to do with a range of resource production tools. In 2001, within the final elective of the sequence, students were targeting future employers as the audience for their electronic portfolio. A number were accessed within job interviews with positive outcomes.

The infrastructure for these workshop mode classes has been rich, with plentiful access to hardware and software that has enabled students to engage in sustained media construction in a collaborative fashion. Careful group selection, peer tutoring and access to technical support can maximize the learning gains from group diversity and use of technology.

The key lessons learned from the evolution of electronic portfolios in these multimedia electives are their highly motivating nature when you allow some flexibility (such as choice of tool for construction), balanced by a need to clearly articulate the purpose, the target audience and the scope. The first element calls for early negotiation of assessment criteria; the second and third elements can be supported by access to past examples of a broad range of student work. Repetition of an activity within a flow of subjects diminishes student concern regarding the nature of the activity and allows them to focus more on the quality and depth of content.

Issues that inform future directions include the need to maintain these summative electronic "products" in an ongoing archive for subsequent deconstruction, adaptation or inclusion in the final marketing portfolio.

Example B: Compulsory first year IT subject in a 3-4 year program

The core compulsory ICT subject within the three-year primary degree has been designed to embed ICT functionally within the life of a teacher, based around four teacher roles – learner, manager, designer and researcher (Brown 2002). Since 2000, this framework has been made explicit as a required electronic folder structure that is to house a collection of tasks the students choose from a set of options. Fourteen options were offered in 2000, and the number was reduced to eight in 2001, based on the popular choices from the previous year.

The purpose of this portfolio is formative, even though it represents a collection of discrete "products". Students are required to create a collection of folders as one potential structure for an ongoing archive of the electronic documents they generate from university and classroom activities. The aim is to equip students with the skills to organize and manage a collection of files. The hope is that they will maintain the habit throughout their course. Earlier activities in the subject ensure students develop some familiarity with database, web site and card-based multimedia construction tools. They get the opportunity to extend these skills through a range of the portfolio activities that are richer tasks. It is always delightful to see the ease with which students hop from one application to another after they have re-visited tools and processes a number of times in self-determined, peer or tutorial-driven sequences.

The infrastructure required for weekly one-hour tutorials is laboratory access with adequate hardware and core software tools. Presentation facilities are vital for *student* presentations, and tutorials allow tutors and fourth year demonstrators to model a vast array of teaching strategies in a laboratory environment. A substantial team of lecturers, tutors and demonstrators are available for student support. Flexible attendance (ability to attend *extra* tutorials) caters for students who need additional help and reduces the stress associated with assignment submission that is constrained largely to tutorial time.

The key lessons learned from this experience are associated with portfolio assignment submission. Many students have little faith in electronic submission and wish to give you wads of paper "just in case". The "teachable moment" lies at the point of submission, and if your attitude is supportive and you help students correct obvious problems or take the time to demonstrate that their files are functional, this can be the most productive moment for the student in the subject. One person needs to coordinate assignment collection and this means a very heavy week for that person. The paper trail that accompanies submission requires students to self-assess their work and allows them to comment on any extenuating circumstances related to equity. It remains vital evidence of receipt of electronic material.

Issues that inform future directions include the need to apprentice other staff to the key coordination role that is crucial as a model for students and faculty, faculty wide awareness of student capabilities so newly acquired skills can be re-visited and refined through options offered in other subjects, adequate technical infrastructure so students can maintain their momentum in a self-regulated way, and faculty level consideration of a the value of a product oriented portfolio at the end of the course that builds on the process this subject initiates.

Example C: Lecture and tutorial series in an annual subject and degree

The Graduate Diploma of Education is a one-year course currently composed of both annual and semester-long subjects. ICT integration is formally addressed in a six-week slice of the annual subject "Pedagogy" early in the year, and informally continues throughout the year. This allows the portfolio activity to feature a seven-week school practicum mid-year. Although the four teacher roles described in Example B are discussed in the lecture series, they are adapted to suit the availability of schools, and re-organized to mirror the teaching cycle. Students first *research* their school ICT environment, *design* activities with their supervising teacher, *manage* those activities and *evaluate* what they have learned. A structured report stitches the experience together, accompanied by electronic folders containing resources, activities and student work. Submission protocol mirrors that for Example B.

The purpose of this portfolio is both formative and summative. The formative nature is anchored to the folder organization and the request for students to collect all available resources and target student work. Unless they have evidence of what the students achieved, they cannot make a meaningful self-assessment of their performance or the value of the ICT they used. The report is the summative component that is assessed as a product.

The infrastructure required for six weeks of one-hour tutorials is laboratory access with adequate hardware and core software tools. Presentation facilities are vital for *tutor and demonstrator* presentations, given the short time frame. Two lecturers and demonstrators manage the group. Flexible attendance (ability to attend *extra* tutorials) is offered to support those in need, and additional tutorials are programmed throughout the year to allow for staggered assignment submission and support.

The key lessons learned from this experience relate to the staggered nature of the "subject" and the ability to focus ICT use on a school practicum. Although students "switch off" to the tasks when the lecture series is complete, the break leads to a more realistic self-appraisal of what they initially learned. The school-driven agenda that emerges from the practicum ensures that students have many rich and unique experiences to share on their discussion forum for later review and analysis.

Issues that inform future directions include the impact of staggered student-driven access to facilities on timetabling and staffing, and the need for more meaningful links with the supervising teachers in schools.

Discussion

Electronic portfolio construction has emerged from an intensive workshop environment with localized infrastructure (Example A) and is occurring in a more student-driven environment without routine laboratory contact (Example C). There is no doubt students engaged in electronic portfolio construction in Example A have the opportunity to utilize the power of electronic composition environments. For students in Examples B & C, faculty wide support is required to capitalize on the benefits of these subject-based experiences. Jonassen (1998) attributes the failure of many projects to poor implementation because the designers or technology innovators " failed to accommodate environmental and contextual factors affecting implementation. Frequently they tried to implement their innovation without considering important physical, organizational, and cultural aspects of the environment into which the innovation was implemented." Good ideas can be foiled by lack of attention to the day to day practical details. To gain value from Examples B & C, the faculty needs to support the idea by addressing three key issues– infrastructure, staff professional development and curriculum leadership.

Infrastructure encompasses hardware and software (sufficient lab access for regular student use), technical support (relative to student needs, rather than simply hardware focused), storage space (for ongoing student storage of their work archive) and backup facilities (particularly for staff) to ensure some degree of student use equity. Staff professional development is needed for electronic assignment collection techniques if they are to understand how ICT can change classroom management. Alternately, there should be a system developed for collection of electronic material across the faculty, possibly staffed by fourth year students for whom the experience would be highly relevant to school protocol. Professional development should also embraces staff links with teachers who are supervising our students. Curriculum leadership is necessary to consider flexible timetables and team teaching where deadlines are staggered. It is also a program level curriculum decision to adopt electronic portfolios.

If the faculty were willing, then I would make a series of recommendations. Begin with a process approach that emphasizes file management associated with electronic archive production. Students need to develop their own mental model of how they wish to organize their work. Providing an initial top-level folder structure can support student management of electronic documents and help them keep track of their electronic work. Support staff professional development if the process approach is applied to an electronic collection of student work throughout the program. Individual lecturers can be involved as little or as much as they feel comfortable. Many lecturers don't think outside the scope of their subject, but student access to archival material permits them to stitch ideas together, re-visit theoretical material and annotate it with class examples, and juxtapose different theoretical models to rationalize differences. Balance the process approach with product focused portfolios that help students refine reflection and presentation skills. Complete the program with a marketing portfolio geared to employers, that pushes students back through their course material to illustrate what they have learned.

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The Intimacies of Electronic Portfolios: Confronting Preservice Teachers' Personal Revelation Dilemma

Joanne M. Carney
Education Division
Mercyhurst College
United States
jcarney@mercyhurst.edu

Abstract: This paper presents findings from a qualitative study of six preservice teacher portfolios—three web-based and three traditional paper format. Using a sociocultural frame, the researcher considered how the tool chosen for authoring afforded and constrained the writer in representing and communicating teacher knowledge. These six cases of portfolios done by secondary certification candidates in a Masters in Teaching program reveal a tool-related personal revelation dilemma. Teacher education programs ought to be aware of this dilemma and take measures to ameliorate preservice teachers' concerns about exposing problems of practice to potentially critical portfolio readers.

Introduction

Portfolios have become common practice in teacher education programs around the country (Georgi & Crowe, 1998). Colleges of education have incorporated them for a variety of reasons: to prompt reflection, to provide a record of professional development, to demonstrate achievement of program goals, to encourage professional discourse, and to give students a portable artifact for job interviews. Underlying these uses is a common assumption: that a portfolio is a good device for representing teacher knowledge. Indeed, portfolios' numerous proponents are able to cite strong theoretical support for the use of portfolios to document, assess, and develop teacher knowledge (Wolf, Whinery, & Hagerty, 1995).

Though the vast majority of teacher portfolios are currently traditional print text, preservice and inservice teachers increasingly are being encouraged to use hypermedia and web technology. Colleges of education, under pressure to incorporate additional technology into teacher preparation programs, often see electronic portfolios as a way to develop preservice teachers' computer competencies (Levin, 1995; McKinney, 1998) and solve many of the logistical problems associated with portfolio storage, ownership, and access (Georgi & Crowe, 1998).

The rapid movement toward all forms of web-based communication makes it likely that, in the future, this particular electronic medium will play an important role in the communication of teacher knowledge. However, we know very little about the implications of using the web for teacher portfolios. In using new technologies for the portfolio, the assumption seems to be that we can substitute one medium for another—keeping the benefits of traditional print formats while adding a host of new conveniences. Our past experiences with innovative technologies would suggest one technology cannot be so easily swapped for another. The introduction of a new tool into human activity often changes that activity in ways unanticipated and sometimes profound (Wertsch, 1995). All tools have particular affordances and constraints—that is, they make certain actions easy to carry out, and others difficult (Gibson, 1979). In analyzing or planning for tool-mediated action, we need to consider how such a device shapes an activity by limiting some of our potential actions with it, while it facilitates others. How will the distinctive affordances and constraints of web technology transform teacher portfolios? Does hypermedia offer teachers new ways to conceptualize and represent their teaching practice? How can we best use electronic portfolios for teacher learning and professional development?

My study suggests some answers to these questions. I will report here on findings related to a personal-revelation dilemma faced, to some extent, by all teachers who author portfolios, but especially preservice teachers. My finding suggest that the use of web technology for portfolio authoring may impose some special constraints on these preservice teachers .

The Study

Case studies of six preservice teacher portfolios were developed in an effort to understand how electronic and traditional portfolios help preservice teachers conceptualize themselves as teachers, represent their knowledge, and communicate it to others. This study used a sociocultural frame to consider how the tool chosen for portfolio authoring interacts with other artifacts in the setting to influence conceptions of portfolio audience, purpose, form, and content. The cases included both a paper and an electronic portfolio from three different secondary subject areas: language arts, social studies, and science (physics). Study participants were in the final quarter of a Masters in Teaching program at a large research university. Data was collected by means of think-aloud commentaries, participant interview, examination of the Teacher Education Program (TEP) guidelines and rubrics for portfolio construction, as well as careful analysis of participants' completed portfolios.

Findings

One finding of my study is that the act of authoring portfolios is a highly personal process for preservice teachers; five of the six participants expressed strong concerns about revealing their deeply-felt motivations for teaching and their most intense student teaching experiences. "This whole process feels so intimate," confided Hannah, a novice social studies teacher and traditional portfolio author.

Doris, another traditional portfolio author, explained her worries and how they caused her to limit personal revelations in her portfolio: "I didn't reveal a lot about, you know, my failures, and I know that, that was part of the process, we were asked to make…but I did not go into any kind of emotional depth in my portfolio. And I could have, but I just, I didn't feel like I could trust it. I just couldn't trust it. (D-I, p. 11).

In contemplating personal revelations, participants who authored traditional portfolios seemed most concerned about prospective employers who might later be readers. The participants who posted their portfolios on the web, on the other hand, worried not only about an audience of school administrators, but also about other unknown, potentially critical readers who might be part of a vast audience on the Internet. Unlike traditional portfolio authors, who could at least decide who had access to their finished portfolio, those who posted their portfolios on the web gave up that control.

Two of the three electronic portfolio authors communicated strong concerns about revealing personal information or speaking candidly about the problems they might have faced during student teaching. Both indicated they had left important things out of their portfolios as a result of these concerns. Maggie, a language arts electronic portfolio author, spoke of her unwillingness to reveal mistakes in her portfolio because she felt this would be like "advertising" herself as a finished product to an imaginary person on the web:

> It's not like I'm afraid to say, I made a mistake here, and this is what I would do differently; there are just like different levels of mistakes, you know there are some that are so fresh and awful…you don't just open those up to people who might not treat that wound kindly…I probably wouldn't do a portfolio in the future on the web, because it's just a spot where I am now, it's not, and I'll be changing from that spot, and I wouldn't want…I guess I'm just really hypersensitive to some imaginary person thinking that I think that where I am now is good enough, that I think that where this portfolio is right now is, shows the best teaching that I can ever do. That's something I really don't like about publishing it on the web, you know…like advertising this is who I am. And because, I guess I feel very fetus-like still (M -I, p. 5,7).

Mark, a preservice social studies teacher and electronic portfolio author, also grappled with this issue of personal revelation. It was a particularly troublesome dilemma for him because it involved the possible revelation of his sexual orientation. Mark would have liked to include artifacts in his portfolio that dealt with issues he faced as a teacher who is also a gay man, but felt he was unable to do so.

> I really would have liked to have included more about issues that I have as a gay teacher. In particular, dealing with homophobia among my students and the different issues I had dealing with that. I would like to have had an artifact where I talked about how I dealt

> with that and why it was different for me than if I were a straight man dealing with it. And how it kind of made it even more of a challenge for me, and how I felt, not only did I feel that I couldn't be out, but the vice principal even told me I could not and that, I just would have really liked to have talked about some of these issues and about how I was in a school where supposedly diversity is treasured on the one hand, but on the other hand, when actually faced with having to deal with diversity, they don't want to deal with it (Mk-I, p. 9).

Although Mark had been open about his identity as a gay man among colleagues in his Teacher Education Program (TEP), and he was "out" among the faculty where he student-taught, he was warned by the assistant principal at the school not to disclose his sexual orientation to students. Mark acquiesced because he was afraid that being fully out might make it difficult for him to get a job. For this reason, he avoided including artifacts in his portfolio that explicitly identified him as gay. He said he could only present these issues in indirect ways in the portfolio—for example, by including a drama script that showed students dealing with homophobia in their school, and in his classroom management plan, where he discussed how he would deal with gender issues and homophobia in the classroom. But these artifacts were not sufficient for Mark to feel that he had faithfully represented himself as a teacher. He said sadly, "So that whole aspect came out in those two ways in a very limited sense, but as far as being able to include that part of myself, I definitely feel like there's a hollow kind of space where this portfolio doesn't represent me fully" (Mk-I, p. 10)

I found it interesting that Mark produced a CD version of his portfolio that differed from the one he posted on the web in one significant way. The dedication page of his CD portfolio has one phrase the web portfolio does not: "[I thank] my partner, Brett (pseudonym) for his loving support." In the web version Mark thanks his "family."

The third electronic portfolio author in my study, a physics teacher whom I referred to as "Kyle," did not speak of worries about personal revelation in his web portfolio. However, this does not mean that Kyle was not concerned about revealing problems he encountered during student teaching. It seems to be due, instead, to the narrow audience and purpose he defined for his portfolio. Unlike the other participants in my study, who attempted to achieve multiple purposes in their portfolios (i.e., seeking to demonstrate reflective thinking and the achievement of program goals for TEP readers at the same time they produced a product suitable for job interviews), Kyle designed his portfolio for the prospective employer and trusted that it would, in the process, also meet university requirements. As he explained it: "I tried to think of it more in terms of the 'gettinajobedness' of it, and then I figured the 'gettinajobedness' of it would end up meeting the university requirements (K-1, p. 7).

As a result of this focus on a single reading audience—the K-12 administrator—Kyle experienced fewer tensions than the other authors, who attempted to achieve multiple purposes and meet the needs of diverse readers. However, Kyle's definition of the prospective employer as primary audience, had an unfortunate effect: his portfolio contained only four incidents of what I termed *critical self-exposure* (remarks exposing inadequacies in one's teaching practice). He speaks of just two problems he experienced during student teaching: managing a classroom so as to minimize behavior issues and preparing students adequately for somewhat unstructured lessons. Kyle's discussion of these issues is unusual in that he ascribes all his weaknesses to a lack of on-the-job experience. His statements are very much in accord with the prevailing belief in schools that one only learns how to teach in the classroom. The kind of theoretical knowledge universities value is portrayed as inadequate. In taking this stance, Kyle is displaying a strong awareness of audience and has clearly adapted his message his audience's beliefs and prejudices.

What is the significance of Kyle's lack of critical self-exposure in his portfolio? I would consider a portfolio author's willingness to engage in *critical self-exposure* to be a necessary condition for reflective thinking about one's practice (Zeichner & Liston, 1995). The preservice teachers in my study avoided critical self-exposure. Table 1 below shows the incidence of such comments in the portfolios:

Table 1: Incidence of Critical Exposure in Preservice Portfolios

	Language Arts	Social Studies	Physics
	Doris	Hannah	Roger
Traditional	3 suggested modifications in instructional method	3 suggested modifications in instructional method	10 suggested modifications in instructional method
	Maggie	Mark	Kyle

Electronic	1 suggested modification in instructional method	3 suggested modifications in instructional method; 8 in classroom management	4 suggested modifications in classroom management

Considering that these portfolios contained eight to ten artifacts, each with an attached entry slip in which the author was to engage in reflective thinking, these preservice teachers identified few troubling puzzles of practice. (Author's note: Although Mark, an electronic portfolio author, has engaged in more critical self-exposure than the other participants, most of his comments are found in a paper he had written previously for a university class, and included as an artifact to demonstrate his capacity to use research sources. He indicated to me that he felt safe in including it because he didn't think any prospective employers would plow through its dense academic prose.)

What does this paucity of critical exposure mean for teacher education programs that mandate portfolios for their preservice teachers? How does the use of electronic portfolio authoring tools and publication on the web influence the manner in which preservice teachers represent themselves and use portfolios as devices for reflecting on problems of practice? I will discuss these issues in the following section of this paper.

Conclusions

My study suggests preservice portfolio authors are very concerned about how the reader will perceive them—especially if that reader is a prospective employer or someone unknown. As a result, they will tend to avoid talking about aspects of self or student teaching that might be viewed negatively. Their personal revelation concerns caused them to avoid the kind of critical self-exposure necessary for truly engaging with problems of practice. If portfolios do not provide a place for such reflective thinking, it doesn't seem likely that they will result in the kind of improvements in teaching practice or continuing teacher knowledge development that advocates hope for.

Electronic portfolio authors seemed particularly worried about potentially critical readers. Publishing on the web offers these portfolio authors the great affordance of being able to communicate with a wide audience, anywhere in the world. This affordance could actually be a constraint for preservice teachers, however. Insecure in their knowledge of a new profession, they are reticent about revealing to unknown readers out there on the web how they struggle with problems of practice—their "wounds," as Maggie called them.

These findings suggest a personal revelation dilemma for teacher education programs that encourage their preservice teachers to post portfolios on the web. The technology that affords teachers the opportunity to share teaching knowledge widely may prove too revealing for novices to deal candidly with problems of practice. And in establishing a situation that inhibits preservice portfolio authors from dealing honestly with the difficulties they experience in student teaching, we may inadvertently contribute to the current culture of isolation in the profession. Imbued with idea that mistakes ought to be hidden, teachers are forced to construct their knowledge of practice privately rather than in a community of practitioners.

Yet web portfolios have great potential for developing teacher knowledge, and we ought not reject them out of hand. Knowledge is developed in a profession as practitioners talk about problems of practice with others in their professional community. Teachers have traditionally lacked the tools and venues for communicating their professional knowledge. Web technology may enables us to establish that discourse online. Wineburg (1997) saw portfolios as opportunities for social learning—web portfolios may extend that social learning beyond the confines of the local setting. To do so we may need to solve the personal-revelation dilemma.

I suggest one structural and two technological solutions to this personal-revelation dilemma. First, we ought to distinguish between *showcase* and *growth* portfolios. A *showcase* portfolio is one designed to show off the successes of one's practice for potential employers and interested strangers. A teacher's "growth" portfolio—with its personal revelations and deep reflection on problems of practice—is more appropriately shared only with those whom one knows would be supportive. If we post portfolios directly on the web, this study suggests they should be showcase versions.

One technological solution to the personal-revelation dilemma may be to create password-protected environments for small communities of teaching practice. Efforts like the University of North Carolina's Lighthouse project (DeWert, Jones, & Carboni, 1999) give us some ideas about how we might establish a setting where novice teachers can talk about problems of practice with cohort peers and supportive university and school teacher mentors.

A second technological solution to the personal revelation dilemma would be to produce the complete portfolio on CD, uploading only a showcase version to a web server. Authoring one's portfolio for CD presentation allows the teacher to better control who will read it. Perhaps several different CD portfolios could be produced, each designed for a different reading audience or to accomplish different purposes. The ease with which one could adapt a full growth portfolio for various audiences would provide a great advantage over portfolios done with traditional media, which don't readily lend themselves to being reassembled multiple times in different ways.

As new technological tools are developed, we need to carefully consider how they might be used to further our goal of developing the professional knowledge of teachers. New web technologies offer us many new affordances that ought to capitalized upon. Conversely, the constraints of electronic portfolio tools ought to be recognized and, if possible, ameliorated through careful portfolio design. This paper suggests some possible solutions to the personal-revelation dilemma experienced most acutely by preservice teacher s who author portfolios on the web.

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Web-Based Electronic Portfolios: A Systemic Approach

Paul Clark
PT3 Grant Coordinator
University of Nebraska – Omaha
United States
pclark@mail.unomaha.edu

Neal Topp
Teacher Education – Associate Professor
University of Nebraska – Omaha
United States
ntopp@mail.unomaha.edu

Bob Goeman
Technology Coordinator
University of Nebraska – Omaha
United States
bgoeman@mail.unomaha.edu

Abstract: The College of Education at the University of Nebraska at Omaha has been developing a digital portfolio for pre-service teaching candidates. This portfolio is database-driven and can be accessed by teacher candidates through a web browser. This portfolio has been developed to be systemic, covering all of the candidate's courses. The teacher candidate has the ability to include artifacts from any of their coursework. Pre-service teaching candidates can review and reflect on work from previous course work for inclusion in their summative portfolio. This process has also enhanced communication between candidate and faculty as well improved the learning process.

Introduction

The use of portfolios for pre-service teacher candidate assessment has been emerging as a trend to be considered when planning for candidate assessment. Portfolio assessment allows teacher candidates to collect, select and reflect on artifacts that allow them to demonstrate teaching competencies and standards. The use of technology in the portfolio development process greatly enhances this process. Rather than storing bulky notebooks or boxes of artifacts, teacher candidates can create and present their portfolios in an electronic format. Rather than flat files, electronic portfolios allow for interactive demonstrations of teacher candidate competence. Multimedia artifacts can be included in the portfolio. Candidates can add digital video, audio, still digital images as well as interactive application presentations created in software such as PowerPoint and Hyperstudio. Text-based reflections and observations of peers and other evaluators can be added to the portfolio as well. The sum of these parts presents a much richer picture of the teacher candidate's abilities than a traditional assessment.

The use of the Internet in the portfolio development process increases the candidate's ability to effectively create and use their teaching portfolio. This process also allows the them greater flexibility in the portfolio development and reflection process. The use of the web browsers to interface with the digital portfolio provides the opportunity to for candidates to work asynchronously from any place that they have access to a computer with a web browser. It also allows evaluators to view and provide feedback to candidates with the same flexibility. Combining the use of databases and interactive web pages also amplifies the effectiveness of digital portfolios. Traditional paper portfolios can be cumbersome to review and assess, especially in universities that have large numbers of teacher candidates. Digital portfolios that are web and database driven can increase the communication between candidate and faculty. These portfolios have the capability to generate email as a communication tool as well provide rapid feedback in the portfolio development process that at times is missing in traditional portfolios. In addition to providing an avenue for the candidate to reflect on their work, the digital portfolio can be electronically modified to accommodate a variety of audiences and purposes such as college administration, performance exhibitions, or potential employers. The web-based digital portfolio also allows for a more systemic assessment of candidate performance. This portfolio permits candidates to reflect on their growth over a long period of time and across courses while giving them a much clearer picture of how their coursework and field placement activities are inter-related.

The University of Nebraska at Omaha (UNO) has undertaken the development and implementation of a systemic, web-based, database-driven teaching portfolio for pre-service teaching candidates. UNO's digital portfolio has been under construction since November of 2000 and has been used by over 400 pre-service teaching candidates. This portfolio process is currently a work in progress. The digital portfolio changes as more discoveries are made about the capabilities of this process. The digital portfolio was developed as a result of a Preparing Tomorrow's Teachers to Use Technology (PT3) grant, a need to more effectively assess pre-service teacher candidates and a need to meet NCATE standards for accreditation. UNO's digital portfolio serves a variety of purposes. First, it provides candidates with the traditional portfolio advantages. It allows them to collect, select and reflect on artifacts in their portfolio. Since it is web-based candidates can present their portfolio to a variety of audiences. The portfolio has a mechanism to demonstrate both INTASC teaching standards and ISTE technology teacher standards as part of a summative portfolio. As the candidates progress through their undergraduate careers, the portfolio gives them an electronic area in which they can collect artifacts that they may want to use for their summative portfolio. The digital portfolio gives them the opportunity to select specific artifacts that will be used to demonstrate the teaching standards. Since the portfolio is database driven it also allows the artifacts that candidates have in their portfolio to be customized for different audiences.

The portfolio is both formative and summative. PT3 staff work with course instructors to develop a series of activities that become artifacts for the formative portfolio. In many cases these artifacts were originally artifacts that teacher candidates were required to include in paper portfolios. The formative portfolio is a work in progress. This area may include many different types and qualities of a teacher candidate's work. These artifacts serve as the basis of the candidate's formative portfolio. As candidates progress through their course work they can select specific artifacts from their formative portfolio for inclusion in the summative portfolio. Currently the summative portfolio is based on both ISTE and INTASC teaching standards. The artifacts selected to be included in the summative portfolio must go through a reflection stage. In this process the teacher candidate reviews the artifact and then refines it with the assistance of college faculty. Since college faculty have already reviewed the artifacts this process assists in the evaluation of the summative portfolio. Once these artifacts have been refined and polished they then become part of the candidate's summative portfolio and are available to be view by appropriate audiences.

The use of a digital portfolio at UNO has lead to unexpected benefits for candidates and instructors. Since instructors work with PT3 staff to develop individual course portfolios, each one is customized. This has lead to another dimension of the teaching portfolio beyond collection, selection, reflection and presentation. This added dimension involves teaching and learning. The use of technology combined with collaborative efforts of the PT3 team and instructors permits the development of activities that fully integrate teaching and assessment. Some activities that become artifacts in the portfolio require candidates to collect data and then analyze it. Prior to using the digital portfolio candidates were able to use only the data they collected. As a result of allowing candidates to enter the data into the web-based database, they have the advantage of sifting through all of the other candidates' data in order to gain a greater understanding of the teaching process. Journal entries and reflection on field placement activities that were originally placed in paper portfolios now take on a new dimension. Including them in the digital portfolio allows the college faculty to give candidates rapid feedback on their reflections and has helped to communicate potential problems and resolve them in a timely manner.

UNO's digital portfolio is still a work in progress and as the process evolves it will be refined to make both the learning and assessment process one that will serve teacher candidates and faculty.

Using Digital Video Tools to Promote Reflective Practice

Ann Cunningham
Department of Education
Wake Forest University
United States
cunninac@wfu.edu

Sandra Benedetto
Director, Product Development
Pioneer Electronics USA, Inc.
United States
sbenedetto@pnmt.com

Abstract: This paper reports the findings of preliminary trials using digital video and digital video editing to encourage reflective practice in preservice teacher candidates. Initial digital video editing projects were piloted to guide future program-wide efforts to integrate digital video tools for capturing and reflecting on teaching practice in a meaningful and productive manner. Issues of technology skill development, access to hardware and software, in addition to the technical aspects of collecting, editing, and publishing large video files all affect program-wide integration. Strategies and technologies for addressing these issues and implications for future research are suggested.

Introduction

Capturing and assessing the performance of teacher candidates in the field is an integral part of traditional teacher education programs, and technology tools play an instrumental role in efforts to document performance. A study of the student teachers' reflections on videotaped performance suggests that the use of videotape supports the development of reflective practice (Jensen, et al., 1994). Recent developments in digital video technologies permit teacher candidates to collect, review, and manipulate video to demonstrate their growth as a professional and as a reflective practitioner. Models from the Bank Street College of Education suggest that reflective practice should be nurtured within the context of teacher education programs (Freidus, 2000). Current technologies exist to simplify the integration of digital video and digital video editing into teacher preparation programs, allowing faculty to foster reflective practice, while candidates develop valuable technology skills throughout the professional phase of their programs. The Department of Education at Wake Forest University established long-range goals for the teacher education programs that include program-wide integration of digital video recording and editing for all teacher candidates. Pilot studies with teacher candidates using digital video camcorders and digital video editing equipment have generated information about the process as well as questions about the content of final performance products. Efforts to determine the best technologies for capturing and storing large, high quality video files in a way that meets the needs of the department and the candidates resulted in the purchase of DVD-R equipment which facilitates the creation of non-linear videodiscs without requiring authoring skills. This article focuses on the technologies used to support the process of recording, editing, storing and retrieving large video files, and considerations for program-wide integration.

Digital Video Tools

Several tools are necessary to collect, edit, and store large digital video files. Although VHS videotapes can be easily digitized for editing on a computer, the advantages of capturing video directly on miniDV make it the preferred method for data collection in the classroom. The smaller, more discreet camcorder makes taping in a student-centered classroom easier, and FireWire/IEEE connections allow fast transfer of data to a variety of storage options. Inexpensive video-editing software applications are easy to use and provide enough options for developing attractive and professional video products. Access to digital editing software on a laptop allows teacher candidates opportunities to review, reflect, and edit their videos with more flexibility than use of a desktop in a lab, even when the camcorder and laptop are shared among several teacher candidates. Short, simple videos consume a lot of space on the hard drive (a fifteen-minute movie take up to 3.5 GB). Storage space for lengthier movies, or collections of student work, presents a challenge. When candidates share a laptop for editing, it is not possible to store unfinished projects on the hard drive, so any unfinished editing projects are saved onto miniDV tape for later editing. Currently, completed video projects are stored on miniDV tape for output to VHS for the candidate to take and share with potential employers. The ease of use and multiple playback options led to DVD-R as the choice storage medium for departmental archiving of video projects generated by all teacher candidates. The camcorder can be connected directly to the DVD-R with FireWire for high speed transfer of video files. Recording directly to a DVD-R obviates the need for the user to possess multimedia-authoring skills and generates a versatile storage solution for the large, high quality video files. On screen buttons and barcodes can be created to facilitate non-linear access to student projects on DVD for analysis of teaching methods, documentation of performance-based assessment, or for presentations. The current assumption is that VHS tape is the most useful storage medium for teacher candidates because of price and the potential for playback to a variety of audiences. But the department is ready to provide teacher candidates with DVD-R copies of their videos as price of DVD-R drops and availability DVD playback equipment becomes more ubiquitous in the educational arena.

Program-wide Reflective Practice - Implications for Integration

Preliminary projects have produced several noteworthy results for integrating student-created digital video projects into teacher preparation programs. Perhaps the greatest influence on program-wide integration is the realization that the creation of a meaningful and reflective video takes a great deal of time; not because of technology, but because critical reflection is a skill that teacher candidates are just beginning to develop during their programs. Candidates participating in initial projects admit that the editing process encourages them to pay close attention to videos of their teaching and requires them to be critical about the clips they select to communicate their growth. Results indicate that candidates spend a great deal of time selecting video clips to communicate their growth, but less on reflection of the performance captured in the video segment. Candidates are quite capable of creating quality videos, but pilot studies suggest a need to improve the quality of their reflections. This revelation supports the program-wide reflective model in use at the Bank Street College of Education (Freidus, 2000).

It is clear that all faculty teaching in the professional preparation phase of teacher candidate development must participate in this learning process. Thus, faculty acceptance of this method for developing reflective teaching videos is necessary when the process spans the professional preparation phase of the program. Getting faculty to embrace this new process is the result of several factors. Presentation and discussion of pilot projects during faculty meetings help generate awareness of the potential of digital video editing and acceptance of this method for recording candidate performance and reflection. Further, selection of technology tools that are simple, effective, and do not detract from the content of the video also encourage faculty to participate in this change. Finally, pilot projects give all faculty an opportunity to contribute to the development of the video-reflection process and encourage input on the process, protocols, and expectations for candidate performance.

The Department of Education at Wake Forest University is currently in the second phase of pilot projects with digital video collection, editing, and reflection. Results of phase one pilot projects generated insights into the use of digital video technologies, and guided purchase of equipment necessary to support the process for all teacher candidates. The second phase of pilot projects will focus on methods for improving the quality of the video reflections while expanding faculty participation. An internal Culpeper grant has been awarded to one faculty member to consolidate the results of the pilot projects and develop an integration outline with protocols for video capture and reflection that can be used by the department. The goal is program-wide integration for all teacher candidates beginning academic year 2002-2003.

Conclusions

Although technology is integral to this process, the decision to use digital-video tools to support the reflective practices of teacher candidates is a departmental commitment to changing performance-based assessment. In order to reach the long-range goals successfully, it is vital to engender the support of every faculty member involved in the process. Teacher candidates are capable of using digital-video editing tools, are eager to embrace this method for documenting performance, but need help with critical evaluation and reflection. Making the decision to integrate digital-video editing and recording tools is an expensive commitment, and there is no turnkey solution that works for teacher preparation programs. A great deal of effort is necessary to research, plan, and practice with technologies to determine which resources meet the needs of the program goals and the people involved in the process, now and in the future. The focus must stay on the final product, and technology should facilitate, not drive, the development of quality video-based performance assessment. Finally, the need to plan, practice, revise, and reflect on the process of program-wide integration takes the time and efforts of faculty working in concert. Although a slow and detailed process, the lessons learned from initial pilot projects provide important results that shape permanent changes in performance-based assessment and technology integration in the teacher education program. These lessons, so far, have proven valuable to moving the department closer to its long-range goals of requiring video-based teaching reflection projects of all teacher candidates and providing meaningful opportunities to promote reflective practice throughout teacher preparation program.

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Promoting Standards, Assessment, and Technology Competencies Through Digital Portfolios

Harold L. Daniels
College of Education
East Tennessee State University
United States
DanielsH@etsu.edu

Abstract: This paper discusses the process of integrating web-based electronic portfolios into the training of pre-service and inservice teachers as part of a college-wide effort to integrate technology competencies and technology-based pedagogies into the training of teachers. In an attempt to establish a systematic method for addressing the numerous standards that they are expected to adhere to and document, a graduate level educational technology class was re-designed to include the documentation of both teacher candidate and p-12 learning within the digital portfolio framework. Both inservice and pre-service teachers sought to demonstrate technology competencies as well as learned society and college goals via the use of digital portfolios. Success of the revision will be measured by diagnostics of technology competencies, assessment of professional organizational standards addressed in sample work, and self-assessment by students. Preliminary data are presented as well as feedback from students and their content area professors concerning the portfolio organization, standards addressed, confidentiality, media delivery and storage issues, and assessment methodology.

Introduction

Institutions that prepare teachers currently find themselves in a sea of standards that they are expected to meet. Nearly all accrediting agencies (NCATE, SACS), professional teacher organizations (NCTM, NCSS, etc.) and organizations focused on educational technologies (ISTE, AECT, etc.) have developed standards that are used to gauge in service teacher's knowledge, skills, and expertise in leveraging technology in their teaching. In addition, teacher preparation institutions are now expected to document not only their teacher candidate's competencies and knowledge but also those of the P-K students who interact with the teacher candidates. The sheer volume of these standards and accompanying assessment needs can be intimidating and frustrating for those trying to adapt existing assessment methods or develop new ones that accommodate these standards. Add to this the institutional, unit, and program goals and objectives that address the use of technology and it becomes clear that assessment of both inservice and pre-service teachers' ability to use educational technology should be viewed holistically rather than individually.

Portfolios have emerged for both teachers (Barrett, 2000; Martin-Kniep & Giselle,1999) and students (Chen & Martin, 2000; Goldsby & Fazal, 2000) as tools for reflective learning and self assessment, documenting growth, and providing evidence of mastery. In addition to providing evidence of content and pedagogical skills and knowledge, digital portfolios provide an authentic means to embed technology standards into the assessment process in the proper context: as a teaching and learning tool rather than a competency separated from the context of teaching. The use of technology with a process based portfolio approach provides an easily accessible and transferable product for the documentation of teacher education program effectiveness to local, state, and national agencies (Smith, Harris, Sammons, Waters, Jordan, Martin, Smith, & Cobb, 2000). This would also seem to be an efficient means to demonstrate mastery in an authentic performance of educational technology standards.

The Pilot Study

The college of education at East Tennessee State University has begun to revise core education courses for teacher candidates to include technology as an integral and appropriate tool for inquiry, communication, research, assessment and development. Rather than institute a static, "one size fits all" approach to the course revision process, we elected to develop a dynamic and flexible method. Pioneering the process is MEDA 5400: Integrating Technology into Teaching and Learning. This graduate level course is designed for both preservice and in-service teachers enrolled in one of four areas of the masters of teaching program. The course was redesigned in the fall of 2001 and will be implemented in the spring of 2002. Following the recommendations of a needs assessment preliminary guidelines were developed for the digital teaching portfolio which addressed organization, assessment, program area implementation, storage and distribution.

The revised course assignments (explicitly linked to the ISTE standards for teachers as well as other college and unit goals) require a planning document addressing content standards (professional society, state standard, etc.) as well as ISTE standards for students plus an authentic field based artifact(s) documenting evidence of learning. Each of assignment is placed into a "developing portfolio" of digital files. As the semester progresses each student will have the opportunity to reflect on and revise the assignments. The final product reveals growth as well as "best work". Thus an account of p-12 learning is documented as well as their own increased skills, knowledge, and dispositions. This dynamic system will provide pre-service and in-service teachers with the tools and opportunities to select multiple ways of viewing their evolving teaching practice, reflect on that practice, and use various representations to meet performance-based assessments as they build digital multimedia portfolios

Evaluating the effectiveness of this approach includes documenting changes in curriculum, evidence of teacher candidate and p-12 learning (both content area and technology). Assessment will include pre and post course performance based assessment of the NETS for teachers, self-assessment of candidates on their use of technology, and portfolio assessment of technology integration. Teacher candidate's digital portfolios will all be evaluated as a part of their program area assessment, with new criteria for the use of technology to enhance classroom teaching. Finally, program area professors, field based teachers, and p-12 students will be asked to critique the teacher candidate's effectiveness in both their content and their use of technology.

As we adapt to the use of this process to document standards and performance indicators in preparation for utilization in Spring 2001, courses are being modified and a "phase in" plan is being developed that allows for adjustment and absorption by both faculty and students. Based upon the quantitative and qualitative data gathered we plan to revise and improve the portfolio process to document performance standards in multiple domains, producing a system that is both standards based yet flexible.

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Electronic Portfolios in Evolution

Roger Olsen
David O. McKay School of Education
Brigham Young University
U.S.A.
rlo@email.byu.edu

Nancy Wentworth
David O. McKay School of Education
Brigham Young University
U.S.A.
Nancy_Wentworth@byu.edu

David Dimond
David O. McKay School of Education
Brigham Young University
U.S.A.
dimo112@alpine.k12.ut.us

Abstract: Electronic Portfolios in Evolution describes a dynamic process of transformation. The story began with a single university class attempting to present limited artifacts of teaching skills electronically and is now moving to an entire school of education working together to create electronic portfolios based on INTASC and ISTE standards. Also included are the AIMS standards, which are the goals exclusive to the Department of Teacher Education.

This project is called Electronic Portfolios in Evolution because, just as horticulturists can take a wild fruit and through cross pollination, grafting, and selective reproduction produce a wonderfully delicious and beautiful fruit, so have the electronic portfolios at Brigham Young University come from a crude beginning and matured into something quite desirable. This maturation involved cross-disciplinary conversation within the David O. McKay [DOM] School of Education, which led to refinement of the portfolios through both augmentation and reduction.

Overview

This paper will show how electronic portfolios developed by elementary education majors at Brigham Young University evolved through:

- Collaboration with other faculty members,
- Ongoing conversations with small groups of students,
- Input from public school administrators,
- Technical support from the department in both equipment and personnel,
- Help from PT3 funding for training (both local and national), and
- The enthusiastic desire of students to create electronic portfolios.

This evolution was made possible through a PT3 grant i.e. training of faculty and public school people from the BYU Public School Partnership, training of lab assistants to provide help to the students doing electronic portfolios, utilizing the expertise of specialists (such as Helen Barrett), attending national conferences (SITE), and numerous other helps.

Another component that helped in the evolution of the electronic portfolio was bringing on board master teachers from the public schools to spend two years at the university assisting in the teacher education program. These teacher educators (called Clinical Faculty Associates) brought outstanding technical skills that have had a major impact on the development of electronic portfolios.

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The following chronology will tell the story of the evolution of electronic portfolios over the past three years in the Teacher Education Department at Brigham Young University.

Chronology of the Evolution

Spring 1999

The idea of the electronic portfolio was born out of a request from the department chair that something be done by a cohort (a group of approximately thirty students who take all of the education courses together) to involve the students in using technology. As the cohort class was not a technology class, the first challenge was to find something required in the class that could be done better with the use of technology and not merely add another assignment to the extremely heavy workload of the students. After a careful analysis of the course assignments, the instructors decided to replace the students' least favorite assignment, the paper show portfolio, with an electronic portfolio. Students had complained that the traditional portfolio was of little or no value since employers were not interested in seeing them. Electronic portfolios seemed, by their very nature, to have greater potential appeal to the students as well as the ability to show to a broader degree the strengths of the pre-service teacher.

Summer 1999

One of the cohort's instructors took a class on "Creating Electronic Portfolios". The creation of what seemed to be a simple product became a nightmare when an attempt was made to include a small sound file. The rendering of the file was so slow that the thought of including sound and video files in the electronic portfolios seemed nearly impossible. Nevertheless, the idea of using video and sound in an electronic portfolio was presented to the department chair. Discouragement once again set in as he explained the vast amount of memory required for digital video and the lack of available hardware within the college to make its use feasible.

Although the path leading to the creation of electronic portfolios was daunting, a vision had been created in the mind of the course instructor. The advantages of an electronic show portfolio over the paper version as envisioned at that time were: to create a portfolio that would be of interest to employers; to show the students' personality, teaching strategies, and management through video; and to showcase students' technological skills. The first experience of having students create electronic portfolios would have been best characterized as a lonely, painful expedition; there was no one else in the department producing electronic portfolios with whom to collaborate.

Fall 1999

Naiveté on the part of the instructors allowed them to start the horrendous process of developing electronic portfolios with a cohort of students. The idea of changing to electronic portfolios was presented to students. Students were given the option of either continuing with the traditional paper portfolios or creating portfolios in electronic format. All thirty students chose to do electronic portfolios. The categories for organizing the electronic portfolio were the same as those used with the paper version, i.e. educational philosophy, effective teaching, classroom management, the learner, diversity, personal and professional development, curriculum, assessment, and parents and community. Those involved in this project had no suspicion of the challenges they would face breaking new ground at the university in capturing and editing video, creating multimedia presentations, accessing hardware to compress video, and utilizing hardware to burn CD's.

After attending a class offered by the university, the instructors decided to use PowerPoint as the software for organizing and presenting the portfolios. They soon discovered that many of the students were unfamiliar with PowerPoint, and none showed any skill in capturing and editing video. Since outside help to teach PowerPoint was not available, a team member condensed the PowerPoint manual into a simplified step-by-step tutorial that could be used in creating the electronic portfolio.

Winter 2000

The first real challenge in the project came after the thirty students had all been videotaped. How would they import the video into their portfolios? Not only were the students lacking the skills to perform the task themselves, but also the required hardware was not available to undergraduate students. Expertise from another faculty member was sought and the grueling work began for one of the instructors to capture and compress all the video clips and burn them onto CD's for the students to include in their portfolios. To determine whether or not they were pursuing the right course, the instructors searched the internet for examples of electronic portfolios with minimal success, leaving little possibility for comparison.

The first electronic portfolios generated did effectively demonstrate that video and still images greatly enhanced the visual appeal of the presentation of students' abilities. However, both the format and content of the portfolios were in the initial stages of the evolution.

Spring 2000

As an assistant to the dean and others in the department saw that electronic portfolios were becoming a reality, funding was given to purchase two additional digital video cameras and offers to give additional support were made.

Summer 2000

Through a PT3 grant, summer workshops were offered providing training in creating multimedia presentations in PowerPoint, digital imaging, adding sound to presentations, and scanning. These seminars gave those involved in the project greater confidence in their own technological skills as they assisted students with their electronic portfolios.

Fall 2000

Electronic portfolios were introduced to a second cohort. As with the first group of students, they were given the option of compiling either the traditional paper portfolio or an electronic one. Once again every student chose the electronic format.

Problems in creating the electronic portfolios experienced by the first students were still in place with the second cohort. One of the goals for this group was to give them more responsibility in capturing and editing the video before its compression. This was extremely difficult because of the availability of only one computer in a graduate student lab to accomplish the task. Students had to schedule their work around the graduate students' use of the computer, which added additional stress in the development of the electronic portfolios.

As an assistant to the dean learned of the difficulties students were having in gaining access to the hardware needed, he arranged for the new computer lab that was under construction at that time to be modified to help meet the needs of students doing electronic portfolios. Five video editing stations were added to the original plans, complete with software, CD burners etc.

A fellow professor and one member of the technology support staff in the department worked with the cohort instructors to train them in the use of iMovie and other software. They were also instrumental in seeing that lab assistants in the new lab would be trained to give support to the students.

Technology workshops continued to be offered by the department to give assistance. The employee in the department over external affairs attended conferences and brought back ideas of what others were attempting to do with electronic portfolios.

A turning point in the evolution of the electronic portfolios came as the professor assigned to evaluate the department goals and student growth viewed several samples of the portfolios. As one student showed his electronic portfolio and then proceeded to tell this professor what he had learned from creating the portfolio and the insights he had gained into his teaching strengths and weaknesses, the professor responded, "That's what should be in the portfolio." As the electronic portfolios were shown to other professors and staff, similar comments were made. There was a glaring weakness in the electronic portfolios--the lack of reflections.

The focus up to this point had been in refining the technical aspects of portfolios, but after those conversations changes were made to incorporate more reflection on the artifacts in the portfolios.

Winter 2001

A great boost came as the department adjusted scheduling to allow a professor who created video teaching ethnographies with his students to also teach the cohort. Since his teaching ethnographies required students to create a CD with video clips of their teaching, they were learning skills and gathering artifacts that would be used in compiling their electronic portfolios. Collaboration took place as instructors from both courses worked together to provide experiences in the public schools for students to record and analyze their teaching philosophies and practices.

During this semester the new computer lab was finished, which gave students access to the hardware and software needed for their electronic portfolios. However, problems still existed as computer lab assistants lacked sufficient training in the software being utilized, and graduate students used all the hard drive space for their projects. As difficult as it was, students were still successful in creating their electronic portfolios, and the workload for the instructors was significantly reduced. Portfolios produced that semester were also more reflective than those from previous cohorts.

The INTASC standards were presented to the education faculty as the standards the state would be using for new teacher licensure. They were then introduced to the students as a possible framework for organizing their portfolios. This was the beginning of a shift from showing evidence of being able to meet local expectations to meeting teaching standards (INTASC) more widely recognized throughout the country.

Samples of electronic portfolios from the cohorts were shown to all thirty-eight elementary school principals in the Alpine School District to see if they would be interested in viewing electronic portfolios as part of the hiring process for new teachers. (Previously, principals had not shown interest in seeing paper portfolios.) All principals indicated in a questionnaire they would like to view the electronic portfolios when interviewing.

Two of the cohort instructors attended the SITE conference in Orlando along with other department faculty. At that conference, another milestone in the evolutionary process occurred. Helen Barrett[1] opened their vision to the deeper, more encompassing purposes of electronic portfolios. To this point, portfolios produced by cohorts were collections of artifacts with some reflection added. It was evident that previous efforts at producing portfolios had focused on creating show portfolios for prospective employers. Working portfolios, with the tremendous opportunities they afford students to evaluate their practices and philosophies, had not been given adequate emphasis. It was determined while at the SITE conference to arrange for Helen Barrett to conduct a workshop at Brigham Young University for the faculty in the David O McKay School of Education.

The leadership in the David O McKay School of Education committed the necessary resources to make it possible for education majors to construct electronic portfolios. Because of this commitment the Alpine team presented samples of electronic portfolios to partnership liaisons and leaders responsible for the cohort program in other school districts. This group seemed impressed with the electronic portfolios; however, most felt they were not ready to attempt electronic portfolios because of inadequacy with technical skills. To address concerns and help in the creation of electronic portfolios a task force was formed. This task force began a dialogue with those who teach the technology courses and other faculty to build a support system for students to create portfolios electronically.

Summer 2001

Helen Barrett instructed the faculty for three days in the purposes of portfolios and how they could be enhanced electronically. Her instruction proved helpful in refining and emphasizing the goals of the working portfolio.

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[1] Helen Barrett, professor at the University of Alaska Anchorage, is a leading authority on electronic portfolios in teacher education. See her website at: http://transition.alaska.edu/www/portfolios.html

Fall 2001

The purposes of the portfolio had now evolved into an opportunity for students to carefully study their teaching as they progressed through the teacher preparation program and to design a sampling of their philosophies and skills that would be of interest to prospective employers. They were built upon the INTASC standards with ideas from Helen Barrett added to refine what had previously been done. The fall cohort had already spent a semester working on their portfolios, so they were not required to change the structure of what they had started but were invited to make the change if they desired. Fifteen of the twenty-three students adopted the INTASC standards and incorporated many of Helen Barrett's ideas.

A high point of the semester was the enthusiasm the students exhibited as they caught a vision of how the portfolio could show evidence that they were meeting generally accepted teaching standards, both during their pre-service experience, and as they met licensure requirements in the first years of teaching. Students who desired were invited to meet with the instructors beyond class time to collaborate on developing electronic portfolios. Students were anxious to meet to share ideas, ask questions and get feedback. The synergism of the group was tremendous as they realized ownership of their portfolios. Much of the energy seemed to come as students recognized that their ideas were valued as much as those of the instructors. They moved from merely collecting artifacts for an assignment to gathering evidence of their own teaching skills.

Some BYU faculty and teams of technology leaders from the partnership districts traveled together to the Classroom Connect Conference in Las Vegas for the purpose of building cohesion in the technology skills taught at the university and those needed by classroom teachers. Many benefits came from the conference, but one in particular was the district's support of electronic portfolios. Since the majority of the new teachers in Alpine District come from BYU, they were excited to learn of the skills that the graduates would bring to the district. They expressed their support for continuing electronic portfolios with those new teachers as they collect evidence to meet licensure requirements during their first two years of teaching.

Several other administrators from the Alpine District met with students and viewed their electronic portfolios. Involving the administrators had a two-fold purpose. The main objective was to provide feedback to the students from a public school viewpoint. Another objective was to evaluate the portfolios in general to see if they actually showed (from an administrators' point of view) evidence that students met the INTASC standards. The response was very favorable from the administrators, but showed that the working portfolios would need to be modified to accomplish show portfolio goals.

Several students who produced portfolios in previous semesters provided some interesting insights into the worth of the project. One stated she was very grateful she had produced her portfolio because of the technological skills she had developed. Another stated that even though the technical aspects of creating her portfolio electronically had proven beneficial as she began her teaching career, she valued the insights she gained into her teaching much more highly. She felt that viewing herself as she taught from an outside perspective was invaluable.

The Future

Electronic portfolios seem destined to play a prominent role in pre-service education at Brigham Young University. Greater acceptance of the INTASC standards within the [DOM] School of Education and more varied technological skills of the faculty are creating an openness to change. The value of media not traditionally connected with paper portfolios in reflection is beginning to open the vision of a relatively new resource to analytical minds.

As the evolution continues, possible changes being considered are: (1) Utilizing HTML format to allow easier accessibility in the show portfolio and to enable artifacts consisting of full pages of text to be displayed in the working portfolio. (2) Beginning the working portfolio in the semester before entering the upper level course work and continuing gathering evidence throughout the two cohort semesters. (3) Creating the show portfolio after the student teaching experience.

Just as cross pollination in the plant world can be used to produce a more desirable fruit, flower or vegetable, so can collaboration improve practices in education. Collaboration has been and will be essential in the evolution of the electronic portfolio.

A Comparison of Two Electronic Portfolio Models

Sebastian Foti, University of Porto, Portugal, US

Introduction

In this session we will share the beginning year of two electronic portfolio projects. One at the University of Porto, Portugal, the other at the University of Florida, Gainesville, Florida, United States (http://www.coe.ufl.edu/school/portfolio/index.htm). These projects were developed and implemented independently of one another yet have many similarities. Our experiences have shown that electronic portfolios have the potential to contribute to a richer learning environment for students, and encourage students to reflect more on their learning and education. In addition, portfolios are changing the way professors and colleges of education approach assessment.

The Projects' Goals

Pedagogically, the assemblage of an electronic portfolio is a classic example of a constructivist activity. Dewey (1915) believed that true, new knowledge and intellectual growth are constrained by the systematic teaching method of assignment, study and recitation, and instead argued for a more learner-centered classroom where exploration and engagement were encouraged. Both colleges believe that the construction of an electronic teaching portfolio enables students to continuously construct and revisit their knowledge, beliefs, and biases about the profession.

The purposes of the electronic portfolio at both schools are to:

- present student selected illustrations of competency
- effectively use and integrate technology in their educational experience
- develop and present a professional vita over time
- provide a forumfor connecting a student's university experience to personal and professional insights.
- assist the student in coming to a better understanding of their profession

The portfolios are organized around the following pedagogical and technological goals:

- encouraging student reflection
- promoting student self-assessment
- Using technology for communication, development, and publication

Lessons Learned

We will share the similarities and differences of the two programs, the conceptual frameworks that undergird each program, and the support mechanisms that facilitate their implementation. In addition, actual student portfolios will be shared. Future goals and project objectives will also be presented.

Conclusion

Portfolios may be used effectively to model 21st century uses of technology to preservice teachers. As students began to reflect on their work and their learning experiences, they began to discuss ideas with their peers.

Both colleges continue to have questions about portfolio development. We believe that by managing the vast amount of information in their portfolios, deciding how to build a public representation of their accomplishments and of who they are, and trying to integrate the various components of their public and personal histories, our students will develop skills and perspectives that will serve them well in the future. The construction of an electronic teaching portfolio forces students to continuously construct and revisit their knowledge, beliefs, and biases about the profession.

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The RIMS/BTSA Electronic Portfolio for Teacher Professional Development

Zeno Franco, Graduate School of Education, U.C., Riverside, US
Linda Scott-Hendrick, Graduate School of Education, U.C., Riverside, US
Scott Lowder, Graduate School of Education, U.C., Riverside, US

Introduction

This presentation focuses on the development of an electronic portfolio project designed by the Riverside, Inyo, Mono, San Bernardino Beginning Teacher Support and Assessment (RIMS/BTSA) program, a large scale beginning teacher induction program in the State of California. Providing mentoring and support services to over 1,400 new teachers and 700 support providers per year, across 56 school districts in 4 counties, RIMS/BTSA is the largest and most geographically dispersed beginning teacher induction program in California. In order to meet new State requirements mandating that the program be responsible for performance-based assessment as one of the components of licensure for the beginning teachers, the program elected to develop an electronic portfolio to manage this new and logistically challenging task.

Prior Art: A Literature Review of Portfolios in Teacher Professional Development

A review of extant literature on portfolio usage and design will be offered as an introduction to the presentation of the RIMS/BTSA Electronic Portfolio for Teacher Professional Development© (EPTPD). This review will examine the topic from three different perspectives: (1) the usage and effect of portfolios with individual teachers (micro-level), (2) the dyadic and social interactions that portfolios engender between teachers, their mentors, and their community of learners (mezzo-level), and (3) the interface between the first two levels and the need of institutions which train and monitor teachers to be able to conduct performance-based evaluations as a part of teacher licensure (macro-level) (Fisher,1994; LaBoskey, 2000; Polonoli, 2000; Milman, 1999; INTASC, 1998). The inherent tensions and emergent benefits resulting from the attempt to maintain the essence of the teacher portfolio while incorporating them into a larger framework of accountability and assessment will be addressed. Additionally, the conceptualization, design, and usage of previous electronic portfolios and how those projects have informed the RIMS/BTSA EPTPD© will be discussed (Penta, 1998; Barrett, 2000).

Description of the RIMS/BTSA EPTPD©

In January of 2001, the RIMS-BTSA collaborative partners designed an electronic portfolio pilot program to be implemented in the 2001-2002 school year. Over the following six months, RIMS/BTSA technical and research staff at the University of California, Riverside outlined the purposes of the electronic portfolio. These include:

1. Increasing the mentored, reflective practice for new and experienced teachers
2. Promoting dialogue among experienced and new teachers, even when geographical distance is prohibitive
3. Allowing new teachers to demonstrate competencies across the California Standards for the Teaching Profession (CSTP)
4. Providing a "real-world" compliment to the *California Technology Standards for Teachers* and encouraging technology usage and competency for new teachers
5. Providing RIMS/BTSA administrative staff with an organized, high-speed system for performing authentic assessment of new teachers which would be tied to the pre-existing RIMS/BTSA Information Management System

Based on the experiences of other projects which have used electronic portfolios, the UCR RIMS/BTSA staff also established several minimum technical requirements for the EPTPD©. The EPTPD© should be:

1. A World Wide Web based application – in order to ensure high availability and easy access
2. Cross platform / browser compatibility – the system must be accessible by PC and Macintosh computers, running either Internet Explorer or Netscape browsers
3. File type flexibility – the system must be able to accept and display a wide variety of media types. This includes video, audio, Adobe Acrobat PDFs, HTML documents, PowerPoint presentations, photos, and simple word processing documents, etc.

The EPTPD© was constructed as a web application on a Windows 2000 web server running IIS 5.0, Active Server Pages, and SoftArtisan's FileUp component. Database features are maintained through Microsoft Access 2000. The portfolio has a "working area" -- a completely private zone for the new teacher, an "assessment area" -- accessible to the new teacher's support provider and the RIMS/BTSA program, and "presentation area" -- a publication option which posts selected portions of the portfolio to a common area accessible to the entire community of learners. Finally, a copy of the portfolio is provided to each participant upon exit from the RIMS/BTSA program on a CD-ROM disk.

The Case Study: Data, Interactive Demonstration, and Discussion

By capturing the conceptualization, construction, and implementation of the RIMS/BTSA EPTPD© as a case study, this presentation examines each major step in its development within a complex organizational and institutional consortium. Some of these steps include:

- The processes of capturing the essence of a teacher development portfolio in a fully digital environment
- Examining the strengths and weaknesses of previous electronic portfolio projects
- The decision to build a custom, in-house solution from the ground up
- Hardware, software, and staffing requirements
- Programming languages
- Coordinating training and mentoring of the EPTPD© in member districts
- Training new teachers and support providers to use the EPTPD©
- Assessment methods for new teacher portfolios in the EPTPD©
- Testing and trouble-shooting
- Lessons learned from successes and false starts

As part of the presentation, client computers will be available for seminar participants to use all aspects of the system, including the participating teacher interface and the support provider interface.

Research Components / Assessment of the System

A mid-project report based on participating teacher and support provider self-reports will be presented. This information will be collected through surveys, focus groups, and individual interviews. Data collected from project participants will include perceptions of the EPTPD©'s efficacy as a staff development and assessment tool, its ease of use, and its ability to provide applied instruction in technology. Qualitative information gathered by EPTPD© trainers during training sessions will be included to provide insight into these issues. Interviews with districts officials involved in the project will also be conducted to incorporate the view of the EPTPD© from an administrative perspective.

[1] Support for this project is provided by the UCR Graduate School of Education and the Riverside County Office of Education. Data are provided by the Riverside, Inyo, Mono, and San Bernardino (RIMS) Beginning Teacher Support and Assessment (BTSA) program of California.

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Electronic Portfolio Assessment in Teacher Education

Constance Geier, Ed.D.
Associate Professor of Education
Northern State University
Aberdeen SD 57401
605.626.3169
geierc@northern.edu

The School of Education at Northern State University is using the electronic portfolio as an assessment tool and as a means of integrating technology throughout teacher education. The electronic portfolio offers a unique opportunity to build preservice teachers= proficiency with technology as well as showcase their expertise in teaching.

This institutional session will focus on the process used to develop electronic portfolios and the method used to implement electronic portfolio assessment in teacher education. In addition, participants will have the opportunity to view student-created electronic portfolios guaranteed to knock their socks off!

Why electronic portfolios? Electronic portfolios emphasize process as well as product and are multi-sensory in nature. They provide the perfect format for facilitating the integration of technology throughout the teacher education program. Let=s investigate three reasons why portfolios have become so popular in the field of education.

First, today=s educators have embraced constructivism -- the belief that teaching is an active and learner-centered process. This philosophy recognizes that students build their own understanding of the world by using what they already know to interpret new ideas and experiences. Constructivists emphasize not only what students know, but what they do.

Secondly, the growing interest among colleges of education in performance assessment makes a transcript of grades and a score on the National Teachers= Exam (NTE) seem inadequate indicators of competence. A wise person once said: AThere is a lot of difference between naming the tools and building the house.@

And thirdly, there is stiff competition for teaching jobs in most areas of the country. It is imperative that prospective teachers be able to demonstrate their teaching competence in concrete ways -- to university faculty, to prospective employers, to policy makers at the state and national levels, to parents, the media, and the general public.

After piloting the use of electronic portfolios with 12 teacher education students during the 1998-1999 academic year, the School of Education at Northern State University began implementing electronic portfolio components into teacher education methods courses. The elementary education program was targeted during Year 1, the secondary education programs were targeted during Year 2,and this year the focus is on K-12 programs in art education, health and physical education, music education, and special education. The model used for electronic portfolio integration solicits proposals from faculty members planning to add electronic portfolios components to their methods classes. To date, twenty-one methods instructors have received summer stipends to plan and integrate electronic portfolio components into their courses.

Teacher education faculty members are currently creating a rubric that will be piloted during the electronic portfolio showcase in December. Two education faculty members will review each student=s electronic portfolio using the newly-created rubric to guide the assessment process. Students= portfolios must demonstrate mastery of the ISTE National Technology Standards (NETS) and performance indicators for teachers. In addition, students must address each of the five components of the knowledge base for teacher education at Northern State University: Knowledge of Self as an Individual, Knowledge of Content, Knowledge of the Learner, Knowledge of Pedagogy, and Knowledge of Self as a Teacher and Member of a Learning Community.

The implementation of electronic portfolios in teacher education programs at Northern State University has not been without challenges; however, teacher education faculty believe, as did Dewey (1904), that Athe purpose of education is to allow each individual to come into full possession of his [or her] personal power.@ In this regard, electronic portfolios rule!

IMPLEMENTATION OF THE E-PORTFOLIO

Grant Abstract

Preparing Technologically Skilled Novice Teachers
A University-Wide P-12 Collaborative

Eastern Kentucky University plays a critical role in reducing the digital divide that exists in its Appalachian service region. The importance of this role is magnified by the fact that EKU is the largest preparer of teachers in the Commonwealth and because our graduates serve one of the most educationally and economically depressed regions in the nation. Through PT3, EKU can substantially improve the preparation of teachers: enabling them to be more adept at applying technology to learning strategies which will, in turn, enhance student performance Our project has three major goals: (1) creating ""clusters"" of both Education and Arts and Sciences faculty, as well as pre- and in-service teachers, to work together to integrate content, pedagogy and technology through the redesign of technology-rich general education and educational foundations courses for future teachers; (2) establishing ""service units"" to coordinate and disseminate outcomes; and (3) creating an electronic/multimedia portfolio assessment system through which future teachers will document their proficiencies and amass strategies to enhance their future teaching.

Electronic Portfolio Rationale

The Eastern Kentucky University PT3 2000 implementation grant is a very unique, collaborative effort among the College of Education, College of Arts and Sciences, and P-12 partners with a focus on transforming the education of future teachers through the infusion of technology throughout the core curriculum.

As the largest preparer of teachers and educational professionals in the Commonwealth, our emphasis on teacher education is a campus-wide priority through which content areas, pedagogy, and instructional technologies are fully integrated.

Our cluster teams are working very hard to develop a core curriculum that continues to challenge our students through academic rigor while exposing them to cutting-edge technology. We are very excited about the positive impact the results of this grant will have on the preparation of our future teachers. As an example of this collaboration, two College of Education faculty members who were instrumental in the development of Eastern Kentucky University's original education portfolio, one College of Arts and Science biology professor, one P-12 teacher, the coordinator of educational technology and his graduate assistant formed the portfolio cluster. The charge of the "cluster" was to focus on reconfiguring the portfolio to an electronic format. The cluster worked for one year to develop a template for the electronic-portfolio (e-portfolio).

The e-portfolio is required of all Eastern Kentucky University teacher education majors and is based on the Kentucky New Teacher Standards. The e-portfolio provides an opportunity for students to showcase their course work and demonstrate their competence in implementing technology.

It is the intent of the presentation to share the framework for developing the e-portfolio and the implementation of its use in the Educational Foundations Class (EDF 203). Review of the objectives for the portfolio and the rationale for developing a template will be discussed.

Successes and pitfalls of implementing the e-portfolio in eight EDF 203 classes taught by seven different instructors will be discussed.

Objectives for the presentation are to: (a) provide overview of the PT3 grant's objectives, (b) review objectives for the e-portfolio, (c) provide a framework for implementing the e-portfolio with approximately two-hundred and fifty students enrolled in an educational foundations class, (d) share observations of successfully implemented strategies and some failures, and (e) share reflections of the process of integrating the technology.

Electronic Portfolios: Where Should the Portfolios Be Stored?

David Hofmeister, Ed.D.
Curriculum and Instruction Department
Central Missouri State University
USA
Hofmeister@cmsu1.cmsu.edu

Andrew King
Curriculum and Instruction Department
Central Missouri State University
USA
AKing@cmsu1.cmsu.edu

Abstract: Student portfolios contain artifacts from performance-based learning activities that attempt to substantiate learning toward one or more measurable outcomes. Typically the parameters for portfolios follow traditional academic presentations on paper and videotape that are compiled, organized in a binder and presented at specific times for evaluation and comment. Electronic portfolios presented digitally and mirror web environments can include electronic pages hyperlinked together, multimedia, video and audio streams, and other presentation formats that enhance the work. A necessary topic in any electronic portfolio discussion is how and where to store the portfolio.

A student portfolio submitted on paper was never a serious consideration among the faculty in the elementary program. Their collective vision for innovation through a multi-year curriculum development process that aligned INTASC standards to NCATE guidelines and then state performance outcomes as well as maintaining institutional character always sought to have an electronic portfolio. How this electronic portfolio was to be developed and presented were the next decisions. Discussants were highly influenced by the pervasive growth and ease of use the World Wide Web offered. It captivated discussions about the way students could handily develop web pages that faculty could navigate through to read artifacts and reflections. It was the desire to use the web that plotted the course of action.

The faculty quickly learned that the onset of a course of action that includes innovations not common in day-to-day university operations necessitates convincing others that policy changes were needed and network functionality expanded to allow students access to a specific university server to develop, store, and present a portfolio. Initiated in 1995, the faculty had a series of early stage roadblocks that are more easily solved on most campuses today.

This paper reviews a three phase, six-year electronic portfolio history that began with a locally controlled Internet-based environment, a second phase allowing for intranet viewing only along with software support for video streams, and a third phase that outsources to a business which supports web based teaching resources, lesson planning, and allows for electronic portfolio development. When viewed across the developmental continuum, the third phase appears to be the most promising yet. The first phase, Internet-based portfolios, was brief as confidentiality concerns associated with pictures of schoolchildren posted on the Internet were too significant to overlook, and the second phase, intranet-based portfolios, is ongoing.

Electronic portfolio development in a performance based learning environment provides portability, scalable and robustness that simply surpasses what a paper portfolio accomplishes. The portability is evident as students are able to work on the portfolio from any networked campus computer, or with the use of file transfer protocol, ftp, portfolio access is even greater. FTP allows a student to retrieve the electronic portfolio, work on it, and then post it to the server for later use. From the faculty perspective, electronic portfolios can be accessed for review at designated times or upon request. No longer are paper notebook binders carried from place to place nor stored. All artifacts and reflections are presented digitally. Scalability, the second topic, is managed with web-editing programs such as Netscape's Composer, FrontPage, HomePage, etc. which make it possible for a browser to open files and navigate the portfolio with relative ease regardless of the development platform used.

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Electronic portfolios are robust. The flexibility of the web, video streams, animations, Flash, Splash, and other programs provide the portfolio developer with multiple tools to present her/his artifacts and reflections. When electronic portfolios are developed with an organizing template and pre-service teachers are guided through specific requirements and reflective writings, electronic portfolios simply supplant paper portfolios. Once the web page software is learned, portfolio development follows.
Storage is sues are significant. How big will the portfolios be when graphics, animations, artifacts, presentations and video streams are included? Should individual student limits be set or can students have nearly unlimited amounts of server space to complete the portfolio? Initially, the unlimited size for each student electronic portfolio was confounded by earlier decisions. Mainly, a three bay server was purchased with an eight-gigabyte drive in each bay. Two drives where set up to mirror each other with duplicate student folders on each drive. Students could opt to develop on either drive. One was on the Internet and the other was intranet only. The first year of development this system worked well. Late in the second year disk capacity was maximized. This coincided with looming deadlines and high student demands on the server, an unfortunate time to realize the system's limits. Through the responsiveness of the university's network services technicians, the server was reconfigured to allow students continued use by breaking the mirroring which freed disk space. While this server continues to function, a larger server with 70 gigabytes of hard drive space was purchased. To date, only the storage demands for video streams have caused limits to be set.

Stability re mains a critical issue. Placing the server on a network makes it available through student login procedures, and tremendous value-added elements are realized because the university's network includes redundancy, high priority server status for 24/7 maintenance, technicians, and regular software upgrades. The relationship with network services support personnel is important. Servers require regular maintenance, access codes, and eventual replacement. Further, backing up student files is an extremely important safeguard in the event of a physical server crash. Who does the data backup, how often, and where is it stored? The electronic portfolio server has data backed up every 24 hours, and a complete server back up each week. In the event of a physical crash, the server can be re-built with only the information from the previous 24 hours lost. Thus, establishing server priorities with network services, making back up data tapes, setting up utilities to add student portfolio folders, and servicing the server are important processes requiring time and expertise. Faculty often do not have time to take care of such routine matters, so university network services meet the electronic portfolio infrastructure needs.

At this writing, the third phase of portfolio storage is coming into view. There are a number of factors contributing to this change. Currently the two servers largely dedicated to electronic portfolios are aging. The department underwrites their replacement costs and must decide to use technology funds for servers or other technology for teacher preparation and academic needs. Given state budget shortfalls coupled with increasing technology demands in preparing teachers for P-12 schools, shifting to a third party service provider is likely. In addition, pre-service teachers can receive more services from a service provider than the university can provide. Costs are nominal especially for pre-service teachers. A one-time charge of approximately $60.00 allows the pre-service teacher multiple years of access and file storage in a web based work environment. Technology costs, replacements, software upgrades, technical support, and other user services are all included in the service charge. Shifting these ongoing costs and services away from the university to a business is fiscally sound. Educationally, the service provider organizes resources to assist learning and professional development. Through templates students can create new works, include state standards, add curriculum frameworks, access other lesson plans, locate web resources, specify lesson formats, link to websites, create webquests and more. Existing resources on the web site such as lesson plans are readily available for students to access, include, organize, and modify. The electronic resources can be organized into a portfolio and presented to specific faculty and students on the web for feedback and editing, or specific resources can be posted on the Internet for review and use. This purchased service is a significant electronic resource including state and professional society standards, lesson ideas, websites, etc. and simply surpasses what is currently available on the university's electronic portfolio support system.

The three electronic portfolio phases span a six-year venture into electronic portfolios. Each phase represents faculty innovations, their reflections, and responses to modify processes that allow pre-service teachers to take advantage of computer technology and present their learning and reflections in as useful a manner as possible.

Where's the Science? The State of Science Content on U.S. Secondary and Middle School Web Sites.

Thomas M. Keating and Christopher Doucette
Boston College Lynch School of Education

The World Wide Web has diffused from a handful of K-12 schools in the United States in 1993 to near ubiquity in 2001. At present, middle and high schools use the WWW as a vehicle for advertising the school and its mission, extracurricular activities (e.g. sports, clubs, and band programs), academic programs, calendars of events, alumni information, teacher and course web pages, and web pages constructed for and about students to highlight their academic work and projects. It is our contention that the latter category, web pages constructed by students that expand the audience for student academic work and projects, begins to capture the full potential of the World Wide Web in school settings.

In this study we investigated the degree to which student generated artifacts of science learning are represented in U.S. middle and secondary school web sites. A content analysis was performed on 20 randomly sampled high school web sites from each of the 50 states and the District of Columbia (total n=1020) to determine the presence and source or absence of science content. The sample was culled from secondary and middle schools listed by state in the Education Category of Yahoo (http://www.yahoo.com). Each web site was explored in depth to identify science content. A coding scheme was developed to represent the origin and purpose of science content:

0= No reference to science or science content present
1=Science content of an administrative nature (course and faculty listings)
2=Teacher generated science content (science faculty pages and course pages)
3=Student generated science artifacts (papers, projects, and web sites)
4=Exemplary student generated content

Preliminary results indicate that 40 percent of middle and high school web sites make no reference to science, a core academic subject. Approximately 30 percent of schools feature science information of an administrative or informational nature. Twenty percent of schools contained science teacher web pages or pages in support of their courses. Student generated materials were found in only ten percent of the web sites sampled. Of the ten percent, half featured student work that we determined to be exemplary and point in directions that communicate robust science learning in middle and secondary schools. Examples of exemplary web sites will be featured in this presentation.

We conclude that as the World Wide Web approaches the second decade of its presence in K-12 schools, on the whole it remains a one-way conduit into science classrooms. The full potential of the World Wide Web for science education will not be realized until the diffusion of information includes the artifacts generated by teachers and students, and central to teaching and learning, in their classrooms.

A Large-Scale Web-Based Electronic Portfolio System: Developing the Purdue Electronic Portfolio (PEP) System

James D. Lehman
Purdue University
1442 Liberal Arts and Education Building
West Lafayette, IN 47907-1442
lehman@purdue.edu

David O'Brien
University of Minnesota
Peik Hall, 159 Pillsbury Dr., S.E.
Minneapolis, MN 55455
dobrien@umn.edu

Joy Seybold
Purdue University
1442 Liberal Arts and Education Building
West Lafayette, IN 47907-1442
jaseybold@aol.com

Abstract: Electronic portfolios offer a powerful tool for students to demonstrate mastery of performance-based standards for teacher education. As one part of P3T3: Purdue Program for Preparing Tomorrow's Teachers to use Technology, Purdue University's School of Education is developing a large-scale, web-based, electronic portfolio system called the Purdue Electronic Portfolio (PEP) system. This customized e-portfolio system relies on a web-based interface to a database in Microsoft's SQL Server hosted on a large server with nearly two terabytes of storage space. The system allows students to store files and create artifacts, which are coherent collections of files coupled to reflective narratives that address specific standards. The system provides templates, which give users flexibility while providing ease-of-use and some flexibility. Completed artifacts are "published" as web pages. Pilot testing with several hundred users in the fall of 2001 suggests it is an effective tool.

Introduction

The national movement toward performance-based standards for teacher education has prompted much interest in the use of portfolios by pre-service teachers to document their knowledge and teaching performance (Barrett, 1999; Read & Cafolla, 1999). Portfolios are purposeful collections of student work that demonstrate effort, progress, and/or achievement (Barrett, 1999; Russell & Butcher, 1999). They are relevant to the student, individualistic, and can show growth and development over time, providing a richer picture of that understanding than can be achieved through more traditional, objective measures. They provide an opportunity for the pre-service teacher to demonstrate and organize his/her understanding of teaching and learning. Of course, they also provide one means by which pre-service teachers can be assessed.

Much of the interest in portfolio development is now focused on the use of electronic portfolios (Barrett, 1999, 2001; Read & Cafolla, 1999). Electronic portfolios offer several advantages compared to their paper-based analogs, including: reduced storage demands, ease of back-up, portability, ability to create links, and development of students' own technology skills (Barrett, 2001). In the context of developing pre-service teachers' own technology skills, electronic portfolios have the potential to help address the shortcomings of teacher preparation with regard to the use of technology that have been noted in a number of national reports (e.g., Moursand & Bielefeldt, 1999).

Purdue Electronic Portfolio System

Purdue University's School of Education is now implementing restructured elementary and secondary teacher education programs. These new programs feature a cohesive set of courses anchored by four strands – technology, diversity, field experience, and portfolio assessment. Purdue's PT3 implementation grant, entitled P3T3: Purdue Program for Preparing Tomorrow's Teachers to use Technology, is helping to support the implementation of these new programs. One P3T3 initiative is the development of a dynamic assessment system that provides pre-service teachers the tools and opportunities to select multiple ways of viewing their evolving teaching practice, reflect on that practice, and use digital representations to meet performance-based assessments. This large-scale customized electronic portfolio system is designed to accommodate the approximately 2300 students in teacher education, and provide for reasonable consistency in how students and faculty deal with portfolios. The Purdue Electronic Portfolio (PEP) system consists of a database developed using Microsoft's SQL Server, a popular web-based database engine. Access to the database is provided through web pages that use Microsoft's Active Server Pages (ASP) technology. This allows for dynamic interaction with the database through a simple-to-use web front end that is familiar to users. The entire system is hosted on an in-house server with nearly two terabytes of storage space, enough to give each user the equivalent of a CD-ROM's worth of personal storage.

Students can use the system to upload files and create artifacts. In our parlance, an artifact is a collection of files that the student assembles in the eportfolio system to address teaching proficiency. Students may classify artifacts according to three broad locally-developed themes as well as the ten INTASC principles that undergird many teacher preparation standards. To display the artifact, the PEP system features a template system that allows students to integrate a reflective narrative with links to various files that relate to a specific artifact (e.g., a written lesson plan, course assignment guidelines, a digital photo or even video of the lesson being taught). The templates provide flexibility in determining how the artifact will look, while providing consistency and ease-of-use. Once completed, the artifact is "published" as a web page with links to the integrated files. Initial pilot testing of the PEP system began in the fall of 2001 with about 400 students in Block I of the teacher preparation program. Results indicate the system provides the necessary functionality for student portfolio creation. The system may provide a model for other teacher education institutions interested in electronic portfolios. For more information, visit our website at: http://p3t3.soe.purdue.edu.

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Reflection as the Foundation for E-Portfolios

Barbara B. Levin
Department of Curriculum and Instruction
The University of North Carolina at Greensboro
United States
Barbara_Levin@uncg.edu

Jean S. Camp
School of Education
The University of North Carolina at Greensboro
United States
Jean_Camp@uncg.edu

Abstract: This paper describes a process used to guide written reflections used for entries in technology portfolios that are required for teacher licensure in North Carolina. While supporting artifacts are important evidence of meeting ISTE's technology standards for teachers (NETS-T), we believe the focus of our electronic technology portfolios should be on our preservice teachers' ability to reflect about their personal and professional uses of technology for teaching and learning. This paper includes an example of an entry from our model electronic portfolio that clearly delineates all the steps of *The Reflection Cycle*: selection, description, analysis, appraisal, and transformation.

Introduction

Reflection is a highly valued attribute of effective teachers (Henderson, 1996; LaBoskey, 1994; Lyons, 1998; Ross, Johnson & Smith, 1992; Zeichner & Liston, 1987). Without the disposition to reflect on their performance, teachers are less likely to improve their practice or to be able to see the links between theory and practice. While some research states that only 20% of teachers are naturally reflective (LaBoskey, 1994), we believe that this habit of mind is so important that we must try to teach all prospective teachers how to reflect on their practice. One way we do this is to use a specific model of reflection with our preservice teachers while they are developing their teaching and technology portfolios.

In our teacher education programs at The University of North Carolina at Greensboro (UNCG), we provide many opportunities for reflective writing including response journals, electronic discussions, self-assessments, and peer coaching. We also explicitly teach a process for reflective writing in our elementary education program and emphasize this practice while our teacher candidates are gathering evidence for their technology portfolios. Reflective thinking and reflective writing are required in our curriculum, but we focus on developing these skills during the preparation of technology portfolios that are required for initial licensure of every teacher in North Carolina. In our post-baccalaureate elementary teacher education program, we also focus heavily on reflective writing, as these students must prepare an integrated teaching and technology portfolio as a requirement for the Masters degree. Another incentive for teaching our students a specific process of reflective thinking is that the state of North Carolina requires initially-licensed teachers to prepare a performance-based (PBL) product, which is essentially a teaching portfolio, in order to obtain a professional teaching license. In an effort to help our prospective teachers be successful in developing their PBL product, we begin teaching them a specific process for reflective writing using *The Reflection Cycle* (see Figure 1) during their preservice teacher education program. We hope that this process has heuristic value for our students as they move into their chosen profession, so that they will think reflectively about their students' learning, the curriculum, and their teaching practices.

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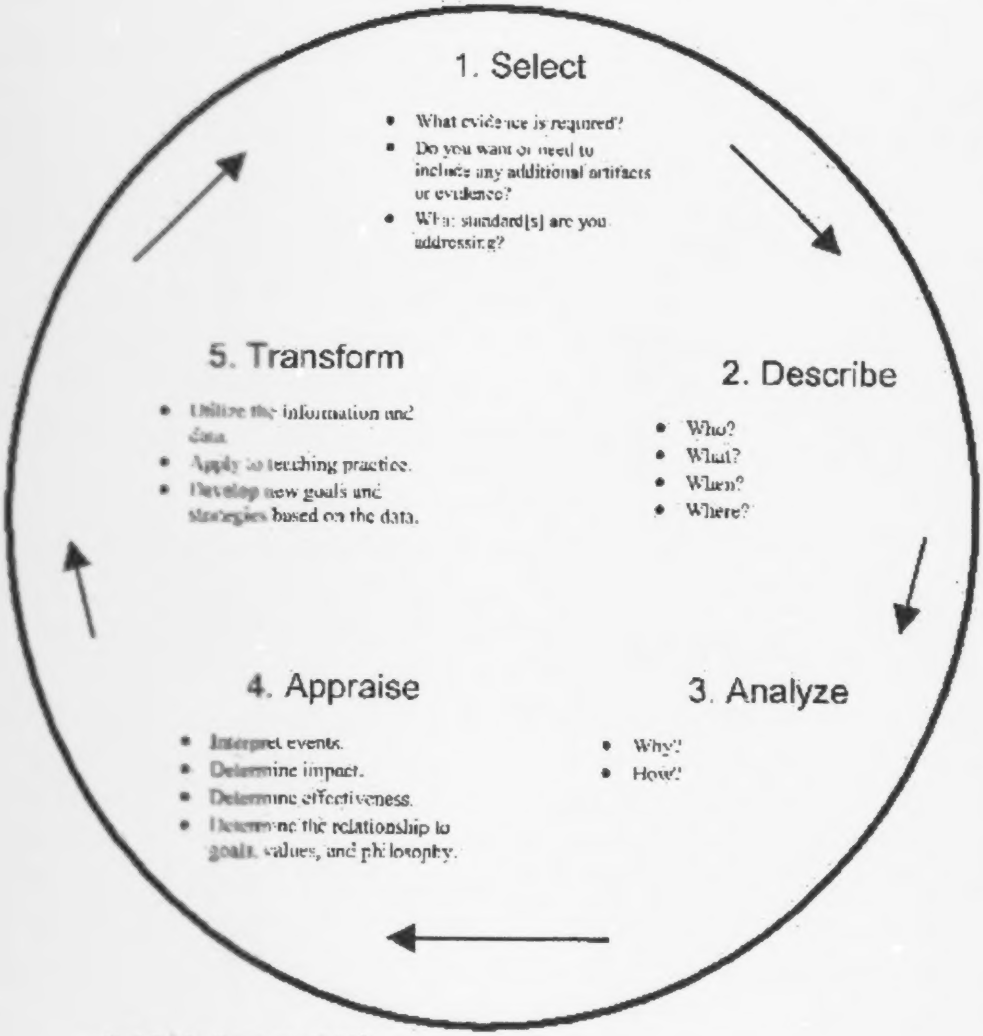

1. Select

- What evidence is required?
- Do you want or need to include any additional artifacts or evidence?
- What standard[s] are you addressing?

2. Describe

- Who?
- What?
- When?
- Where?

3. Analyze

- Why?
- How?

4. Appraise

- Interpret events.
- Determine impact.
- Determine effectiveness.
- Determine the relationship to goals, values, and philosophy.

5. Transform

- Utilize the information and data.
- Apply to teaching practice.
- Develop new goals and strategies based on the data.

Figure 1. The Reflection Cycle
Source: NC Department of Public Instruction
http://www.ncpublicschools.org/pbl/pblreflect.htm

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Integrated teaching and technology e-portfolios

While some teacher education programs at UNCG require separate technology portfolios, most require teaching portfolios with technology integrated throughout them. Technology and teaching portfolios emphasize reflection that requires descriptive, analytical, and transformative writing about the evidence presented in these portfolios. Although our portfolios are organized around standards, including the ISTE NETS-T and the INTASC standards (or our state's Advanced Competencies for Master Teachers for M.Ed candidates), our prospective teachers are asked to use *The Reflection Cycle* to justify how their artifacts meet each standard. The overall goal of this focus on reflection is to foster understanding of how technology will impact teaching and student learning. We find that pushing our preservice teachers to go beyond describing the evidence in their portfolios to analyzing and appraising it, and then to thinking about how it transforms their practice, requires a concerted effort on their part and ours.

Recently we have begun the process of moving from print to electronic portfolios that integrate teaching and technology standards, following models developed by Helen Barrett of the University of Alaska. However, our version of e-portfolios continues to emphasize reflection and use of *The Reflection Cycle*. In fact, we spend as much time helping students learn to reflect on how they can use technology to promote student learning as we spend on refining their own technology competencies as professional educators. As our preservice teachers begin collecting evidence to demonstrate mastery of the NETS-T and INTASC standards, they simultaneously learn and practice their reflective thinking and writing skills. Evaluation of their e-portfolios is based mainly on their success in using *The Reflection Cycle* to (a) describe each entry, (b) analyze why and how their evidence meets a particular standard, (c) appraise their evidence against their effectiveness for teaching and learning, as well as against the goals, values, and philosophy of the standards, and (d) write transformative statements about how the evidence applies to their teaching practice and how they will do things differently in the future.

Scaffolding reflective writing

Among the supports we provide our preservice teachers as they learn to use *The Reflection Cycle* are examples of reflective writing based on this model. We provide both good and poor models of reflective essays so that our preservice teachers can identify elements of *The Reflection Cycle* in examples that are well-written and those that need revisions, or may even have essential elements missing from the examples. We follow this with written feedback on drafts of reflective essays submitted with supporting evidence, which will eventually go into their teaching/technology portfolios. We also provide opportunities for peer coaching and peer feedback when at least half of the preservice teachers have become adept at using *The Reflection Cycle*.

The following example, which is taken from the model Teaching/Technology E-Portfolio that we have online at http://www.uncg.edu/soe/affiliates/teachers_academy/e_portfolio/main.html, actually has the parts of *The Reflection Cycle* labeled, so that readers can easily see the selection, description, analysis, appraisal, and transformative sections of the reflective essay. This example meets NETS-T #6 (*Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PK-12 schools and apply those principles in practice.*), as well as INTASC principles # 9 (*The teacher is a reflective practitioner who continually evaluates the effects of his/her choices and actions on others (students, parents, and other professionals in the learning community) and who actively seeks out opportunities to grow professionally.*) and #10 (*The teacher fosters relationships with school colleagues, parents, and agencies in the larger community to support students' learning and well-being.*). In fact, in the e-portfolio, standards that are indicated in parentheses are hyperlinked to copies of these standards. There are also hyperlinks to specific artifacts that provide supporting evidence for the reflection, such as the PowerPoint slideshow discussed in this example.

Example of Reflective Portfolio Entry about Social, Legal, Ethical, and Human Issues (ISTE-NETS-T #6)

Select: I developed and facilitated a PowerPoint presentation for parents and teachers at a PTA meeting at Verifine Elementary School (INTASC #9, #10). The presentation was about social, ethical, legal, and human issues with respect to technology use (NETS-T#6).

Describe: During my presentation (see Artifact #1-PowerPoint slideshow) we discussed how to protect one's privacy while using the Internet. We identified problems and dangers that students might encounter when using the Internet and I demonstrated the filtering software that we use at Verifine School (see Artifact #2 – link to information about filtering software). Then we brainstormed rules that students would follow when they are online to avoid these problems (INTASC #10). Next, I explained the Acceptable Use Policy (AUP) at Verifine School (see Artifact #3 – copy of AUP). Each parent received a copy of the policy to discuss with their child before signing and returning it. (NETS-T #6, INTASC #10). Next we examined equity issues around technology. I shared statistics demonstrating gender inequity with regard to computer technology (NETS #6). We brainstormed strategies that students can use to recognize bias in materials. We also discussed some of the things that students need to consider when collaborating on projects, especially computer-based projects. We discussed what students and parents need to know when evaluating the authenticity of material found on the Internet. Finally, we talked a lot about copyright issues, especially how it relates to electronic material and how the "fair use" policy is used by educators (Artifact #4-link to copyright information).

Analyze: I think parents and teachers learned a lot from the presentation. I am also confident that they will share this information with their children and model responsible ethical and legal decision-making concerning technology (INTASC #9, #10, NETS-T #6). I found that my presentation was aided greatly by my use of technology (INTASC #9). Using PowerPoint helped me organize my presentation into a series of slides that contained talking points. As I facilitated the presentation and ensuing discussions, the slides kept me focused without having to look at my notes.

Appraise: I realized that parents are receptive to learning new things about educational uses of technology. They were glad to hear more about our AUP and to know that we are teaching how to use the Internet responsibly (INTASC #10). I believe that PowerPoint was an effective use of technology because it created a bright and appealing visual aid that kept the audience focused.

Transform: If I were to do this presentation again I would definitely use PowerPoint, but I would change two things. The first thing is that I would invite parents and students to come to the meeting together. The presentation is appropriate for children and they would have also learned a great deal. I think this would be a great opportunity for parents and children to learn something together (INTASC #10). The next thing I would change would be to include specific scenarios that deal with social, legal, ethical, and human issues around technology (Artifact #5-example of scenario about piracy). I think such examples would make the presentation more interesting and the content more understandable for the learner (INTASC #9, NETS-T #6). In the future, I also plan to make use of PowerPoint in the classroom because the visual nature of the slides will help some students stay on task and the organizational schema will help students understand and remember material – especially my visual learners.

Progress toward reflective thinking in e-portfolios

We believe the quality of our teaching/technology portfolios has improved over the five years we have required them. Such improvement seems to be commensurate with the focus we have placed on integrating the reflective cycle into our professional courses. By the time our prospective teachers graduate, reflecting seems to be a natural process and, hopefully, is one habit of mind they will take not only into their induction period, but throughout their teaching career. As we evaluate this year's teaching/technology portfolios we will continue to refine our efforts to support prospective teachers as they learn to reflect about their practice and about their students' learning. We feel that they have made progress during the past five years, but we will continue to strive to help our students develop into reflective practitioners.

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A WEB Based Electronic Portfolio System for Tracking, Assessing and Displaying Candidate Performance

Leroy Metze and Mark Pitcock

Western Kentucky University's College of Education and Behavioral Sciences has received an Innovation Challenge Grant from the United States Department of Education. The project, called e-train express, will implement programs and strategies that increase the number and quality of new teachers who are highly effective in using technology to facilitate, assess and communicate learning for all students.

Since only 20% of current teachers feel comfortable using technology in their classrooms and over two million new technology proficient teachers will be needed in the next decade, Western Kentucky University (WKU), along with partner schools [schools in the 28 districts of the Green River Regional Educational Cooperative (GRREC)], the Compass Learning Corporation and NetTango are implementing programs and practices designed:

- To ensure that all teachers who graduate from our teacher education program can use technology to increase student achievement;
- To ensure that all graduates can use technology to assess student learning;
- To ensure that all university faculty from both teacher education and the arts and sciences departments can model effective technology-assisted instruction for prospective teachers;
- To ensure that electronic portfolios are used as the primary means of gathering data used in the evaluation of teacher performance;
- To use technology to show K-12 students that teaching is a good career option; and
- To set up an electronic clearinghouse that will give teachers and teacher educators throughout the country access to exemplary technology-assisted lesson plans and assessments.

Western Kentucky University believes that technology has the potential to make teaching and learning far more efficient than in the past. Technology not only gives people access to new information, it gives them more opportunities to work together. The e-train express will enable WKU to integrate technology in teacher preparation courses and use technology to spread the best practices that develop from them.

During the first year of the e-train project the focus has been on two areas: Ensuring that all university faculty from both teacher education and the arts and sciences departments can model effective technology-assisted instruction for prospective teachers and establishing and using an electronic portfolio system for tracking, assessing and displaying candidate performance and assessing our program. This paper focuses on the development and use of our electronic portfolio system.

This paper describes:

- The process of developing critical performances for every course taken by teacher candidates in teacher preparation courses and courses in the arts and sciences:
- The process of developing scoring rubrics for these performances;
- The development of a web based electronic portfolio system for tracking candidate behaviors related to each critical performance;
- The development an assessment system for evaluating candidate work using the electronic portfolio system;
- The development of a process for making selected student work available for perspective employers and others to view;
- The development of a procedure for assessing our program using data from the electronic portfolio system; and
- The process that has been developed for other colleges and universities to share our system.

For more information about e-train express, please see www.etrainexpress.com.

Development of Digital Portfolios in a Outcomes Based Curriculum

Jacques Morin, Zayed University, AE

Zayed University is located in the Gulf Region in the United Arab Emirates. It is a 3 year old all female institution providing undegraduate education in an outcome based curriculum.

This year, the university will graduate it's first ever class. All students are required to create a digital portfolio related to the published outcomes for each of the colleges.

Two departments are are involved in assisting Faculty in the development of these portfolios for students. Media Services and Information Technology.

This paper describes the start up issues of Media Services and IT and the training required for Faculty to allow them to be technologically competent to assist student in the development of digital portolios.

As the institution moves towards digital portfolios for students, several key factors have been indentified as requirements including the level of technology competence for Faculty and the availability of production facilities.

Electronic Portfolios in Teacher Education: From Design to Implementation

Laurie Mullen
Department of Educational Studies
Teachers College
lmullen@bsu.edu

Amy Doty
School of Music
College of Fine Arts
adoty@bsu.edu

Richard Rice
Department of English
College of Sciences and Humanities
rarice@bsu.edu

Ball State University
United States

Abstract: In this session, we share results of our second year of electronic portfolio design and implementation. We highlight the pedagogical and programmatic considerations that have emerged from the portfolio models. Suggestions for other institutions who are considering electronic portfolios centered on reflection and performance based artifacts will be shared. Our presentation includes specific portfolios representing various licensure areas.

Background

Due do concomitant national and international teacher education initiatives, namely performance based assessment and educational technologies for teaching and learning, the implementation of electronic or digital portfolios as a major means of assessment is growing. By June 2002, our university is mandated to have a performance-based Unit Assessment Plan (UAS) in place. Our institution has identified student electronic portfolios as one performance assessment instrument for demonstration of multiple competencies. Engaging in the electronic portfolio process will also help students to develop technology-related knowledge and skills.

Our portfolio model includes a focus on student reflection and performance-based artifacts. Given the longitudinal nature of the student portfolio, reflection will become more rich and complex as students continue in the program. Students use course assignments along with outside experiences as potential artifacts to demonstrate competency in the INTASC and state standards. Building with their first education course through student teaching and induction years, candidates will offer an evolving portrait of their growth as prospective teachers supported by hyperlinked artifacts that demonstrate and exemplify this reflective development and competency.

Preliminary Findings

We highlight only two issues from our on-going analysis for promoting reflection and demonstrating competency in electronic portfolio environments.

Reflection

The anticipated level of reflection was not apparent in the students' electronic portfolios. Even though the students were told that their portfolio was a place to process, the students did not want or feel comfortable reflecting on highly personal or ambiguous issues in a web-based format. One student shared that the *gloss* of a web page forced her to write in a way that appeared as "finished" and "clean". In addition, the reflections are mainly text-based as students made limited use of hypertextual language structures and almost no use of other digital media. Students reported a lack of experience across their curriculum with writing in electronic hypertextual environments. The quality and depth of reflection in the oral portfolio presentation however, was far greater than the students' written text. The ability to reflect orally in presentation format and in interactions with instructors and peers holds great promise for capturing rich reflection

Artifact Choice and Justification

The artifact choice in a portfolio may well be one of its most important components. In our portfolio model, the artifact is matched to a standard and is meant to document current competency. Equally important is the artifact *rationale* in which students articulate their justification for inclusion in relation to a particular standard. The rationale is meant to make implicit and explicit connections for the student as well as for the reader. Students were to 1) explain *why* the artifact was filed under a particular standard, 2) describe *how* the artifact fits into a student's growing competency, and 3) explain their strengths and weaknesses in relation to a particular standard.

Many students struggled with a coherent fit between the standard, the artifact, and the rationale. This was more prevalent with freshmen that were just becoming familiar with the various standards while trying to learn the technology and make decisions about appropriate artifacts. Upperclassmen who already had working knowledge of the various standards were better able to choose and create appropriate rationales for artifacts. This discrepancy may also be influenced by the wealth of potential artifacts that the older students had available to select from, as well as their confidence in their knowledge and ability to justify their progress in their degree program. For many however,the rationale and artifact were treated as isolated items with little relation to each other. It will take time in the program to teach students how to "think" about their work in portfolio terms.

Significance

Increasing numbers of universities moving to electronic portfolios will require university educators to provide assistance in the process of deep reflection and performance-based competency in this new medium of representation. While our data are not generalizable to other contexts, the issues raised here may alert others to similar areas of concern. One potential danger lies in the treatment of knowledge as superficial and "thin" at a time when the concept of knowledge as constructed and dynamic in nature persists. In an attempt to infuse technologies into the teaching and learning process for preservice students, we may inadvertently misdirect our students in terms of representing knowledge growth. Our initial work demonstrates the importance of the purpose of alternative assessment method as capable of capturing long term process and alternative representations of knowledge.

Data from this study suggest that researchers in this area may need to explore new methods of collecting reflection as it appears in new hypertextual and hypermedia forms. These data also suggest that instructors must teach students how to explicitly make the connections between artifacts and meaning-making rationale. The way in which we ask preservice students to verbalize abstract, complex, possibly ethereal, and certainly fragile understandings of the learning to teach process affects *what* and *how* they tell us. If language creates a particular view of reality and of the self, we need to investigate how language and meaning are mediated by digital environments. Van Manen (1990) raises the issue of the epistemology of language and text when he states:

> We must not forget that human actions and experiences are precisely that: actions and experiences. To reduce the whole word to text and to treat all experience textually is to be forgetful of the metaphoric origin of one's methodology (p. 39).

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The Model of a Teacher's Electronic Portfolio: Enhancing Instructional Planning

Ju Park
School of Teaching and Learning
University of Florida
United States
juwonp89@hotmail.com

Abstract: The purpose of the short study is to suggest how a teacher's class web site, as an electronic portfolio, can be efficiently designed for instructional planning. The findings guide a teacher to avoid haphazard web site designing. Specifically, the suggested model of a class web site covers the sections of a teacher's biography and course information.

Introduction

Teachers have used various types of technical skills and products such as web sites, multi-media presentations, educational videos, and so forth to facilitate learners' achievements (Shuell & Farber, 2001). Upon finishing a particular lesson, a teacher usually starts to evaluate students' results or productive outcomes in several ways. Students who actively participate tend to have a stronger learning experience through integrated instructional technology (Fischer, 1996).

An electronic portfolio has become a new method for faculty's assessment of student's lesson outcomes and even for pre-service teacher education (Read & Cafolla, 1999). Furthermore, teachers have used their own electronic portfolios as a supporting instructional resource. However, there are some aspects to be critically considered for designing efficient faculty's class web sites. With respect to sections on a class web site, one can differentiate, customize, and develop his and her class web site that stores text, photos, and graphics; even pictures on a class web site produce diverse meanings upon viewing (Zammit, 2000).

According to the study of Lankes (1995), there are several types of electronic portfolios: Teacher planning, proficiency, showcase, employment skills, and college admission. The electronic portfolio as a class web site is based on the perspective of a teacher-planning portfolio.

Using the suggested model of faculty's web site (Ruffini, 2000) is to serve for a teacher's electronic portfolio. Ruffini's model has three main sections: Biography, course information, and publications. Those are critical for portfolio development, which demands several developing stages such as collecting, inspecting, purpose and audience, and so forth (Barrett, 2000).

Advantages of an electronic portfolio as a class web site

Electronic communications in schools have created opportunities for teachers to interact with their students quickly without limitation of time and location. In order to have this advantage, teachers and students need to have computers, printers, fax machines, and other equipment for various communication ways. Among these, a teacher's electronic portfolio serves as a class web site that gives students more convenient access to updated information and better understanding about the class. The teacher's class web site becomes the storage of students' completed projects, allowing other students see what classmates have produced for each project. In comparing others' works on a teacher's electronic portfolio as a class web site, students can do the following:

- Improve her/his productivity, Adjust new information to one's learning strategy, Have answers to questions via updated information, Create and innovate new idea, Raise critical comments in group activities, Improve access-quality beyond the limitation of time and location

A class web site at schools becomes not only a collection of a student's work, which demonstrates her/his skills and achievements in projects or activities, but also a class electronic bulletin board, which posts class schedules, current students' activities, students' personal directory, an upcoming assignment information, and so on. Among models suggested by Lankes (1995), the teacher planning electronic portfolio is used as a class web site and a collection of students' accomplishment. A teacher may use an electronic portfolio to receive information about incoming students in order to effectively plan both a class curriculum and instructional design and strategy. As a result, the teacher may have an idea of the level of knowledge and employ the electronic portfolios as a pre-assessment for classes before a class starts.

A teacher may store a sample of an assignment while students start to create an assignment. For example, if assigning the creation of the timeline of American Civil War in Florida in a social studies class, a teacher may post several sample works in order to give students in and out of a class better understanding of format and components. In viewing these samples, students are able to consider what they need for a project and to provide sufficient information for specific events in American Civil War in Florida. Furthermore, students in a group activity can communicate with group members and discuss their projects via an electronic bulletin board in a class web site.

Suggested factors in a class web site

In designing a class web site, a researcher found that employing systematic approaches will help prevent a haphazard web site because an ill-planned web site may cause students to be confused and distracted when they attempt to retrieve information (Ruffini, 2000).

To design an effective class web site, a teacher may include the following factors:

- Target Audiences, Objectives, Contents, Page Design and Structure

In terms of appropriate level of instruction, a teacher should consider pre-requisite skills and knowledge, learners' current levels of knowledge, and predicted objective outcomes. In considering these factors, the teacher can design a class web site that is user-friendly accessible and appropriate for the incoming students. When a teacher designs a class web site, the teacher should ensure that the information included for students is consistent with instructional objectives. Several reasons to have the class web site consistent are; it reduces vagueness of instructional objectives, emphasizes the purposes of the class, and clarifies the information required for assignments, projects, and class preparations. With respect to contents, accurate information is critical to make a class web site a relevant information resource. Inaccuracies in the content of the class web site may misguide students.

Zammit's research on graphic icons (2000) shows that "pictures and graphics are more likely to be seen by different users in different ways than would chunks of text" (p.217). Due to that, a teacher should, upon planning and designing, consider user readability. It would be difficult to satisfy all students' comprehension of information provided in a class web site. However, as long as the class web site is not e-commerce web sites, which are typically long and complex, a teacher may be able to create and maintain an unequivocal class web site. When applying these ideas, a class web site serves as a teacher's electronic portfolio and may include several sections: Instructor's background, information for the class, and a collection of students' products; each section may also have several sub-sections.

Conclusion and Discussion

"E-mail is used to facilitate communication among students or between the instructor and students; and electronic discussion boards and liaison are used to expand classroom discussion" (Shuell & Farber, 2001, p.119). Other than e-mailing, some of the valuable ways in which electronic portfolios can be used are: Posting outcomes of students' learning, management of teachers' instructional strategies, and storing and supporting academic information by school library media specialists. The electronic portfolios can be designed systematically in order to facilitate maximum functions with respect to delivering and storing information. If a teacher cannot store or manage many students' electronic portfolios due to capacity of file volumes and computer system, media specialists should manage such huge portfolios for most teachers and students in a school media center (McDonald, 1997). There are issues concerning the collaboration between a teacher and a media specialist in meeting instructional needs of students' electronic outcomes.

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Year Two of the Electronic Portfolio Project at the University of Florida

Gail Ring, University of Florida, US

Abstract In this session I will report the results of the first year of implementation of the electronic portfolio project in the College of Education at the University of Florida. I will address the successes of the project as well as project weaknesses.

Background

The college of education at the University of Florida has completed its first full year of implementation of the Electronic Portfolio Project in which all preservice teachers are required to develop, publish, and maintain electronic teaching portfolios. During this first year we have learned what contributes to the success of such a program as well as what impedes its success.

The Purpose

All students majoring in Early Elementary Education, Elementary Education, and Secondary Education at the University of Florida are required to develop and maintain an electronic teaching portfolio. The purposes of the portfolio are to:

- present illustrations of competency in the 12 Florida Accomplished Practices;
- promote the use and integration of technology in the educational experience at UF;
- promote the development of a professional vita;
- provide a forum for connecting a student's university experience to personal and professional insights;
- provide a better understanding of professional requirements for certification beyond the University of Florida, i.e., National Board Certification.

In addition, our students have come up with different ways to use their portfolios. For example, some students use(d) their portfolio as a teaching tool, others as a way to push themselves to learn more about innovative uses of technology.

Strengths of the program

The Electronic Portfolio Program has enabled the college to involve students in their education. Students have commented that throughout their program they were often just taking classes, not really thinking about what it was they were learning. More than one student noted that the development of the portfolio enabled them to step back from their assignments and reflect on what they were learning and its relevance to their teaching. Student comments such as: "After I began to work on my portfolio and put all the elements together, I began to see that I really had learned a lot!" reiterate that reflection is a necessary element of the portfolio development process.

Weaknesses of the Program

The first year taught us a great deal about the implementation of a college-wide innovation. We learned that the success of the project is directly correlated to the level of classroom integration. In other words if the faculty don't actively support the project the students are often going to feel that it is an add on and will go away, or that no one will look at the portfolios so they can be put together quickly at the end of the semester.

Student Benefits

The e-portfolio was designed as way to encourage students to make connections between the theories they are learning in their courses, their assignments, and the authentic experiences they have in their field work. In addition, developing a web-based portfolio of their work enables students to learn how to use and integrate technology throughout their graduate program. This provides our students with technological fluency. In addition, through their reflective (rationale) statements students provide tangible evidence that they have a clear understanding of the Florida Accomplished Practices.

Programmatic Benefits

The portfolio project is part of an intensive change effort at the college, and as such has the potential to impact the curriculum, level of technology integration, and evaluation. Change, however, is rarely easy and not embraced quickly and evenly. Although many professors had little involvement with the portfolio project in the first year, by the second year, many are beginning to discuss portfolios with their students and seeking ways to integrate the electronic portfolio project in their courses. In addition, many professors who have not previously used technology in their teaching are taking advantage of the faculty development opportunities available to them in the college.

Future Directions

As we proceed with the project we continue to have many questions about portfolio development such as: What factors in the development process contribute to richer student learning? How will developing a portfolio contribute to students' ability to reflect about their own work and their own progress? How does developing a portfolio contribute to the students' perceptions of themselves and their own abilities? As we continue to work with our students and their portfolio development, we hope to address these issues.

The Good, The Bad, & The Ugly: lessons learned from electronic portfolio implementation

Ann Rose, West Liberty State College, US

At the SITE 2001 Conference, we were inspired by the work being done with electronic portfolios. Returning to campus, we knew that this was something we wanted to do. It fit so nicely with what we had heard about the new NCATE guidelines. So, during the past year, West Liberty State College, a small 4-year state institution in northern West Virginia, undertook the challenge to move to performance-based assessment and electronic portfolios within the Professional Education Department. As a result, over 900 of the institutions 2500 students are now creating electronic portfolios for student and program assessments.

This decision was not made quickly or lightly and reflects our commitment to remain aligned with the new NCATE guidelines and the NETStandards. Through the development and implementation of our plans, we learned many lessons that should be valuable to any other institution considering a similar program. Our faculty required education on portfolios and performance-based assessment before we could begin discussing portfolios, electronic portfolios, or artifacts and structures. This lead to an enlightenment that perhaps some very tried, if not true, teaching methods might need to change. We conducted workshops and in-services in addition to one-to-one mentoring sessions. In addition to motivation for the common good of our students, we are approaching an NCATE review next year.

Once a commitment to portfolios was formalized, albeit some reluctance, a committee was formed to make a proposal. The format was determined to be electronic with a meshing of our NCATE Conceptual Framework and the INTASC Standards. Students would be required to select two artifacts to support each standard and provide a written reflection offering (1) a description of the artifact, (2) a statement relating how the artifact demonstrates work related to that standard, and (3) a personal reflection of future growth goals in this area. Additionally, each portfolio would include a personal statement/resume, a philosophy of education, and any additional information the student wished to include. Finally, it was decided that the portfolio would be conceptually introduced in the first education course, *Introduction to Education* and the technological mechanics would be addressed in the first technology course.

The second hurdle was the decision of how to "use" the portfolios. The department agreed that this should be an assessment portfolio demonstrating breadth, depth, and growth on the part of student. A comprehensive rubric was developed and a decision made to assess the student reflections rather than the specific content of each artifact. As a result, we back peddled and decided that each and every EDUC, READ or SPED course would include multiple assignments that would be designated as "potential" portfolio items. Each assignment should be performance-based and assessed within the course where it was assigned. The instructor of each course would be required to assess the assignment and give a course grade. From this collection of "potential" portfolio assignments, the student then selected the items for reflection and inclusion within the portfolio. The initial evaluation of the portfolio would be at the time of formal application to the Education Program. This usually occurs after approximately 60 credit hours. A committee of two faculty members would review each portfolio in conjunction with other admittance criteria.

The second assessment would occur midway through the professional/student teaching semester. At this time, the portfolio would be assessed to determine how the student demonstrated mastery of each of the standards. Again, a rubric was developed to guide a committee of three faculty members. Scores for each standard were noted and used to determine weaknesses in our program and courses. Students received an unacceptable, developing, acceptable, or exemplary rating. Feedback from this assessment is used for program modifications and department decisions.

One of the most challenging decisions was to use an electronic format. Several faculty were not comfortable with this idea. Unfortunately these people are not comfortable with much of the technology available today and reflect many of the skills still found in our local schools. For this purpose, it became necessary to select a platform that was advanced enough to provide a comprehensive picture of the candidate's knowledge, skill and attitude yet still be consistent with what might be useful for future purposes (i.e. interviewing). We chose to build web-based portfolios with electronic documents, scanned documents and images, digital photos, video clips, and audio clips. Students were encouraged to link PowerPoint presentations, Web Quests and other projects as artifacts.

We have worked on this for one year and now know what we did right and what we did wrong. Our first set of portfolios has helped us to see what we should have considered. The largest problems we are facing are reluctant students and overworked faculty members. The students don't see the value/need for these. They are very comfortable with the tried and true lecture to me and then give me two tests model. Many are kicking and screaming about a shift to performance-based assessment. Yes, it is more work for them; and for us, the faculty, too. The faculty found more work than expected in designing, developing and grading these portfolio assignments. Faculty had the additional burden of assessing the portfolios. Let's see... 90 student teachers with 3 evaluators each means 270 assessments divided among 12 faculty members who don't all do share. Sound familiar? This was the ugly part!

The actual portfolio results have been both good and bad. Some are disappointing. Others made it all worthwhile. The elementary students have more motivation but sometimes lacked the depth of reflection or technical skills. Some of the secondary students really showed their expertise and have portfolios on CDs that will certainly open many job doors. Some others, often by major, are less satisfactory. For us, we will continue and hope that we can grow from our lessons learned. Perhaps, our lessons learned will help you too.

Promoting Paperless Portfolios as Assessment in Graduate Level TESOL Programs

Annis N. Shaver
Department of Teaching and Learning
University of Miami
United States
ashaver@miami.edu

Mary A. Avalos
Department of Teaching and Learning
University of Miami
United States
mavalos@miami.edu

Abstract: This article describes curriculum and course design innovations for electronic portfolios used as a final evaluation in a graduate level TESOL program. Components of this portfolio are authentic documentation of the abilities mastered by the inservice teacher during the course of graduate study. The highlighted components, among others, are compiled into an electronic portfolio, making use of a multi-media format (i.e., digitized video clips, tape recordings, photographs) in a PowerPoint presentation.

The use of portfolios as a means of authentic assessment and evaluation has become increasingly popular in undergraduate as well as graduate programs (Tellez, 1996). Graduate programs often make use of portfolios in place of traditional comprehensive exams as final student evaluation. As technology becomes the norm in all areas of education, such evaluation portfolios are becoming paperless. Recent research indicates that paperless portfolios in graduate programs have distinct advantages over other conventional forms of assessment, such as the traditional portfolio or comprehensive exam (Jackson, 2000; Swain & Ring, 2000). Benefits of electronic portfolio assessment are demonstrated both in terms of authentic student evaluation and in students' ongoing use of technology in their practical and professional endeavors. This presentation describes an electronic portfolio evaluation being developed for teachers in a graduate level TESOL program. While the concept of the paperless portfolio is well founded in the literature, the design is innovative.

The context for this qualitative study is a Teaching English to Speakers of Other Languages (TESOL) Master's degree program at a large university in the United States, whose participants include beginning and veteran teachers. This presentation includes a description of components of the electronic portfolio based on core course work, the ESL Standards for Pre-K—12 Students (TESOL, 1997), Preprofessional Competencies for Teachers of the Twenty-First Century (Florida Education Standards Commission, 2000), and National Board Certification Standards (National Board for Professional Teaching Standards, 2001). The portfolio contents are assembled by the program participants during the year-long program of study for the Master's Degree. The skills acquired by participants will be beneficial in promoting technological expertise.

An innovative twist to this portfolio design is the integration of the components across the program curriculum. As we researched previously designed electronic portfolios and planned implementation of such a portfolio into our program, we noticed that components of many such portfolios were based on one specific set of standards, i.e., best teaching practices, with the student required to document competency in each area. Because teaching is such a complex and integrated field, we decided it would be a more authentic form of assessment to design components enabling teachers to demonstrate multiple competencies over time and across graduate courses. Our faculty collaborated to design portfolio components that integrate the objectives of several classes, and to re-design class projects in order to support these components. They worked to ensure that each exercise would be a truly authentic assessment of TESOL pedagogical practices. One component, for example, is a case study that integrates language assessment with knowledge of linguistic subsystems, knowledge of second language acquisition, and knowledge of TESOL theories and practices. Other features of this innovative electronic assessment include video clips of the students teaching, and student-designed internet-integrated curricula for K-12 students learning English as a second language.

The Linguistic Assessment Case Study component was the result of a brainstorming session of the TESOL faculty. It integrates material learned in four courses: Applied Linguistics, Language Assessment, First and Second Language Acquisition, and Theories and Practices in TESOL. It also integrates the TESOL Standards dealing with language and assessment, seven of the twelve "best" teaching practices and five of the twelve National Board Standards. When preparing this component of the portfolio, the student will implement an on-going authentic assessment of a learner with limited English proficiency (LEP) for one academic year. The learner's progress will be assessed through a collection of interlanguage samples. Progress will be scored using analytical rubrics and the assessor's knowledge of linguistic structures as they relate to these subsystems. The learner will be assessed in the areas of speaking, reading, writing and content areas. Second language acquisition will be assessed compared to the theoretical sequence of second language acquisition. TESOL theories and practices will aid the assessor in prescribing curricula for the learner based on the assessed needs.

The Integrated Webquest Unit integrates two TESOL standards, nine accomplished practices, and eleven National Board Standards. Using the combined knowledge of TESOL theories and practices, concepts in multi-cultural education, and curriculum design for LEP students, the student will design an integrated multi-media/web-based unit for second language learners.

Another opportunity to demonstrate knowledge and skills acquired throughout the program of study is the Practicum Portfolio. While working with an experienced ESOL teacher, the student will have the opportunity to observe and reflect on teaching practices, and to prepare and present lessons in the classroom. The Practicum Portfolio will be a collection of the lessons taught, reflections on teaching practices and issues in the LEP classroom, observations on lesson modification, and a collection of classroom students' work.

The implementation of each of these components, and other portfolio elements, requires the student to learn many technology skills. Students become proficient with PowerPoint software, video equipment, and scanning techniques, while creating the portfolio. While many teachers and students already have technical proficiency and use it in the classroom, there are many more who do not. By preparing this electronic portfolio, students are required to hone these skills in order to prepare a quality product.

While our electronic portfolio is still in the implementation phase, preliminary work by current graduate students has produced positive comments. The master's degree program is intense, lasting slightly over one calendar year, but students feel the benefits of the electronic portfolio far outweigh the extra work required to prepare it. They already predict the implementation of the portfolio will lead to better knowledge and understanding of the concepts for teaching ESOL students. The opportunity to put these concepts into practice works to strengthen the student's academic self-efficacy. These teachers expect to make use of the technology skills learned in this process in their own classrooms. Many have commented that they foresee the electronic portfolio as a useful tool in securing a teaching position in the TESOL field.

To summarize, this presentation showcases the innovative, integrated components of this TESOL Master's Degree electronic portfolio. In addition, we exhibit the usefulness of the paperless portfolio as an authentic, visual future reference for prospective employers. Finally, this presentation displays how the electronic portfolio assessment augments students' technological expertise, preparing them for the challenges of teaching diverse students in an increasingly high-tech classroom.

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Meeting Technology Competencies: The Digital Portfolio Approach

Liz Stephens, Southwest Texas State University, US
David Byrum, Southwest Texas State University, US

Prospective employers and accreditation agencies expect preservice teachers to provide documentation of their work in education. Universities are moving from traditional scrapbook portfolios to digital portfolios (Aschermann, 1999). The traditional teacher portfolio is a collection of artifacts from course work and field experience in a three-ring binder (Louisiana Tech University, 1997). In contrast to the traditional portfolio, the digital portfolio is simple to update and makes distribution of multiple copies reasonable. The digital portfolio eliminates storage issues while providing preservice teachers with a powerful means of circulating their work (Polonoli, 2000). Preservice teachers who create digital portfolios enhance their technology skills and make themselves more marketable (Milman, 1999).

Recently, we received a PT3 grant to extend our "Viewing and Doing Technology" program into the elementary school blocks and our field-based faculty. Training sessions for the elementary faculty are held throughout the Fall and Spring semester conducted by faculty who have expertise in certain areas of technology. These new technology skills are in turn used by faculty to model and assign technology components in their classes. For a more complete description of the "Viewing and Doing Technology Project" please see our website http://www.ci.swt.edu/vdt/vdt.html. As part of the grant, the committee charged with setting the standards for the VDT program decided to begin a digital portfolio process for the preservice teachers in the elementary program. The digital portfolios will contain artifacts demonstrating the technology skills acquired during their course of study.

The following are several of the many questions we addressed in considering a digital portfolio showcasing the preservice teacher's technology competencies.

1. Which technology standards should be used? (ISTE, TEKS, INTASC, others)
2. Which should have prominence in the portfolio, the standards or the content (artifacts, reproductions, productions, and attestations)?
3. What format should the digital portfolio take? (web based, hyperstudio, pdf, PowerPoint)
4. Which web authoring program should be used? (FrontPage, Dreamweaver, Netscape Composer)
5. Should the portfolio be template driven or should students be allowed to create a portfolio from scratch?
6. How much time will it take for students to assemble the portfolio?
7. Should step-by-step instructions be developed to guide the student through the process?
8. What type of artifacts should be included?
9. Should the artifacts be in their native format (for example, a Publisher or PowerPoint document) or should they all be converted to pdf files?
10. How should artifacts be stored prior to being put in a digital portfolio? (floppies, zip disk, CD-RW)
11. How should the portfolio be distributed? (Web based or CD-R)
12. At what point in their professional program should students begin assembling their digital portfolio? (first semester, second, or third)
13. Organization: how should the standards be displayed or presented and linked to the teachers work?

This paper/presentation will discuss many of the questions posed above. The presentation—rather than repeating the printed material—will share the digital portfolio products created by students.

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Collect, Select and Reflect: Using the Electronic Portfolio in Teacher Preparation

Paul Walsh, Johns Hopkins University Center for Technology in Education, US
Gigi Devanney, Johns Hopkins University Center for Technology in Education

Traditionally artists used portfolios to demonstrate their work. More recently many artists have created websites to highlight their accomplishments, expand their client base, and increase opportunities for feedback from the art community. The education profession can reap great benefits from shifting from the three-ring binder scrapbook approach for portfolios to a web-based, standards-driven collaborative tool for both pre-service teacher preparation and professional development. The Electronic Portfolio developed by Center for Technology in Education at Johns Hopkins University offers a comprehensive view of a teacher's performance and potential. This web-based tool hosts selective collected works, interpretations of standards, professional development goals, educational philosophy, journal entries, resume, and the ability to gather feedback from throughout the education community.

Electronic Portfolios have the capability to increase professional growth, improve teacher quality, and ultimately raise student performance. Accessible anywhere users can get to the web the Electronic Portfolio becomes the teacher's online filing cabinet as they gather potential artifacts. Refinement of these resources involves reflection on the part of the teacher and collaboration with peers and advisors. Reflection is an integral part of the Electronic Portfolio as users seek to interpret program standards and integrate a solid foundation of subject matter expertise with the most current knowledge base on teaching and learning. Being electronic, users have the ability to request feedback from others on any element of their portfolio, without giving access to the entire portfolio. This allows users to craft their interpretations, rationales, reflections, and evidence without surrendering control of their portfolio.

Working with the nationally recognized traditional portfolio structure required in the Masters of Arts in Teaching Program at Hopkins as a foundation, the Center for Technology in Education has created this Electronic Portfolio application that allows teachers to analyze their own practices with the ease of an intuitive, web-based tool.
The Masters of Arts in Teaching Program has embraced this solution and now requires all MAT students to use the Electronic Portfolio to collect their evidence and present a finished portfolio to a review team. The review team also benefits from the move to an electronic portfolio conducting preliminary evaluation and scoring prior to a face-to-face presentation.

This presentation will highlight the functionality of this application developed by the Center for Technology in Education (CTE) and the reflective process conducted by the Masters of Arts in Teaching Program (JHU) to implement a program wide electronic solution. Participants will gain an understanding of the promise of Electronic Portfolios and their implementation across an entire program. The presentation (lecture-interactive) will start with an identification and honest appraisal of traditional portfolio programs followed by the goals set out for development of an Electronic Portfolio system. Hurdles such as faculty and student training and implementation will also be discussed.

In that any set of standards or principles can be entered into this application (ATE, INTASC, etc) presenters will use ISTE NETS to showcase the functionality of this tool.
Presenters include those who developed/coded the application, those who have implemented it across the MAT program, and MAT faculty to ensure a complete program team capable of engaging a wide audience on a number of levels. Presenters will demonstrate actual teacher portfolios, not just samples. A website explaining the Electronic Portfolio and offering a brief tour will be complete prior to the conference (www.cte.jhu.edu/epweb).

Participants need no prior knowledge of Electronic Portfolios.

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ELECTRONIC PORTFOLIOS ON A GRAND SCALE

Nancy Yost, Ph.D.
University School
Indiana University of PA
United States
njyost@grove.iup.edu

Dolores Brzycki, D.A.
Manager of PT3 Grant
Indiana University of PA
United States
dbrzycki@grove.iup.edu

Lloyd C. Onyett
Assistant Dean for Information and
Communications Technology
Indiana University of PA
United States
lonyett@grove.iup.edu

Abstract: A PT3 team discusses their trials, tribulations, and triumphs of implementing electronic portfolios at a larger teacher certification university with programs across several departments and colleges. The presentation will share the templates designed, training provided for implementation, and technology advancements and purchases dictated by the implementation.

With the move of NCATE toward a documentation developmental portfolio, many teacher education institutions are taking the process to a digital format. This makes a lot of sense considering the wider range of artifacts that can be included in a very compact archiving format. The ease of cross-referencing artifacts to multiple standards is another benefit. Over the last few years, we have attended many conference presentations on digital portfolios. We have gained much insight into format, style, and artifacts. However, we were often left wondering how to translate the information to our particular situation. Many of the presentations dealt with relatively small student populations and a few faculty members in the portfolio development process; but our institution is considerably larger with over 100 faculty and approximately 3000 teacher certification students. Our college has decided that electronic portfolios will be required as part of all teacher education programs. Students are required to have an electronic portfolio begun as part of their admission process to the teacher education program. Fall 2001 was the first year of this new admission requirement, so in three years ALL education majors will have developmental electronic portfolios. This paper will share the lessons learned though our last two years as we have begun the development and implementation of electronic portfolios. We will share information on the questions we asked and answered, the problems that occurred, and the team building that was necessary for a project this size.

Building Ownership

While the PT3 grant team had been charged with assisting with the implementation of the electronic portfolios, we knew that we could not infuse the portfolios across the entire teacher certification program by ourselves. Because the programs are distributed across multiple colleges on campus, we decided to use a built-in mechanism to assist with the implementation. The College of Education Associate Dean provides the central link for all the undergraduate teacher certification students across campus. His office is responsible for filling the applications with the State Department of Education. This Associate Dean established a Teacher Education Coordinating Council (TECC) that works on the unifying processes that are necessary to have conformity of requirements. In the past this council has dealt with such issues as student teaching evaluation forms, student teaching handbooks, and pre-student teaching meetings. This group seemed the logical place to begin.

The members of our PT3 team attended several meetings of TECC, explaining the expectations of NCATE and the potential of electronic formats. A committee was then formed from TECC and PT3 to work with the Assistant Dean to establish some standards for the electronic portfolios at IUP.

The Templates

The portfolio committee met several times debating questions such as: content that should be required of all students, what should be optional, confidentiality of information, what the expectations should be, rubrics, and formats. The student teachers had been required to make portfolios for several years; however, these were hiring portfolios created in their senior year. The requirements for these portfolios gave us a place to start with some of the content requirements. It was decided that all portfolios would include a resume, philosophy statement, health screenings, clearances, and transcripts. The final discussion was the inclusion of standards --- Which ones? We had seen portfolios built on NCATE standards, ISTE standards, and INTASC standards. After some discussion, it was decided to use NCATE standards in our electronic portfolios. Members of the committee put together three different forms of the portfolio as examples to share with TECC: PowerPoint, HTML, and Word.

Templates were created that the students would be able to personalize, but the basic content would remain consistent. The templates began with a home page. This page included the name, contact information, major plus links to the resume, philosophy statement, health screenings, clearances, and transcript pages. A menu line is included on all the major pages of the templates allowing for easy navigation. Instructions on the pages tell the students to cut and paste information into the page or insert images of scanned documents.

The standards page becomes a little more involved. The NCATE standards can be rather lengthy to include all of them on one page, so the committee decided to abbreviate the standard statements on the initial page. When you click on an individual standard you are taken to another page that provides the entire standard statement. Students are then to include artifacts that illustrate their progress toward meeting the standard. We have established practices of reflective statements in our education programs, so this was continued into our electronic portfolios. The students are asked to reflect on the artifact attached to a statement, explaining why it is being used and what it says about their working toward the standard. Students are encouraged to use artifacts to illustrate multiple standards, which was difficult in a traditional portfolio.

Spreading the Word

One week long workshop on creating portfolios was offered during the summer. Faculty at this workshop were taught how to use Netscape Communicator and how to modify the templates. The foreign language faculty attending the workshop wanted to include their professional standards into the templates. The PT3 team assisted with this modification. During Fall 2001, the PT3 team offered a series of workshops focusing on implementing the portfolios. Workshop topics were: Using Netscape Communicator to Create Electronic Portfolios, Using MS FrontPage to Create Electronic Portfolios, Inserting Graphics into Electronic Portfolios, Adding Video to Electronic Portfolios, Adding Audio to Electronic Portfolios, Using a Digital Camera for Electronic Portfolio Artifacts, Incorporating Artifacts into Electronic Portfolios, and Burning CD's. Interest in portfolios began to increase as people began to see ways to utilize the portfolios in their individual courses. Handouts were created on each of these topics to enable faculty to review on their own and to reduce the amount of preparation time they would need to introduce portfolios in their own courses.

The PT3 team attended a meeting for the education faculty across campus looking at the upcoming NCATE review. The electronic portfolios were shared at this meeting. We offered to assist departments with the implementation. Subsequently, we attended a departmental meeting to share the portfolios and answer questions. The PT3 team worked with several departments, making nearly 20 visits to individual classes, modeling for faculty how the portfolios could be developed with students. The templates have been made available to students in classes, from internal servers, and our PT3 site (http://www.coe.iup.edu/PTTUT).

One faculty member, who had been a part of the TECC Portfolio Committee, began the semester utilizing portfolios with the students in her program. She has provided the PT3 team with much needed feedback on how the templates work and how we might improve the process. Similarly, by co-teaching classes with faculty, we gained feedback that was used to improve our templates and handouts.

During the semester break two separate workshops were offered. One day long workshop assisted faculty members in making example portfolios for their individual programs and courses. The second workshop encouraged departments to begin looking at the larger picture of where artifacts could be created and how their department would systematically integrate electronic portfolios.

Support for Student Portfolios

The College of Education and Educational Technology at Indiana University of Pennsylvania actively supports and assists the students as they develop their portfolios. Not only do we provide portfolio templates for our students and train our faculty how to teach the students the necessary computer skills to create their portfolios, but we also provide a special Portfolio File Server for students to use as a repository for their portfolio files. Each student is currently provided 40 megabytes of storage on the Portfolio File Server, and students can request more space if needed. Each student has a folder, identified with their user name, on our Portfolio File Server, and the access rights are set such that only the student has access to the folder and any files within the folder. The Portfolio File Server does not provide web access to student portfolios because of our concerns about confidentiality.

In addition to the Portfolio File Server provided by the College of Education and Educational Technology, the university provides additional special server storage space for students to share portions of their portfolio with their faculty on a Project Directory Server. The graphic below shows the folder structure of the Project Directory Server. Each semester, a folder for each course taught at the university is created on the Project Directory Server. Within each course folder, there is a folder for each section of the course. Within the section folder, there are several folders including a hand-in folder for students to submit assignments, an information folder where faculty can place files they wish to share with students, and a student folder for use by the students enrolled in the particular section of the course. Within the student folder, there is a separate folder for each student, and only the student and the faculty member teaching that section of the course have read and write access to the individual student folder. The student folder provides space for sharing files, including portions of their portfolio, with the faculty member teaching the course. Since only the students have access to their own personal folders on the Portfolio File Server, students can copy portfolio artifacts from the Portfolio File Server to their folders within a course section on the Project Directory Server where their faculty member can view the files.

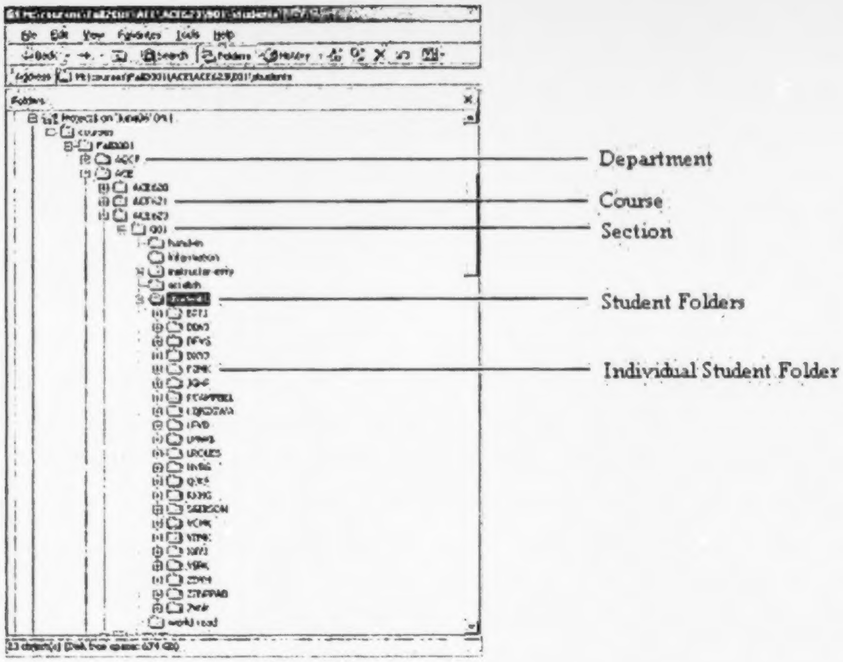

Figure 1: Project Directory Server File Structure

Since the Portfolio File server does not provide web access, if students wish to place part or all of their portfolio on a web server, we recommend that they use one of the many free web hosting sites or contact their Internet provider for web space.

Students can burn a copy of their portfolio to a CD when they need to share their portfolio with other people. We have provided multiple CD burners for this purpose in each lab within the College of Education and Educational Technology at the university. All of the computer labs within the college have scanners, CD burners, and web page development software.

The College of Education and Educational Technology has also created a Portfolio Studio where students can get additional instruction on using CD burners, scanners, digital cameras, video editing equipment, web page development software, and other helpful tools for portfolio development. A graduate assistant and practicum students are available in the Portfolio Studio to assist students and faculty.

Conclusion

While the integration of electronic portfolios is far from finished at our institution, we feel we have made great headway. There are still questions to be answered and hurdles to be overcome, but the departments are beginning to wrestle with them. For example, questions still remain on mechanisms for advisor review of portfolios at different stages of student progress through their programs, as well as on organizing the college portfolio server. Moreover, the PT3 team could not design each program's portfolio - that needs to be done internally. Nonetheless, the challenging task of creating the training, instructional materials, and infrastructure for nearly 3000 teacher preparation majors to create electronic portfolios is well under way at our university.

FACULTY DEVELOPMENT

SECTION EDITORS:

Bob Gillan, Northwestern (LA) State University
Karen McFerrin, Northwestern (LA) State University

Providing continual and detailed faculty development for all teachers is now absolutely vital as every teacher's role has shifted to meet the demands of a rapidly changing society. A growing commitment in some PK-12 school districts and institutions of higher learning is creating a stronger need for effective faculty development.

American education must be transformed to meet the needs of an emerging information society as new communications technologies impact higher education. Attaining this goal requires that teachers meet professional standards. Today's society needs a workforce that can apply knowledge, reason analytically, and solve problems. Faculties must be trained to determine the most appropriate tools for design, support and delivery of courses. The challenge for continuing professional development and renewal to adapt to this changing environment has become critical. Faculty must use recently acquired knowledge and new skills to adapt existing courses to implement new technologies. The standards for teachers supporting these new skills have been developed by the professional organizations governing accreditation in each academic field (NCATE, 2001).

Both the International Society for Technology in Education (ISTE) and the National Council for the Accreditation of Teacher Education (NCATE) have specified the technology skills that teachers are expected to have when they enter the teaching field. These organizational standards provide the foundation for the professional development programs designed for higher education faculty. ISTE suggests that teachers be able to meet these standards: apply tools for enhancing their own professional use and productivity, use technology in communicating, collaborating, conducting research and solving problems, promote legal and ethical use of technology, use technology to support their instruction, and plan the delivery of instructional activities that integrate technology (ISTE, 1998).

The papers included in this section address various approaches available to meet the professional development challenge of these new standards. The papers represent the four areas of long papers, short papers, interactive sessions, and institutional sessions. The 26 long papers cover general informational clusters as diverse as pre-service and preK-12 initiatives in professional development, online and other distance education initiatives in staff development, campus models for faculty development, program implementation strategies and technologies, and case studies and research in faculty development. Specific topics range from "Technology Integration in Teacher Education: Changing the Way Learners Think About and Do Their Work" and "Integration for ESL Success: TESOL Standards, Multiple Intelligences and Technology" to "Tracking a Faculty Online Course Impact" and "Project Merlot: Bringing Peer Review to Web-based Educational Resources". Additional detailed papers cover a center-based approach to assessing the integration of technology within a context of change, perspectives of coaches and players in faculty technology development, and the use of a problem-based learning methodology for faculty development.

The 23 short papers cover topics on the changing roles of college faculty, using a questionnaire to induce reflection on educational practice, making technology meaningful to faculty, a peer mentoring program that empowers higher education faculty to use technology to enhance teaching and learning. Papers concerning Web-based instruction in undergraduate nursing education, a joint instructional technology and library needs assessment program, the transition period between technology and careers, and faculty adoption of technology are also presented.

Three interactive session papers are included. Michael Uttendorfer of New York Institute of Technology describes "Adding "FLASH" to your Faculty Development Program." David Deorgi of California State University at Bakersfield discusses "Operationalizing a Technology Standard with Proficiency Skill Sets" and faculty from the University of Alabama at Birmingham contribute "Technology Committee Function: Holly Jolly Technology Folly."

The two institutional session papers are entitled "Re-creating Curriculum Integrity through Professional Development in the Information Age" from the East Windsor Regional School District and "Evidence for Campus Transformation Through Instructional Technology Faculty Development" at Southeast Missouri State University.

This diverse collection of Faculty Development papers describes effective initiatives and innovative models that have been designed and conducted to improve the use and integration of technology at institutions of higher education and PreK-12 educational settings worldwide. Taken as a group, the methods and models provided will aid in the effective training of faculty and will address the critical need for continuing professional development and renewal to adapt to the rapidly changing technological environment.

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Bob Gillan, Ed. D., Associate Professor of Educational Technology in the College of Education, Northwestern State University of Louisiana, directs one of the largest Educational Technology programs in the country. He is actively involved in a number of grants and research initiatives in Educational Technology. Additionally, he serves as online editor for one publication and is on the editorial board of three other publications.

Karen McFerrin, Ed.D., Assistant Professor of Educational Technology in the College of Education, Northwestern State University of Louisiana, teaches undergraduate and graduate students in the areas of integrating content standards and technology into the classroom, technology coordination and planning in PreK-12 schools and districts, and restructuring education with the use of technology.

Faculty Development with Technology Integration: A qualitative analysis of faculty mentoring.

Ronald Abate, , US
Judy Stahlman, Cleveland State University, US
Abu Nasara, Cleveland State University, US

Abstract

The Modeling Instruction With Modern Information and Communications Technologies (MIMIC) Project was funded through a U.S. Department of Education Preparing Tomorrow's Teachers to Use Technology (PT3) Implementation Grant. The MIMIC Project focused on faculty development in the integration of technology in pre-service teacher education. A classroom teacher as mentor / faculty member as mentee approach served as the model for faculty development. Data was collected from both technology mentors and faculty participants. This data included qualitative components including; implementation plans, monthly log data, and journals. Project evaluation activities were conducted to address both formative and summative evaluation questions that examined the validity and impact of the project. The evaluation was designed to provide performance feedback throughout the grant period, allowing the project staff to monitor progress towards the desired outcomes

A comprehensive sequence of qualitative evaluation activities were implemented to insure that the goals proposed by the Mimic Project were addressed satisfactorily. A monthly review form tracked project activities and verified if planned activities occurred as scheduled. Progress notes were recorded and used to modify planned activities. Mentors together with each faculty member prepared an implementation plan and maintained notes on support provided. This qualitative data was used to modify mentoring plans. Logs of technology activities implemented by participating faculty and supervising teacher provided qualitative data documenting technology use by the participants.

This paper examines the results of qualitative analysis of participant journals, implementation plans and monthly logs. Content analysis and data management analysis was implemented using NUDIST. Patterns indicated in the data analysis pointed to critical factors for increasing the level of faculty modeling of technology in pre-service teacher education.

Integration for ESL Success: TESOL Standards, Multiple Intelligences and Technology

E. Carol Beckett
Elementary Education
Arizona State University West
USA
ebeckett@asu.edu

Ines Márquez Chisholm
Elementary Education
Arizona State University West
USA
ines@asu.edu

Abstract: English language learners need an education that builds upon their strengths and acknowledges their differences while developing their English language proficiency. They also need opportunities to develop information technology skills that will prepare them for the increasingly technological job market. The TESOL standards for Pre-K-12 ESL students make it possible for ELLs to achieve the standards for academic subjects while developing English language skills. Teachers incorporating MI theory for ELL instruction support the rich diversity of cultures and languages in the classroom, provide a framework that enhances teaching and help students develop all of their intelligences. The integration of technology, TESOL's standards, and Multiple Intelligences supports learning differences, promotes technological competency and develops English language skills across the curriculum. Preparing preservice teachers who can integrate technology, TESOL standards and the theory of Multiple Intelligences provides their future students with an equitable education.

Introduction

English language learners (ELLs) generally differ in native language, cultural heritage, social experiences, and prior learning from native English speakers. They need an education that builds upon their strengths and acknowledges their differences while developing their English language proficiency. In addition, they need opportunities to develop the information technology skills that will prepare them for the increasingly technological job market. By 2006, half of all jobs will be in information technology or will require information technology skills (Carvin, 2000). In order to provide English language learners with the opportunity for a viable economic future, we must prepare them to become technologically competent.

To cultivate teachers who can meet the needs of a variety of students, teacher educators must rethink and reassess preservice teacher education. Teacher education graduates should go into their classrooms with a repertoire of professional skills and instructional methods, an understanding of second language acquisition and cultural diversity, expertise in second language teaching methods, and competency in the effective integration of technology. Our graduates should be able to teach students who differ in cognitive strengths, cultural background and language proficiency. Preparing preservice teachers to integrate technology, TESOL standards and the theory of Multiple Intelligences (MI) provides their students with an equitable education that supports learning differences, promotes technological competency and develops English language skills across the curriculum.

Diversity in Schools

Within the United there are 176 languages spoken at home (Grimes, 2000). In addition, there are some 154 indigenous American languages (Estes, 1999). Between 1979 and 1995, the number of school age children who spoke a language other than English and who had difficulty speaking English rose from 1.3 million to 2.4

million (Federal Interagency Forum on Child and Family Statistics, 2000). While not all Hispanic children are limited English proficienct, they comprised three-quarters of all students in Limited English Procient programs (ERIC Clearinghouse on Urban Education, 2001).

Each cultural group has its own set of learning expectations and its own emphasis on what should be learned (Hopkins, 1998). Gardner asserts that learning characteristics are the consequences of cultural, motivational, and experiential factors that can be enhanced when teachers teach to students' strengths in the Multiple Intellligences (MI) (as cited in Ghosn, 1997).

Federal and state mandates require accommodation for the needs of English language learners (ELLs). Yet only 76.8 percent of limited English children in public and non-public schools were in programs designed to meet their educational needs (NCBE, 1998). The remaining 23.2 percent percent received little or no support for their English learning needs. Teachers who are not trained in second language teaching methodologies often find themselves with ELLs in their classrooms. But only 20 percent of classroom teachers report feeling well prepared to meet the needs of limited English proficienct students or those from diverse cultural backgrounds (National Center for Education Statistics, 1999).

Information Technology

By 2006, half of all jobs will be in information technology or will require information technology skills (Carvin, 2000). Education, as preparation for constructive citizenship, requires the preparation of technologically competent individuals who can locate, manipulate, and organize information to solve problems, create new knowledge and produce useful outcomes.

Children vary in their access to technology. For example, there is a 50 percent gap in computer ownership between households earning $14,000 or less and those earning from $50,000 or more (Nickell, 2001). Many ELLs are from homes where the income level is at or below the poverty line. Eighteen percent of Hispanic children use a computer at home as compared to 52 percent of White children (ERIC Clearinghouse on Urban Education, 2001). Similarly, the proportion of rural Native American households with access to computers is 26.8 percent, almost half that of the national average (Luening, 2000). Only 2 percent of children living in poor, rural households have Internet access (Children's Partnership, 2000). Children from the poorest households and living with adults with the least schooling are the least likely to have Internet access at home. Moreover, because eighty-seven percent of documents on the Web are in English (The Children's Partnership, 2000), the web is largely inaccessible to an estimated 32 million Americans who are non-English speakers (Children's Partnership, 2000).

For ELLs, schools are a primary location for accessing information technologies and for developing computer skills. However, schools with the largest concentration of children in poverty had a 9:1 ratio of students to computers as compared to the national school ratio of 5:1 (Cattagni & Westat, 2001). In high-income areas, 74 percent of classrooms have Internet access, in low income areas 39 percent of classrooms do (Carvin, 2000). Teachers in poor inner-city and rural schools have less technology training than those in wealthier schools (Kleiman, 2000). Thus, children in the poorest regions of our nation have the least access to computers and the Internet at school. Many of these children are ELLs.

Though there are few studies on ELL children using information technologies, the research suggests that the integration of technology can improve academic achievement, promote English and native language proficiency, augment positive self-concepts, enhance motivation, stimulate positive attitudes towards learning, and foster higher level thinking (Diaz, 1984; Knox & Anderson-Inman, 2001; Meskill, Mossop & Bates, 1998)

Information Technologies, Multiple Intelligences and TESOL Standards

Information technologies provide varied entry points to learning that match the learners cognitive strengths and intelligences, as well as language proficiency level. Technology combined with cooperative learning not only increases instructional effectiveness and efficiency, but also promotes positive social interactions (Johnson, Johnson, & Stanne, 1986; Schlechter, 1990). Cooperative learning at the computer enhances ELLs' communication skills (Steinberg, 1992), meets the needs of those with strong verbal/linguistic and interpersonal intelligences, and develops social and collaborative skills. Partner and small group work offers an authentic purpose for oral communication, as well as peer support for academic content and development of technological competencies. Multimedia, computers and the World Wide Web can address the multiple intelligences through varied forms of input and output. For example, they relay text, music, video, photographs, and visual art. Voice recognition and digital sound recording allow for oral/aural input and output, while graphics provide ELLs with comprehensible input.

Teaching that incorporates MI theory helps support the rich diversity of cultures and languages in the classroom while providing a framework that enhances teaching and helps students develop all of their intelligences. Information technologies combined with MI theory enrich students' learning experiences and induce students to want to learn because the learning activities appeal to their personal intellectual strengths.

The Teachers of English to Speakers of Other Languages (TESOL) standards for Pre-K-12 ELLs "articulate the developmental English language needs of English language learners and highlight special instructional and assessment considerations that must be given" so that these children may "benefit from and achieve the high standards proposed for other subjects" (TESOL, 1997, p.2). The TESOL standards are guidelines that help teachers address the challenges accompanying the increasing numbers of English language learners.

Content and language instruction that incorporates technology and TESOL standards has multiple benefits for ELLs. The integration of TESOL standards with MI theory and information technologies provides a structured, intentional approach to the development of second language proficiency across the curriculum while enriching the learning experience. This integration ensures an equitable education by providing access to technology for authentic purposes to those students least likely to have that access outside their school. MI theory and technology afford numerous entry points into the academic content while the TESOL standards allow teachers to plan for students' English language growth in a variety of contexts and for a variety of purposes.

Activities	Description	Multiple Intelligences	TESOL Standards
Graph tally results of observed transportation (e.g., walking, cars, trucks, buses, bicycles)	In small groups students tally traffic passing their school at different times of day. Tallies are graphed using *The Graph Club*. Students compare the amount and type of traffic from different times of the day.	Verbal/linguistic Logical/mathematical Visual/spatial Interpersonal	G2, S2 Descriptor: Analyze, synthesize and infer from information Compare and contrast information Progress Indicators: Research information on academic topics Construct a chart/graph synthesizing information (TESOL, 1997, p. 87)
Gather weather data, take digital photographs, write and illustrate a report using *KidPix* and digital pictures.	For two weeks students observe cloud formations and gather data outdoors using thermometers, rain gages, and an anemometer,. They compare their findings to local weather on *Intellicast* (http://www.intellicast.com/). Key Pals compare weather and exchange photographs of local topography in their respective countries.	Verbal/linguistic Logical/mathematical Visual/spatial Bodily/kinesthetic Interpersonal Intrapersonal Naturalist	G1, S1 Descriptor: Share and request personal information Use non-verbal communication Progress Indicators: Correspond with Key Pals Volunteer information about self (TESOL, 1997, p. 71)

Figure 1: Sample activities integrating information technologies, MI theory and TESOL Standards

Figure 1 illustrates how learning activities can integrate technology, MI theory and the TESOL Standards across disciplines. These sample activities address content area knowledge, higher level thinking, and problem solving, while building on students' intelligences and developing English language skills. Integrated activities such as these make learning meaningful, transferable and engaging because they complement students preferred ways of learning, develop weaker intelligences, and engage students in genuine communication. Technology in this approach becomes a viable means to attain information, reconstruct knowledge, and demonstrate learning. Technology thus serves as a means to an end, rather than as the end itself.

Teacher Education

Given the rich diversity in America's classrooms and the continuing inequitable access to technology, teacher education programs must prepare future teachers to meet the needs of their diverse students. Preservice teachers not only need to spend time in multicultural classroom settings, but they must demonstrate professional skills, instructional flexibility and the ability to apply a variety of methodological approaches. Because future teachers will likely have ELLs in their classrooms, all preservice teachers should know and be able to use a number of second language teaching methods. Preservice teachers must not only be familiar with the TESOL standards, but be able to apply them in classroom instructional activities.

Graduates of our teacher education programs should translate theory into practice, including MI theory and language acquisition theory. This ability can be fostered by explicitly drawing attention to their own learning and to their instructor's modeling of effective instructional practices. Preservice teachers do not readily perceive how their instructors apply theory to teaching while they are immersed in the process of learning. To see the link between theory and practice being modeled by education faculty, preservice teachers must be observers, not just participants. Education faculty should help preservice teachers reflect on what they observe and see how teachers' instructional behaviors are linked to theory. For example, the instructor may ask the class which theories underlie the learning activity they have just participated in and which multliple intelligences were addressed during the class period. In short, the teacher educator must make explicit what is implicit in their own teaching and serve as models of good teaching.

Preservice teachers also need to know more than how to use a computer and run software applications. Such knowledge can be gained outside the College of Education. Computer knowledge and competency does not readily translate into effective integration of technology in the classroom. In order for preservice teachers to understand how technology becomes a part of effective instruction, they must see inservice teachers and education faculty using technology. They must discuss what they observe school teachers and university faculty doing with technology in the classroom, understand what are essential and what are nonessential uses of technology, and evaluate the educational value and appropriateness of software applications and Internet sites. They must learn how to use technology to meet educational objectives. And they must have opportunities to practice planning and using technology for instruction.

Similarly future teachers need to learn how to effectively connect technology with the diversity and multiplicity of intelligences. Teacher educators should model the integration of technology, TESOL standards and MI theory in their own teaching. In learning how to create lesson plans, preservice teachers can assess the quality of online teacher-created lessons in terms of appropriateness of technology integration, support for multiple intelligences, incorporation of TESOL and state standards, and provision for linguistically and culturally diverse learners. This assessment develops awareness of how lessons can be adapted or improved to meet the needs of diverse learners. Once preservice teachers understand how technology, TESOL standards and multiple intelligences can be integrated, they can begin to plan and implement such lessons.

Attaining the goal of graduating teachers who can teach to a diversity of learners, help ELLs expand their second language proficiency, and use technology in pedagogically sound and effective ways is not easy. It requires faculty and administrative commitment, faculty development, technological resources and conscientious planning. But ultimately, the integration of technology, TESOL standards and multiple intelligences is a win-win educational experience for preservice students and, in turn, for their future students.

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Vocation or Profession?
The Changing Roles of College Faculty

Bob Bermant and John Knight
Department of Psychology and Department of Philosophy
University of Wisconsin Waukesha
rbermant@uwc.edu and jknight@uwc.edu

The emergence of online course software such as BlackBoard, Prometheus, and Web-CT has made it relatively easy for faculty to add a web-based component to their traditional classroom courses and it has fostered the evolution of new pedagogical strategies and formats including web-enhanced, hybrid, and completely asynchronous instruction. As a result it is likely that faculty are investing significant time to develop materials and modify pedagogy so that it is appropriate for and compatible with these new instructional modalities. Therefore in important ways the demands on contemporary college faculty are changing and along with these changes have come new roles with very different expectations. This paper investigates the impact of these changes and explores faculty perceptions of how the work of the professoriate is evolving in an age of rapid technological change.

A colleague recently asked the following question, "Do you use *BlackBoard* or a blackboard'? A few years ago the question would have seemed absurd. No longer. Today instructional technologies such as *BlackBoard*, are fostering new and for some confusing opportunities to re-engineer their courses. For faculty in our own institution, the University of Wisconsin Colleges, the pace of technological innovation is breathtaking.

At the beginning of each year we are confronted with new options, new opportunities, and new reasons to feel overwhelmed. This year for instance our IT staff held short courses on everything from *Outlook* to *Acrobat* and from *BlackBoard* to *Win2K*. Pity the poor faculty member who is struggling just to stay on top of work in his own discipline. Now he must juggle .doc files, Ethernet cables, and the virtual "F" drive on the server. No wonder, among our peers, prescriptions for Prozac are skyrocketing.

Simply put, the job we took some twenty-five years ago and the job we have now display some superficial similarities, but in important ways they are very different. Yes, we still teach or try to teach that bunch of teens that seems to miss many of our jokes and fails to appreciate our sartorial brilliance. But today we compete with MTV, AOL Instant Messenger and cell phones that ring during our classes. It is tempting to ask, "is it for me"? Of course change is inevitable, but that doesn't make it desirable.

So what has happened in those twenty-five years? Well, the PDP-11 down the hall with those large 8" floppies has been replaced by the *iBook* on a desktop with *Wi-Fi*. The floppy is or should be nearly extinct, and the web, merely a twinkle in the eyes of Tim Berners-Lee back in the frontier days of the late '80s, has emerged and become pervasive, indeed inescapable.

Today, who or what does not have a www address? BB is thinking about getting one for his fox-terrier, www.zeke.org. Cable modems, and DSL have replaced those 56k guys which in turn have replaced modems that not that long ago operated at an incredible bandwidth of 28.8 k! Now our T1's sometimes bog down and seem slow! The alphabet soup of technology pervades the college quad; mp3s, XP, 10.1, urls, jpeg, gifs and we suppose, a few gaffs. Don't get it? Well, "you've got trouble, my friend, trouble right here in River City" as the *Music Man* once said. Trouble indeed. Just try to remember the Chinese symbol for misfortune can also mean opportunity.

Sometimes we feel like novice carpenters who have just picked up a shiny, new *Craftsman* toolkit at the local *Sears* store. Look at all those wrenches, ratchets, pliers and planes. Nice to have, for sure, but what the heck do we do with all this stuff?

The sociologist down the hall has a beautiful array of *PowerPoint* slides; the graphic artist in Southview loves *Photoshop*, and the PE fellow across the way does kinematic analysis on his laptop. And the math folks upstairs, they do mysterious things with *MathCAD*, *Maple*, and Macs. The English tutors pride themselves on their virtual writing lab. The philosopher among us has a club on-line and the psychologist will confess to using *BlackBoard* for just a few things. What is the point? Simply this: information/instructional technology (IT) is seeping into our lives, changing what we do, and more importantly, how we do it. Are you college professors? Yes, but sometimes we wonder.

Steve Jobs, CEO of Apple Computer, once characterized the computer as a "bicycle for the mind." Like a physical bicycle, a computer can transport you anywhere you choose to go. Problem is, you have to have a destination before you can get there. So, where are we going and how will we know when we have arrived? The multiplicity and diversity of applications makes instructional technology tough to define. It is difficult to distill its essence, assess its influence, and quantify its impact.

We recently surveyed our faculty to learn about their experiences with and perceptions of information technology. One hundred fifteen surveys were completed representing twenty percent of the sample. We discovered that about seventy-five percent of our faculty use some form of IT and that their response to it has generally been favorable. Although faculty indicate that IT enhances their teaching, they also note that it takes additional time, that technical support has been lacking, and that it can be difficult to navigate. On the other hand, our faculty appear to value their increased accessibility, e-forums for discussion, and the ability to put materials on the web where students can get at them 24/7. And yet at the same time, they complain about the lack of institutional recognition combined with not so subtle pressure to use IT, persistent network glitches, the absence of adequate evaluation, and the emphasis on "WHAT we can do; instead of WHY we are doing it."

Computers and more importantly, the WAN and LAN infrastructure gives us easy access to distributed resources, wherever those resources may physically reside. Text, graphics, images, audio, and video files are just a mouse-click away. It is no longer an exaggeration to say that, "the world is at our fingertips." But another equally appropriate aphorism comes to mind, "the world is what we make it." Given immediate access to an exponentially expanding electronic universe, sometimes it is tough to discriminate a meaningful signal from what often appears little more than a sea of random noise. Sometimes it is tough to separate the wheat from the chaff.

Perhaps that is why we seem to struggle with technological stress. We wrestle with computer-driven constructivism, worry about courses as commodities, fear the art of teaching will be lost among the ruins of technology, and mourn the loss of physical presence. And yet, however dissatisfied, disaffected, disillusioned, and disheartened, we still come to class on Monday. We still cherish the possibilities of the classroom.

Just as some of our courses have assumed a hybrid character, combining face-to-face meetings with Internet-mediated time-out-of-class; arguably, our roles as teachers have also become an amalgam, requiring not only disciplinary expertise, but a not inconsequential level of technical skill as well. *BlackBoard* or blackboard; vocation or profession? Perhaps the answer is somewhat less important than the question. Teaching and learning remain quintessentially human endeavors. Yes, *XP* is cool, *Wi-Fi* (802.11b to the cognoscenti) really rocks, and the web can be a wonderland. Some things have changed but the most important things have not.

Whether we are thinking about adopting a textbook or constructing a web site; choosing a compelling software application or finding a new anthology, the task remains much the same. As teachers our job to identify the best resources whatever form they may take, discover the most effective ways to use them, and then continuously evaluate their impact. In this as in so many other endeavors, sound analytical skills and good old common sense make an unbeatable combination.

It is easy to be seduced by technology, and to be infatuated with the thrill of "connectivity." There is a certain undeniable sex appeal in a shiny new laptop, a colorful array of *PowerPoint* slides, a well-constructed web site emerging from the ether, and evidently, a cell phone that rings during class!

In the hands of an artisan the most primitive of tools can yield a masterpiece; after all, Shakespeare wrote with a quill. But even with a 1.2 GHz Pentium and a broadband connection, a monkey probably couldn't do very much of note. Just as tools don't make a carpenter, technology doesn't make a teacher. Carpenter or teacher, the tools can make a tough job a bit easier, but in the final analysis it isn't the tools that make a difference; it is what we do with them that counts.

Inducing Reflection on Educational Practice with a Questionnaire Tool

Jo Breda, Kim Waeytens, Mieke Clement
University Educational Support Office
University of Leuven
Belgium
Jo.breda@duo.kuleuven.ac.be
Kim.waeytens@duo.kuleuven.ac.be
Mieke.clement@duo.kuleuven.ac.be

Abstract: In order to encourage the acceptance of student course ratings by faculy and to provoke reflection, a questionnaire tool was developed that allows faculty to select questions that closely fit their personal subjective theories on education and their specific educational practice. As a first stimulus for reflection, frameworks are introduced that need to be used in the tool to describe educational practice and subjective theories. As a second stimulus for reflection, feedback on subjective theories and educational practice is given. The hypothesis was that the questionnaire tool hightens the commitment of faculty to the evaluations results and enlarges the impact of student course ratings on faculty's thinking.

Introduction

Student course ratings are often used to enhance professional development. One of the common problems in the use of student course ratings is a failure to tune the questionnaire to the educational practice and subjective theories of faculty. The proposed questionnaire tool is designed to be flexible and adaptive to the specific needs of the users.

Faculty accept results of evaluation better when they feel committed to the evaluation and when they have a perception of high usability of the evaluation instrument (Waeytens, Elen & Lowyck, 1999). To heighten the commitment to the evaluation, contribution of faculty to the evaluation process is maximised. In the questionnaire tool, faculty decide themselves whether they want an evaluation, which aspects will be questioned and what exact questions will be posed. To heighten the perception of usability, the content of the questionnaire needs to be in accordance with the way the user perceives reality (Smyth, 1990). In the questionnaire tool, faculty are invited to express their subjective theory. This theory will influence the questionnaire that will be the result of using the questionnaire tool.

The challenge is not only to help faculty accept student course ratings as important feedback on their specific educational practice. The challenge is also to help faculty reflect on their educational practice, so that a student course rating can be a starting point to improve teacher thinking. Indeed, reflection upon professional educational action can be an important learning activity and a motor for improvement of teacher thinking (Clarke, 2000). As a first stimulus for reflection, the tool introduces frameworks that need to be used by the faculty to describe their educational practice and subjective theories. As a second stimulus for reflection, feedback on their subjective theories and educational practice is given.

Description of the questionnaire tool

The questionnaire tool consists of three modules. These modules are organised linearly, but strolling back and forth is encouraged through hyperlinks. At the end of the tool, which is the end of the third module, feedback can be given that refers the user to the first module, which makes the tool circular.

The first module consists of a measurement of subjective theory. This measurement is based on Samuelowicz and Bain's (1992) dimensional model about conceptions of teaching. This model proposes five constituent dimensions that underlie a global dimension reaching from student centred to teacher centred. For the tool these dimensions were extended to eleven dimensions, based on an overview of literature. These dimensions were transposed to eleven forced choice items. After filling out the forced choice items, users receive integrated feedback on different levels. The feedback consists of textual feedback on three clusters of items (items about

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knowledge, the teaching process and educational goals). At the most basic level a textual elaboration is given for every forced choice item. After this feedback, faculty can loop back to the forced choice items to change their answers.

The second module consists of an analytic scheme with the form of a hierarchical network to describe educational practice. The parent nodes are organised in a global scheme of interconnected elements within a learning environment: student characteristics, educational goals, information, teaching methods, evaluation and student activity. Faculty is invited to indicate all the relevant aspects in the hierarchical network underlying this global scheme.

The third module combines both information sources (subjective theory and description of educational practice) in order to propose relevant questions for the faculty to compose a questionnaire. For every selected element of the analytic scheme, the list of questions is shown that is congruent with the subjective theories of the faculty. If faculty do not find their choice in the list, they can choose to select a question that is not congruent with their subjective theory. At that point they are suggested to check and change their answers in the first module of subjective theory. In this way, the system is circular since the faculty is redirected to the first module when their selection of questions deviates from the measurement of subjective theory. Users can also decide to go back to the second module and change their description of educational practice in order to receive different lists of questions to choose from.

The selected questions are printed on paper questionnaires and administered to the students. Faculty receive paper reports with their results compared to the results of the same questions of the whole university, and (if appropriate) with former evaluations. The possibility for electronic administration of the questionnaires will be offered after the initial test time.

Results and perspectives

The questionnaire tool is designed to be used on individual basis as well as integrated within a faculty development training. The questionnaire tool is currently in use in a training for beginning faculty. The tool will be filled out on an individual basis before the first collegial consulting session where the resulting questionnaires will be discussed. The second collegial consulting session shall be treating the results, the interpretation and planning for amelioration.

The individual use of the questionnaire tool seems to provoke reflective thinking and could as such be considered to be a powerful instrument to induce learning experiences. Preliminary findings of ongoing research suggest that users accept the framework of the subjective theory module. At the same time the feedback on subjective theory seems to induce reflection in that it opens perspectives to different views on education. The framework of the second module, the hierarchical network of concepts, seems to be difficult to understand and to work with. Maybe this framework does not relate strong enough to faculty's personal interpretation of their educational practice. Further research on the way faculty can describe their educational practice is needed. An exploration of the frameworks non-users utilise to describe their practice, in comparison to the one used in the tool is launched in order to resolve this shortcoming.

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Collaborative Support for the School of Education: a Joint Instructional Technology and Library Needs Assessment Program

H. Jean Bryan
Instructional Technology Development
DePaul University
United States of America
jbryan@depaul.edu

Terry Taylor
University Libraries
DePaul University
United States of America
ttaylor@depaul.edu

Mickey Anne Hinojosa
University Libraries
DePaul University
United States of America
mhinojos@depaul.edu

Abstract: DePaul's School of Education was the first implementation of a Needs Assessment designed jointly by the university's Instructional Technology Development (ITD) area and the University Libraries. The goals for the Needs Assessment were to identify areas in which an expanded, unified and comprehensive faculty development training and support package would both address faculty's perceived needs while also improving adoption of existing instructional technologies and/or services. The Library's education bibliographer and the ITD consultant for education interviewed faculty representing a cross section of departments and programs as well as technological expertise. The results were analyzed; issues were sorted according to faculty priority and by length of time and resources needed to address them.

Introduction

In the months following a reorganization, two units in the newly combined Office for Teaching and Learning Resources – the General Library and Instructional Technology Development (ITD) – examined ways in which to deliver course management software training for faculty. In the first year, the two support areas established a successful working relationship by collaborating on faculty training for Blackboard, the course management system adopted for use at DePaul. The introductory Blackboard training session – led by instructional librarians – combined both an introduction to Blackboard as well as an overview of web-accessible library resources such as online journals, databases, and electronic reserves. From these initial collaborative efforts the need to identify and deliver an expanded, unified and comprehensive support package to specific academic units became apparent. The School of Education was the first implementation of the resulting Needs Assessment process.

Goals and Process

In planning for the Needs Assessment, four goals were identified: first, to ascertain opportunities, unique to the School of Education, to enhance faculty skills in instructional technologies and in online library resources; secondly, to design a training plan for the School of Education, based on results of the needs assessment; and thirdly, to provide an opportunity for Education faculty to become aware of the services and tools available to them through these two offices. Lastly, the process developed would become a model for training needs assessment that could be applied to other DePaul academic units in the future.

Twelve open-ended questions were designed to stimulate critical reflection on the possibilities of electronic resources and instructional applications. Some questions referred to specific features of existing applications (i.e., "Education faculty could use the assessment features – online surveys, tests, and gradebook – in Blackboard to ____"). Other questions were more general in nature (i.e., "What have you seen others do that you'd like to do?"). Eight SOE faculty were selected to be interviewed; they represented a cross section of departments and programs as well as technological expertise. The Library's education bibliographer and the ITD consultant for education met with each faculty member in individual sessions lasting approximately one hour. The results were analyzed; issues were sorted according to faculty priority and also – on the part of the Libraries and ITD – by length of time and resources available to address them.

Process Issues and Suggestions

Suggestions for future Needs Assessments fall into four categories: when to perform a needs assessment, what questions are to be asked, who is to be interviewed, and who will perform the interviews. In terms of when, the DePaul Needs Assessment was performed soon after an accreditation report that suggested improving technology integration throughout the school. It was found that by timing such a venture to coordinate with the school's program review or accreditation cycle, faculty members were ready – and in some instances, eager - to comment on technology adoption issues. Questions referring to specific functions or applications may need to be altered for faculty who are not acquainted with that function. So a question such as: "If all Education courses had a Blackboard web site then___" might be altered to: "If all Education courses had an easy-to-access web site where students could access resource materials, assignments, and hold discussions then…." Adding a question that could elicit suggestions on how to operate most effectively within the School's unique culture might assist academic support areas in formulating successful training and support activities.

Faculty members in DePaul's School of Education vary widely in their adoption of technology. It was, therefore, important to include among the interviewees as wide a range of users as possible, also making certain to include representatives of the various departments within the school. This meant that several faculty who were interviewed were previously unknown to the Library and ITD interviewers. The combination of using, for interviewers, the Library bibliographer for the academic area and the ITD consultant for the school or college seems best suited for DePaul's unique academic support situation.

Conclusions

The process of meeting with key faculty members and hearing their input while introducing them to the work and services of these two support areas immediately strengthened the working relationships between the Libraries, ITD and the School of Education. The professional staff participating in the interviews became better acquainted with key faculty members. These faculty members, in turn, are more fully aware of the central services available to them from these two academic support units.

Short-term goals, which can significantly affect the current level of faculty understanding and application of currently available services –such as Carl UnCover – include simple-to-implement paper and e-mail communications specifically tailored for School of Education faculty. Workshops and Brown Bags on specific topics also provide immediate impact with minimal additional resources. It will be important to work closely with the School of Education in developing and advertising these sessions. In addition, success rates may increase if these sessions can be held either in or near School of Education offices.

In the long term, ITD and the Libraries can benefit from a continuing alliance with Education faculty on several issues and resources, including design of online versions of induction and continuing education courses, the curriculum materials center, redesign of computer classrooms, research and advocacy toward streaming video and audio, as well as applications to support streamlined administrative processes (e.g., Syllabi on line) and improved learning (e.g., database of case studies with video examples).

Making Technology Meaningful to Faculty: Two Approaches over One Semester

Marcie Bump
Action Communities for Teaching Excellence
University of Houston
United States
marciebump@yahoo.com

Lavinia McGhie
Action Communities for Teaching Excellence
University of Houston
United States
laviniamcghie@yahoo.com

Abstract: This paper provides two different examples of work during a single semester with two different faculty and two different PT3 team members. Example one shows how much technology learning can be accomplished over one semester with an open-minded and excited professor. Example two shows a different approach with a more technologically reticent professor. Each illustrates how different strategies must be enlisted for varying instructor needs and interests.

Introduction

Faculty contact is a chief component of the PT3 program because the knowledge the faculty members acquire through these services can then be delivered to the pre-service teachers. In this area, team members are assigned at least one professor to work with on integrating technology into their curriculum. In this paper, two different examples of work throughout one semester are discussed with the purpose of showing specific goals that can be accomplished in this amount of time.

Example 1

The first meeting with a new faculty is one of the most important meetings. In this, not only the importance of integration of technology into their curriculum is established, but the faculty is allowed to express their ideas and needs for the following semester. The technology fellow serves as both an assistant and a guide in the completion of the faculty's requests because he has access to hardware, training, and discipline-specific media that is easy to use (Groves & Zemel, 2000). In order for the approach to be successful, these three components are vital.

One of the strengths of this approach is that presenting technology in a way that is relevant to their individual needs can stimulate the instructor's engagement. In this example, the professor was a relative novice with little exposure to technology beyond basic word processing and email. She was intrigued by the possibilities of using technology in her curriculum, and her hesitancy was diminished by the one-on-one support of the technology fellow.

During the first meeting the discussion focused on what the professor wished to accomplish during the semester. In this instance, the faculty member's specialty was art education, and the display of graphics and images were central to her curriculum interests. PowerPoint was the most logical application to begin with, and it offered a convenient lead-in for the introduction of graphic file formats. Soon the instructor was requesting to learn about digital cameras and CD burners, as well as asking for server space. This instructor's enthusiasm continued, carrying her to learn Netscape Composer to begin to create web pages for her classes. As always, the technology fellow walked through the web process with the professor so that her comfort level was high and her understanding was guaranteed.

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The whole process of working with faculty was extremely successful because it facilitated the transformation of an educator who gained important technology tools for teaching.

Example 2

The relationship between faculty member and Tech fellow is an integral part of the faculty experience within the fulfillment of the PT3 Grant. In this case, the faculty member was quite comfortable with his level of technology, but not particularly interested in new skills. Since the professor delivered a high number of presentations each year, PowerPoint was suggested as an alternative to his customary transparencies.

The initial meeting with the faculty member provides an opportunity for the assessment of needs. The professor's method and style of presentation and the technologies that are utilized are all concerns that should be addressed. As found by Vannatta and Beyerbach (2000), the relevancy of technology issues and applications are key points in engaging the faculty in using new technology. The faculty member was particularly fond of his outline process for using transparencies, and needed to be assured that the transition from using the overhead to PowerPoint was a logical one. To demonstrate this, the technology fellow created two different versions of one of the instructor's presentations. Upon seeing the prototypes, the faculty member was swayed by the flexibility and potential of digital presentations. He was quickly interested in learning to compose his own PowerPoint based on another set of transparencies for the next meeting. The tech fellow instructed the basics of the program informally by helping the professor convert another of his earlier presentations from transparencies to PowerPoint.

After the professor's initial success with PowerPoint basics, he became more interested in the special effects aspects of PowerPoint and wanted to learn more advanced features within the application. He was particularly interested in inserting JPEGs and links to related websites that might be of importance to his class. Soon, the professor had created a slide show that he felt was ready for presentation. He showed confidence with the program and expressed interest in acquiring a CPU and projector for his class. By this time, he was also becoming interested in other programs such as Win Zip, and made plans for further technology interests.

Time is often a major factor for many of the faculty contacts and this professor was attracted by the conservation of time that the program offered. What seemed to impress him even more was the versatility of a program that could be utilized every semester. The overall experience for the faculty member seemed to be an invigorating one in that he took great pride in his creations and his expanding knowledge base and the contribution to that by this grant was a motivational concern to all Technology Fellows. The coming year will hopefully encourage progress within the integration of more technology into his classroom and with time saved there may be an opportunity to include the usage of further applications.

Conclusion

The process of working with faculty through this grant was successful because the approach was individualized for each professor, and the resources such as training, hardware, and media were all available. The time and effort invested into this branch of the program has already paid for itself: professors are using technology in their education courses, and our pre-service teachers are understanding how the integration of technology can facilitate a lesson.

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Project Merlot: Bringing Peer Review to Web-based Educational Resources

Ralph Cafolla, Ed. D.
Associate Professor, Educational Technology and Research
Florida Atlantic University, USA
cafolla@fau.edu

Abstract: The unprecedented growth of the Web has resulted in a profusion of educational resources. However, the challenge for faculty is finding these resources and integrating them into their instruction. Even after the resource is found, the instructor must assess the effectiveness of the resource. As the number of educational web sites mount into the millions, this task is becoming increasingly difficult.

To address the problems of finding instructional sites, evaluating their educational value, determiningtheir accuracy and assisting professors to integrate the resource in a learning environment, the Multimedia Educational Repository for Learning and On-line Teaching (MERLOT) was established. The MERLOT virtual repository (www.merlot.org) of instructional materials is hosted by the California State University Center for Distribute Learning. The project also provides a peer review process to ensure the quality of the educational resource.

The exponential growth of the World Wide Web has resulted in a profusion of educational resources that are potentially useful in higher education. The challenge for faculty interested in using web-based resources as an important aspect of their instruction is finding these resources and integrating them into their instruction. Even after the resource is found, the instructor must assess the effectiveness of the resource. As the number of educational web sites mount into the millions, this task is becoming increasingly difficult.

The unparalleled growth of the Web is partly due to the fact is that just about anyone can develop a Web site. With the aid of inexpensive or free Web editors, creating a Web site is almost as easy as using a word processor. There are also a myriad of companies that will host your site for very little or no money. Since it is so cheap and easy to establish a web presence, the number of web sites, both good and bad, have proliferated. While using the traditional search engines can be useful in finding educational sites related to a specific topic, experienced Web users know how difficult it can be to find relevant information. Search engine may find a few million sites it deems relevant, but it does not separate the good from the bad. Educators have a particular responsibility to ensure that Web resources that they use in their courses are *authoritative*.

The concept of *authoritative* gets at the question, "Who says this material is accurate?" By knowing the background of the authoritative source of a work, one can judge how much one trusts it. For example, if you access the Microsoft® knowledge base (Technet, 2001) to look up information on installing a new NT driver, you would tend to trust what you read. Also, if you access a particular professor's course web site, you would know that the professor is the authority behind the information on the site. The professor's students would know that they need to believe what they read, at least for the rest of the semester. Since these pages are probably posted on a university's server, the reputation of the institution also gives it additional authority. However, until recently, there has not been any "objective" review of higher education Web resources available.

Even after finding the educational resource and determining its accuracy, the potential user must determine if the resource is effective in teaching or demonstrating the concept. A Web page could be both relevant to your topic and accurate, but may not be useful by the target audience you want to use it with. If it is pure text with no interactivity, has inappropriate vocabulary, or is simply ineffective instruction, you would probably not want to use it. To address the problems of finding instructional site, determining their accuracy, and determining how to integrate the resource in a learning environment, the Multimedia

Educational Repository for Learning and On-line Teaching (MERLOT) was established. The MERLOT virtual repository (www.merlot.org) of instructional materials is hosted by the California State University Center for Distribute Learning. As the project evolved, a peer review process initiated to "improve the effectiveness of teaching and learning by expanding the quantity and quality of peer-reviewed online learning materials" (University of Michigan, 2000). The balance of this paper discusses both MERLOT as a virtual repository of web based educational resources and as a source of peer reviewed resources.

MERLOT as a Virtual Repository of Education Resources

The MERLOT community has established and maintained a virtual collection of educational resources. Membership in the MERLOT community is open to any interested educator and there is no cost for membership. Once you have registered as a member on the MERLOT web site (www.merlot.org), you can contribute to the MERLOT community by posting links to web-based materials or by providing user comments to sites already posted. MERLOT members also receive periodic updates about MERLOT activities and projects.

Experienced Web users know that there are several ways to find information on the Web. When one is interested in searching for broad topics, a Web index like is useful. These indexes are useful for browsing, using hyperlinks to make it easy to navigate through a Web site. However, when you are looking for something more specific, a powerful search engine may be more useful. These search engines allow for complex searches using Boolean logic and sometimes even use artificial intelligence to find information. To accommodate both of these approaches, the educational resources, called *learning objects* in MERLOT terminology, can be accessed by either browsing through the materials by broad subject areas or using a powerful search engine.

Browsing the MERLOT Site

As shown on the MERLOT home page (see Figure 1: The MERLOT Home Page), the learning objects are categorized by both subject area (Arts, Business, Education, etc.) and academic discipline communities (Biology, Business, Chemistry, etc.).

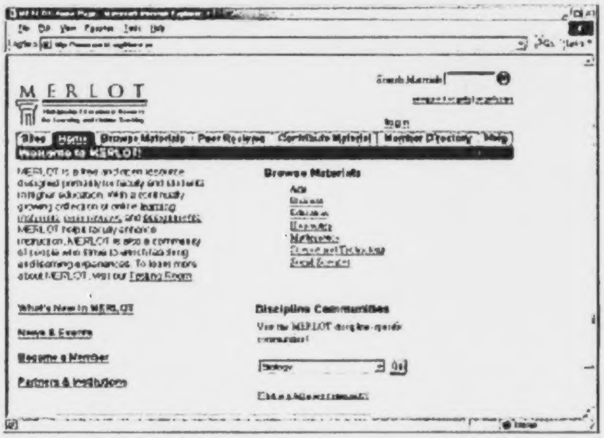

Figure 1: The MERLOT Home Page

Selecting a subject under the Browse Materials menu takes you to a screen showing the sub categories of the subject. For example, Figure 2: Science and Technology shows the categories produced by click on the main Science and Technology subject.

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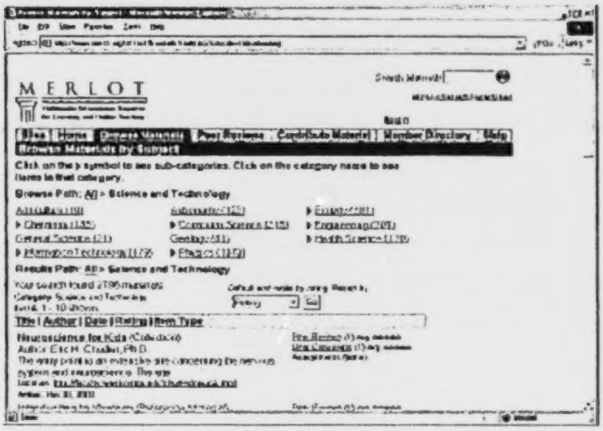


Click on the ▸ symbol to see sub-categories. Click on the category name to see items in that category.

Browse Path: All > Science and Technology

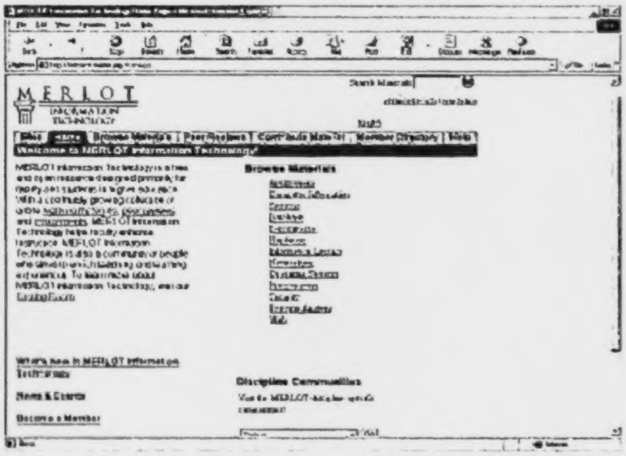
Results Path: All > Science and Technology

Title | Author | Date | Rating | Item Type

MERLOT
Search Materials
Home
Browse Materials
Peer Reviews
Member Directory
Help
Browse Materials by Subject

Figure 2: Science and Technology

The discipline community index works in a similar manner. For example, selecting the Information Technology discipline from the Discipline Community drop-down menu displays the sub-categories of the discipline (see Figure 3: Information Technology Discipline Community).



Welcome to MERLOT Information Technology!

MERLOT
Search Materials
Browse Materials
Peer Reviews
Member Directory
Discipline Communities
News & Events
Become a Member

Figure 3: Information Technology Discipline Community

While having two indexes to the site may be a little redundant, they provide two easy ways to browsing the MERLOT site. They are both excellence ways to become familiar with the variety of learning resources available. However, as noted above, sometimes a powerful search engine is better suited for the task.

Searching the MERLOT Site

The MERLOT search engine provides for both simple string searches and advanced searches that allow you to specify the fields you want searched. The advanced search facility also allows the use of Boolean (AND/OR) operators to refine the search. As Web users know, sometimes your initial search is too broad and returns too many hits. To address this problem, the site recently added an advanced sub-search capability. This allows you to narrow the results of a search by adding additional conditions.

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These searching and browsing capacities alone make MERLOT a valuable source for finding educational learning objects. However, as the project developed, it became obvious that MERLOT could perform an additional valuable service by providing some means of indicating the educational quality of the web sites. In 1999, a rigorous peer review process was initiated (MERLOT History Page, 2001). While only a small percent of the websites on MERLOT have currently been peer reviewed, the number is constantly being increased. This will make MERLOT an even more valuable resource in locating and using quality, authoritative learning objects.

Peer Review

Traditionally the quality of published educational materials has been ensured by the publisher. Publishers use processes including peer review, editorial assistance, and other procedures to ensure that published materials are authoritative and up to scholarly editorial standards. Because publishing on the Web has little or no expense, all of the expertise involved in the publishing process above the author is often eliminated. This means that the author, who sometimes isn't even identified, becomes the sole authority for the site. The MERLOT community decided to implement a peer review process for leaning objects to ensure that the sites are well designed and contain accurate information.

In order to develop a scholarly method for peer review, three models of peer review were considered: the peer review process used by journals, the process used in reviewing published materials, and the methods used for pre-publication reviews. All three of these methods select materials and review a bit differently.

Scholarly journals require the author to submit previously unpublished materials for review. In general, authors are expected to have knowledge of journal's standards and must submit the material in a specific format. It is incumbent upon the author to follow the journals style and subject area. The paper is generally sent out to several scholars in the field for review. The more scholarly journals perform a blind review to ensure fairness in their acceptance policy. The journal will then read the reviews and make a decision on the fate of the work. The editor may accept, reject, accept with revisions, or reject with recommendations.

Book companies use a pre-publication review to both determine if a manuscript is worthy of being published and how it can be improved. As such, it is more formative in nature. The reviewers are generally professionals in a field who are given a small honorarium for the review. The reviews are usually given to the author along with "suggestions" from the publisher.

After a work has been published, the editor of a professional journal may wish to have it reviewed. The editor selects both the reviewers and the book to be reviewed. Obviously, this type of review is for a different purpose. It is to evaluate the quality of an already published work rather than determining if something should be published.

Despite these differences, all of these models of scholarly peer review processes follow similar general processes to assure quality. For example, all of these publications establish evaluation standards and communicate these standards to their academic community. Reviewers then apply the evaluation standards to determine the worth of the material and write some sort of recommendation regarding the material. The model developed by MERLOT is a synthesis of these models.

The MERLOT Peer Review Process

In order to help higher education faculty to decide if online learning resources are appropriate for their courses, MERLOT provides a structured peer review process. To ensure the validity of the review, they are all performed by experts in the academic field of the topic being reviewed, not by instructional technology experts. (Unless, of course, if the academic topic is information technology.) All reviewers are professors that actually use Web based resources in teaching their academic discipline.

The reviews are all conducted by at least two higher education faculty members who use Web based resources in their courses. A composite review form based upon the individual reviews is posed to the MERLOT website. There are now twelve discipline-based communities conducting reviews.

The peer reviews evaluates learning resources along three dimensions: 1) quality of the content, 2) usefulness as a teaching tool, and 3) ease of use. Each review evaluates each dimension using a 5 point rating system. The ratings rate from 1 star (poor) to 5 stars (excellent). Only sites averaging 3 stars or higher are posted on the site (MERLOT Peer Review Page, 2001).

The MERLOT review process focuses on specific leaning modules (or learning objects) rather than entire Web sites. This allows professors to incorporate these modules into there own Web sites. Materials that have higher ratings come up first on MERLOT's search engine.

It should be noted that Merlot is not the only guide to academic Web sites. For example, see the World Lecture Hall at the University of Texas' World Lecture Hall (World Lecture Hall, 2001). Many scholarly associations and other groups have developed guides to course materials for their specific subjects, but these sites generally don't assign ratings to resources (Young, 2000).

Conclusion

Historically, college professors are rewarded for their scholarly activities. A professor that publishes a book with a respected publisher is able to use that scholarly accomplishment for promotion and tenure. Unfortunately, if one chooses to publish electronically, it may be difficult to get the proper "credit." The reason for this is partly due to the fact that the traditional scholarly processes used to validate a work have not been in place for the electronic media. MERLOT offers a solution to this problem. "If you spend a lot of time working on a module, then you should get some credit for it," says Cathy Owens Swift, a professor of marketing at Georgia Southern University who is one of Merlot's reviewers. "People spend a lot of time developing modules, but nobody else ever sees them except their students." Merlot's also plans to recognize professors who have developed excellent sites by mailing notices to their department heads (Young, 2000).

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Helping to Prepare Tomorrow's Teachers Using Technology: Faculty Development

Gloria J. MacCorkindale, Campus K12, CA

Prosperity in the global information society of the 21st Century is dependent upon the success of schools across the United States to increase students' knowledge and skills in all subject areas. As the demand for highly skilled workers increases in the workplace, the school system must network students and teachers to resources to help prepare them for jobs when they enter the workforce. Computing technologies are vital to support the educational needs of students and teachers to address these issues.

The rapid changes and pace of technology around the world, generates a requirement for the United States to have the necessary pedagogues to support the development of a knowledge-based economy and learning society, and to transfer the resulting knowledge into organizations, institutions of learning and companies for worldwide utilization. As a result, partnerships with businesses and the education community are necessary to address these important challenges of the 21st century.

The potential for increased access and reaching out to previously unmet education and training needs through learning technologies is a highly visible growth area. Funding for education is being reduced at a time when educational institutions need to maintain and increase a focus on the learning process. One way to address this challenge is to provide teachers with access to a central repository of state-of-the-art curricula using information technologies.

Current instructional system design and development techniques, evaluation methods, tools for lesson plan development and pedagogical issues in the design of effective instructional materials are being addressed by technology. The need for a unified curricula to enable collaboration via standardized curricula databases has surfaced. A technology-based learning approach could serve to tie together subject-specific educational learning needs with information technology learning technologies for personal growth and staff development to help teachers face the challenges that lie ahead.

With the introduction of these educational technologies, a radical disruption to the pedagogical foundations of the work of teachers has resulted. Computer technology and increasing access to educational resources through the Internet require teachers to rethink how they teach and how they assist students to prepare them for the digital workplace. The rapid change and pace of technology requires school districts, local schools, and school administration to consider facilitating teacher staff development through the use of computer-based educational technologies and tools.

The question is: how do we best prepare tomorrow's teachers to support their personal growth and development to help them maintain and stay ahead of technological advances?

A Solution?
A technology-based knowledge and skills development system to provide the opportunity to prepare tomorrow's teachers to use technology effectively, efficiency and in a cost-effective manner to address their learning needs and support the student learning process is the solution. A knowledge and skills development system, consisting of three main components: 1) a *Standards Proficiency* tool; 2) a *Learning Plan Deli*very tool; and 3) an *Authoring- and Publishing-to-the- Web* tool is the answer.

1. Standards Proficiency Tool

The *Standards Proficiency* management tool will allow administrators, teachers or students to check compliance to Federal, State or Local Standards; for example, this could include the ISTE National Educational Technology Standards for Teachers and/or Students, or the ISTE Technology Standards for Administrators (TSSA).

This standards proficiency-based tool will analyze a school district's core knowledge, skills and attitudes (KSAs) required for teachers to perform an established set of professional responsibilities. Using a

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systematic assessment of staff development needs for the incorporation into teacher staff development curriculum will involve defining optimal performance, assessing actual practice, and identifying the gap between the two. Further, the standards proficiency tool can be used as an advanced organizer to maintain an up-to-date knowledge and skills base for standards' proficiency at all levels.

2. Learning Plan Delivery Tool

The *Learning Plan Delivery* tool will allow on-line chat sessions, on-line self-study sessions, synchronous "real time" instructor-led lectures and courses, web-delivered learning activities, instructor assignments; for example, reading a chapter in a book, writing an essay, as well as threaded discussions to increase teachers' knowledge and skill. This tool will provide the opportunity for teachers to select staff development activities to address their individual learning style in a just-in-time manner.

3. Author and Publish to the Web Tool

The *Author- and Publish-to-the-Web* tool will automate the content publishing process to allow teachers and staff development instructors to create on-line courses. The uniqueness of this tool is the authoring system is based upon sound instructional design principles. Further, the theoretical underpinnings are based on Bloom's Taxonomy of Learning Objectives and Gagne's Nine Events of Learning.

Instructional design is the iterative process of planning instruction. It is based on research findings on how learning takes place, and considers the conditions of learning of both external events of instruction, and previously learned capabilities which are stored in memory. The design phase is a detailed plan that defines, describes and prescribes methods and procedures for the development, implementation, and management of an instructional episode. Three points must be in agreement for the design. They are: the performance objectives, the instructional materials, and the evaluation instruments.

This authoring- and publishing-to-the-Web system will be aligned to relevant learning activities as prescribed learning interventions in the *Learning Plan Delivery* tool. This tool will help achieve the intended learning outcomes based on sound instructional design practices and principles. Further, this tool will allow for the automation of the instructional design process overall, and will facilitate automated collaboration between staff development content designers and subject matters experts (SMEs) to create on-line courses for teachers, administrators and students.

Summary

New staff development methodologies and technologies are being developed in response to the rapid technological changes within schools and the school community. To keep pace and ahead of these changes, staff development is required to support a flexible learning environment in order for teaching staff to respond and adapt quickly to these changes. Due to educational computing technology innovations, staff development no longer needs to be isolated from the school or the school community. Developments, like the *Standards Proficiency* tool, the *Learning Plan Delivery* tool, and the *Author- and Publish-to-the-Web* tool, now allow for distributed staff development to occur anytime, anyplace.

Faculty Development in Educational Technology

Cathy Cavanaugh, Ph.D. Curriculum & Instruction, University of North Florida, USA. ccavanau@unf.edu

Abstract: Many education faculty members do not feel qualified to integrate and model the use of technology in their own teaching. A faculty development program is one college's approach to expanding the confidence and abilities of education professors to use technology as a teaching tool. The college's Technology Committee conducted a needs assessment consisting of focus group discussions and a survey to discover and prioritize the technology interests and abilities of faculty. In response to the needs, the committee prioritized technology purchasing, developed an online technology FAQ, sponsored a technology open house, and held small Tech Friday focused learning sessions.

While faculty members in colleges of education generally agree that children in the information age need technology fluency, and therefore teachers need expertise in teaching with technology, the majority of faculty members do not feel qualified to integrate and model the use of technology in their own teaching. The faculty development program described in this paper is one college's approach to expanding the confidence and abilities of education professors to use technology as a teaching tool.

The National Council for the Accreditation of Teacher Education (NCATE) regularly evaluates the practices of teacher education programs, and technology has become an important part of the evaluation process. NCATE unit standards give technology an important role in teacher preparation: importance is placed on "the unit's commitment to the integration of technology to enhance candidate and student learning." In fact, the conceptual framework of a teacher education program is required to address its commitment to technology.

> The unit's conceptual framework(s) reflects the unit's commitment to preparing candidates who are able to use educational technology to help all students learn; it also provides a conceptual understanding of how knowledge, skills, and dispositions related to educational and information technology are integrated throughout the curriculum, instruction, field experiences, clinical practice, assessments, and evaluations. (NCATE, 2000)

The target of teacher education programs is developing candidates who "present the content to students in challenging, clear, and compelling ways and integrate technology appropriately." In order to meet these standards, teacher education professors must have the skills and interests to integrate technology into their teaching. NCATE states, "Teaching by the professional education faculty reflects the unit's conceptual framework(s), incorporates appropriate performance assessments, and integrates diversity and technology throughout coursework, field experiences, and clinical practices." In short, the success of a teacher education program depends in part on its ability to produce novice teachers who can effectively teach with technology. In addition to NCATE requirements, the state mandates that teacher education graduates document that they can teach using technology. None of this is likely to happen unless faculty model and integrate technology into teaching.

Over the last academic year, our college of education at a regional state university embarked on a mission to improve the technology integration among faculty. The college's technology committee led the mission. The process began with a needs assessment intended to discover and prioritize the technology interests and abilities of faculty. The technology committee began by hosting two hour-long technology focus group discussions, during which professors were invited to describe their views on technology in the college and to elaborate on their needs. The focus group sessions brought to light the main concerns of professors related to teaching with technology and helped to build consensus about the most urgent needs of the college.

Based on the issues presented during focus group sessions, the technology committee conducted a formal survey of faculty technology needs. In order to direct the college's technology resources in ways that best met their needs, faculty were requested to answer five questions. The questions concerned their current use of technology to support teaching, scholarship and service, and the forms of support that would best enable faculty to better use technology in their work. In an attempt to make the survey as user-friendly as possible, it was distributed on paper, and each question included a list of possible choices along with the option to write in a response. The majority of professors completed the survey.

The surveys showed that the faculty fall along a wide continuum of technology use and skill. A few professors used no technology at all, a few were expert users of advanced technology, and most had experience with one or two technology applications that they use regularly. A small minority felt comfortable teaching with technology. Among the faculty at large, technology was used in several ways to support their activities. In their teaching, professors used technology for presentations to students, presentations by students, preparing print or electronic teaching materials, locating or providing online materials for students, and email. In research, technology was used in writing, data collection, data analysis, electronic searches, and reading the work of others. To support their service responsibilities, professors used technology for committee reports/agendas, gathering information for committee work, work with schools, and work with professional organizations.

When asked to indicate the technology topics about which they most needed training or seminars, faculty listed the following, listed in order of preference: Digital video, Web design, Electronic portfolios, Presentation design, Online course management (Blackboard, Lotus, Learning Space), Digital cameras, Palm/PDA, Databases, Online audio/video conferencing, Scanners. The vast majority of professors stated that they preferred small group sessions for learning technology integration, and several stated a preference for on-to-one personalized instruction. Very few preferred large group or online learning experiences. There was a strong desire among faculty to bring their own work to the technology sessions, so time would be used productively. Faculty also requested informal sessions that fostered two-way dialog with a facilitator who understands the education setting. One professor said, "Anything us better than what we have now." Faculty suggested Friday afternoons for workshop sessions, because that is a time with no competing demands on time such as teaching or meetings.

Based on the survey of the technology needs of college faculty, the college technology committee launched a plan to progress toward meeting faculty needs. The department chairs agreed to fund small grants for faculty who request assistance in integrating technology into their teaching. The technology committee prioritized their purchasing plan based on the needs expressed in the survey. A technology fair open house was scheduled to acquaint faculty with the technology resources and support available in the college educational technology center. A web-based technology FAQ was developed. A series of Tech Friday faculty development sessions was offered to teach the most-requested skills. The sessions featured small groups in a relaxed and interactive atmosphere led in project-oriented learning by a colleague. While groups on campus previously offered similar workshops, education faculty did not participate, saying that they preferred to learn new skills among colleagues in an education context. Learning from an "in-house" educator also made long-term follow-up with faculty more effective.

The Tech Friday sessions were seven half-day hands-on seminars led by a variety of faculty members who have had success using the technology and who wanted to share their experiences. A schedule of sessions was posted and emailed to faculty, who were invited to sign up for sessions. Faculty were requested to bring materials or ideas related to their goals or projects to enable the session leader to give more practical guidance. Workshop materials including printed guides and handouts were supplied. Tech Friday topics were digital camera basics, digital camera intermediate skills, scanners, web browsing and searching, presentation design basics, presentation design intermediate skills, creating CD-ROMs, digital video basics, digital video applications, electronic portfolios, Blackboard online course system overview, Blackboard applications, web design basics, and web design intermediate skills.

The anticipated results of these activities included faculty who recognize their technology integration support network, faculty who model effective uses of technology in their teaching, and students who are successful in integrating technology into their work and teaching. Professors have responded very positively to the new opportunities to learn technology skills. They have been enthusiastic participants in all activities. Immediately, professors began requesting technology equipment and using it in their courses. Several professors stated that prior to hearing about and participating in the Tech Friday sessions, they simply didn't know they had access to such technology for their teaching. Now the technology spends more time out of the closet than inside it. As our department chair says, "If the technology becomes obsolete before we wear it out, we're not using it enough!"

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How to Effectively Integrate Technology Into the Curriculum—Through Faculty Development

Donna L. Cellante, Ed.D.
Robert Morris University
Department of Computer & Information Systems
United States
cellante@robert-morris.edu

Abstract: Many school and higher education faculty are being faced with a paradigm shift in the way they convey information to their students and communicate information to their peers. Many are fearful of technology; many more do not understand technology's function, and still others are not aware of technology's capabilities in their particular fields. My role as director of instructional technology at Robert Morris University is to help faculty to effectively integrate technology into their curricula. I will show the process I have used thus far to get the faculty involved in integrating technology.

Introduction

The following is a discussion of technology in education, how society can be encouraged to integrate technology and the ways in which I aid Robert Morris University faculty to integrate technology. Technological changes in the 20th century have enabled us to access information quickly and make effective decisions that used to take considerable time. The American society has embraced computer technology and allowed it to reinvent the ways in which we create, find, exchange, and even think about information. The workplace and the operation of businesses have encountered rapid changes. So has the education arena. As we enter the 21st century, educators must find answers and solutions to the concerns and issues surrounding the use of technology as an information tool.

Education is one of the areas where technology has had a direct impact on the way information/knowledge is delivered. Technology in education is no longer a novelty in instruction. It is a basic component of education like reading, writing, and arithmetic. When implemented effectively, technology can help support achievement by enabling learners to be independent, competent and creative thinkers, as well as effective communicators and problem-solvers (Edwards, May 21, 2000).

Technology in Education

Technology in education is a tool; a means to an end with endless specific implementation possibilities. Some of the numerous potential uses of technology in educational settings include support for individual learning activities through CD-ROM or Internet-accessed resource bases, support for group learning activities with E-mail supporting group communication or presentational software to allow groups to collaborate on presentation, support for instructional management through management of student portfolios, and support for development of individual student instructional plans, communications, and administrative functions through support for attendance and accountability.

The CEO Forum (June 2001) report argues that the 21st century demands a new set of skills necessary to prepare students for life and work in the digital age. These skills include: digital literacy, inventive thinking, effective communication, teamwork, and the ability to create high quality products.

According to the CEO Forum, technology can help to develop 21st century skills through improved basic skills, improved digital age literacy skills, improved inventive thinking skills, improved effective communication and interpersonal skills, and improved productivity (p. 6). The North Central Region Education Laboratory (NCREL) has developed the following list to help visualize 21st century skills.

21st Century Skills
Digital Age Literacy

1. Basic, Scientific, and Technological Literacy
2. Visual and Information Literacy

3. Cultural Literacy and Global Awareness

Inventive Thinking

4. Adaptability/Managing Complexity
5. Curiosity, Creativity, and Risk Taking
6. Higher Order Thinking and Sound Reasoning

Effective Communication

7. Teaming, Collaboration, and Interpersonal Skills
8. Personal and Social Responsibility
9. Interactive Communication

High Productivity

10. Prioritizing, Planning, and Managing for Results
11. Effective Use of Real-World Tools
12. Relevant, High Quality Products

Ehrmann (September/October 1999) discussed the Third Revolution in higher education for using technology to improve access and quality. The key technologies include silicon chips, a globe-spanning network of optical fibers and satellites, telephones, fax machines, video cameras, and the communications and data-storage agreements that undergrid the World Wide Web (p. 3).

Getting Faculty To Embrace Technology

With these in mind, the question becomes "How then do we get teachers to embrace technology?" That is a question I struggle with in my new role as director of instructional technology at Robert Morris University. RMU has invested thousands of dollars in state-of-the-art presentation classrooms. These rooms include an overhead projector, a computer, a document camera, cabling for a laptop, and a VCR. At RMU the problem is not equipment, but rather how to help faculty overcome their fears, prejudices, and uncertainties. My first step was to help faculty decide in what ways could technology be integrated into the curriculum to allow faculty to significantly enhance learning. Pierson (Summer 2001) states that unless a teacher views technology use as an integral part of the learning process, it will remain a peripheral ancillary to his or her teaching. True integration can only be understood as the intersection of multiple types of teacher knowledge and, therefore, is likely as rare as expertise." One of my goals as director of instructional technology, taken from CEO Forum (2001) is "to use technology to transform the learning environment so that it is student-centered, problem and project centered, collaborative, communicative, customized and productive (p. 5)."

In September, we began offering training sessions for the faculty that addressed issues such as operating the various types of presentation classrooms (deluxe, Smart cart, console), Group Wise (our E mail system), grade submission, adult pedagogy, on-line education, and application software, such as PowerPoint and FrontPage. These sessions were designed to aid the faculty in their teaching and learning.

Some of the benefits our faculty can realize through education technology include:

1. Improved ability to meet student education outcomes
2. Improved professionalism
3. Improved instructional practices
4. Increased communication and collaboration
5. Improved efficiency and more constructive time spent on administrative tasks.

Kagima and Hausafus (2001) report that recent studies indicate that faculty are not supported with in-depth staff development or follow-up activities, which results in minor integration of new instructional technologies in their teaching.

According to Kagima and Hausafus (2001), educators are not easily disposed toward replacing familiar strategies, techniques, and methods of instruction learned over several years that have worked successfully (Hope, 1998). For educators to integrate technology into their teaching and learning environments, they need to believe that using technology is more efficient and effective than their familiar methodologies (Hope, 1998; Simonson & Thompson, 1997). Dagga and Huba (1997) notes that although implementation of technologies is growing, acceptance of new technologies does not occur readily. Several barriers have been identified that hinder educators' capacity to adopt computer-related technologies in their educational practices. Herring (1997) and Kelsey (1997) identified career concerns, lack of institutional support, fear of being replaced by the technology, and the lack of technological competence as key barriers. Several educators identified time as one of the most critical barriers to integration of technology (Albright, 2000; Beaubodin, 1990; Dillon & Wright, 1993; Leggett & Persichitte, 1998). In relation to time needs, Leggett and Persichitte (1998, p. 33) notes that faculty require:

1. Time to plan, collaborate, prepare, and use technology in the classroom.
2. Uninterrupted time during the day to go online.
3. Time during and outside of the school day for technology training.
4. Time to personally explore, digest, and experiment with technology as well as maintain skills.

Teachers need to design/redesign the staff development process so it meets their needs—includes time to practice using the equipment, to watch teachers model lessons that infuse technology into the curriculum, and to mentor other teachers. Educators must have the time to work together, to explore, and to play with technological tools (Schrum, 2001).

Aiding Faculty to Integrate Technology

My role as director of instructional technology is to share with the faculty some literature and suggestions for incorporating technology into the classroom. Many of the faculty are very accustomed to using the technology, but they wanted some suggestions (with supporting documentation) of ways to effectively use technology in the everyday classroom.

The suggestions I shared with them are as follows:

1. Have clearly defined learning objectives. According to Eib (May/June 2001), "to know the best ways to use technology in teaching and learning, educators must know the learning objectives (p. 2)." For example, if the objective is to provide a map as one piece of information about a country or region, then any map will do. However, if the objective is to see where cities, national forests, and waterways are located and relate to a certain population, then another tool may have been more effective (Eib, May/June 2001).
2. Have some general ideas about the technology available to use. Lim and Clark (1998) offer a whole list of technology curriculum integration ideas for faculty to use. For example, there is multimedia software such as PowerPoint, Hyperstudio, or Web pages. Using this software to create lecture supplements, to present or assess information to create calendars of events or faculty/staff pages, or to conduct guided searches of the Internet aids learning.

Word processing software can be used to have students write stories, essays, or report research findings on various topics. It can be used to enable students to keep a journal.

Spreadsheet and database software can be used to compare information, such as literacy rate, per capita income, etc. Online databases can be used to find information quickly and efficiently.

Desktop publishing and graphic/paint/draw software can be used to have students create posters, maps, invitations, or newsletters (Technology Curriculum Integration Ideas!)

According to Caswell (Sept/Oct 2001), the Internet can be used as a way to conduct the threaded discussion forum. "Discussion forums are areas of the Internet that provide a common meeting place where participants can contribute to a dialogue and access information asynchronously (p. 1)."

3. View technology as a tool. According to Schrum (2001), if it's clear that technological tools will help them achieve their goal of having student's learn, educators will use those tools. In a technology-rich environment, students are active learners—producing knowledge and presenting that knowledge in a variety of formats. A tool is intended to aid in the learning process. For example, various software packages have specific intents.
4. Establish roundtables with other members of the school and department. Share ideas about what works and what doesn't over lunch, through a department meeting, or by visiting others' classrooms. Show demonstrations/ samples of projects. Coordinate strategies to move to a student-centered environment. Some faculty are comfortable with inviting their peers to sit in their classroom and observe the strategies and techniques used.
5. Observe others in the discipline to "see" technology use in action. Determine frameworks that will work for the classroom. Talk with others through "chat lines" to discuss ideas for

projects, etc. Either visit in person or on-line to see the actual technology being used. Find ways to make yourself comfortable with using technology.

These are some of the ideas I have shared with the faculty at Robert Morris. We have made some advances to get faculty to incorporate technology into the classroom, but the process is slow.

The technological changes in the 20th century have caused educators to change their viewpoints about the use of technology as an information tool. In this paper I have discussed the use of technology in education, how society is encouraged the integrate technology, and ways in which I aid the RMU faculty to integrate technology.

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Empowering Higher Education Faculty to Use Technology to Enhance Teaching and Learning: A Peer Mentoring Program

Regina Chatel, Saint Joseph College, US

ABSTRACT: This paper describes a peer mentor program to help college faculty integrate technology into their teaching and to use technology for personal learning and professional development. In order to help faculty become more comfortable with and use technology, a faculty mentoring program was created which centered on a faculty memberserving in the capacity of a faculty mentor. This paper reports from the mentor's perspective the technology-centered concerns that the faculty reported in an initial survey, the nature of the mentoring program and the current effort to make the mentoring program into an institutionally supported position.

Faculty Technology Survey

Faculty technology mentor conducted a survey to explore the nature of faculty concerns with respect to technology issues on campus. Survey results indicated several major areas of concern, including:

Faculty Concerns with Respect to Technology and Student Learning

- How to make this activity (**electronic discussion**) supportive of course objectives is an important question…if it just seen and experienced by the students as a gimmick, it will not be helpful. What is unique about the use of discussions that makes it worthwhile for student learning? I think I know but students don't always seem to be as motivated to get on the lists and participate.

Faculty Concerns with Respect to Technology and Time & Management

- Haven't had time or success with working with IT on these more instructional type issues.
- Workshops are slow and general: I want an intense session specific to my needs. I can't give 3 hours to many workshops, but 1/2 hr one-on-one is extremely helpful.

Faculty Concerns with Respect to Technology and Information They Needed About **Available Hardware & Software in Classrooms & Various Sites**

- … am interested in transposing my overheads to Power Po int (or some other more technology-based media). I have run into several barriers: Equipment (I can't be assured of having a way to project the images in my classroom at Beach Park); Information about resources – such as, do we have a way of scanning images?

Faculty Concerns with Respect to Technology and Technical Support from the IT Department

- I will need the **ability to run Java applets** on the machines in the networked classrooms in fall 2001…The *issue was not resolved at that time* but I will need it (the capacity to run the applets from actual files developed by students) for a course in the fall.
- I increased by enrollment one semester in …. because I was promised support. However, the assistants were not able to help in ways anticipated, and they were not trained or interested. They seemed annoyed to even be asked.

Faculty Concerns with Respect to Integrating Technology into Their Own Teaching

- Need to know how to use technology in my teaching methods courses, other than word processing. Need the appropriate equipment: hardware & software; need to know what others in similar teaching areas are doing in this area

Faculty Concerns with Respect to Technology and Support in Handling Student Concerns

- …need to know how to address student concerns, particularly their skills and available facilities/equipment at the college and home

Faculty Concerns with Respect to Technology and Institutional Support

- I don't feel we have the support at SJC (maybe until now!) to help make things work right for faculty and students…

Faculty Reported Some Integration of Technology into Teaching

- I don't like our email system (Electronically mediated discussion such as threaded discussion using our email system) for threaded discussions, and I have started to use Blackboard instead, which student appreciate!

Professional Development Activities

Faculty technology mentor provided professional development activities based on the needs expressed by faculty as indicated in the table below:

I am interested in Professional Development Options: (February, 2001)			
Personal	**Informal**	**Workshop**	

Contact	Discussion	Small Group	
7	5	10	Integrating the Internet into my courses
9	4	7	Support in developing a personal web page
4	3	5	Support in developing a department web page
7	3	14	Electronically mediated discussion such as threaded discussion using our email system
4	2	8	Creating PowerPoint presentations
1	3	3	How to evaluate software
1	5	4	How to evaluate World Wide Web sites
9	1	2	On-site (in the classroom) support when I try an innovation the first time
7	6	9	What's Janzabar and Why should I care?!
3	7	14	Discussion with faculty who are teaching online courses
3	5	12	Overview of teaching an online course
4	4	13	Overview of process of developing and online course
3	3	15	Managing and surviving an online course
3	4	14	Creating a learner-centered environment in an online course
7	2	7	Assistance in developing an online course
3	2	6	Using the SJC library from my home via the Internet
3	1		Accessing email & Public Folders off campus
	1	7	Developing a technology vision for SJC

In order to make my work meaningful to the faculty, I conducted a needs assessment survey. Survey results indicated six general areas of need as expressed by the faculty. During the course of the spring semester, I spent **57 hours in direct contact with faculty** either individually or in small groups focusing on the six areas of need. As indicated below, many projects have been completed. However, many have been started and work will continue in fall.

1. **Personal Web Pages**
   - Developed and posted 6 faculty personal web pages; 3 of these will require further development in the fall.
   - Started work with 6 other faculty members and will continue this fall in the development of their personal web pages.
2. **Department Web Page Development**
   - Continuing work with Religious Studies Department to develop web page.
3. **Electronically Mediated Discussion**
   - Shared research in support of the use of electronically mediated discussion.
   - Held one orientation meeting for faculty; 11 faculty members attended.
   - Mentored 3 faculty members in setting up and using public folders in conjunction with traditional instruction.
   - Anticipate working with these faculty members in the fall in terms of providing technical support the first time they try this with their classes.
4. **Online Course Development**
   - Shared research in the development and teaching of online courses.
   - Held one orientation meeting for faculty; 16 faculty members attended.
   - Mentored 4 faculty members in the development of CTDLC grants. Psychology Dept., Chemistry Dept., Biology Dept., and Counseling Dept. have developed and submitted CTDLC proposals for funding to online course development.
   - Continuing to work with English Dept., Nursing Dept., Nutrition Dept., Psychology Dept., and Counseling in the development of CTDLC proposals for the next round of grants.
5. **Conducting Research in the SJC Library**

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- ➢ Shared with interested faculty the process for conducting electronic research.

6. **Accessing email & public folders from home**
    - Shared with interested faculty the process for accessing email & public folders off-site.

Institutional Support for Faculty Technology Mentor

The technology mentor position has been incorporated into the 5 year technology plan. Furthermore, it is specified that the person who will be a mentor is a member of the Faculty. The position taken is that such a program would be best staffed by a faculty member because of the specialized knowledge and closely related to the academic mission. There was much support for having a faculty member who understood how technology could be applied within the context of a pedagogic framework. This position has the full support of the Faculty and the college administration.

Faculty Development for Moving From Class Rooms to Learning Spaces.

William N. Chernish
Conrad N. Hilton College of Hotel and Restaurant Management
University of Houston
United States
wchernish@uh.edu

Abstract: The recent popularity of distance learning has brought increased pressure for change in institutions and for those who teach in them. Cheaper computers, greater capabilities, applications programs, inexpensive telecommunications, and more savvy groups of learners have built pressure for faculty and administrators to change for survival. One university has embraced a number of formal and informal methods to prepare, develop, support, and encourage faculty to adapt and change. These methods include faculty-driven efforts, administration sponsored peer-learning, monetary rewards, and availability of grant funds to encourage better use of technology in distance learning, and in taking that knowledge back into the traditional classroom.

Introduction

The process of facilitating learning, or providing "education" has remained basically unchanged for several millennia. Much of what happens in classrooms today—at primary, secondary, and post-secondary levels--is modeled after the Aristotelian approach of gathering students about the feet of the master. The teacher gathers students in a classroom, decides what is to be taught and proceeds to dispense information. Incremental changes in that model have been facilitated by technology beyond chalkboards and chalk, (opaque projectors, film-strips, films, overhead projectors, videos and television), though the model has remained relatively intact. The model has remained, however, largely teacher-centered, linear, and prescriptive in that the teacher sets the agenda, timing, and method of delivery.

Technology and Change

During the last decade, the application of relatively cheap, easy-to-use and fast-evolving technology has permitted and even required different ways of approaching learners and learning. Inexpensive and high-powered computers, affordable mass storage, generic and application-specific software, and telecommunications have come together to drive a revolution in education whether in the classrooms or on to the anytime-anywhere concepts, with many hybrids in between.

The application of technology to the teaching and learning process is not a panacea. Its potential is both broad and deep, it does not appear to answer every student or every learning need. There are some students for whom technology will be especially helpful, and some who might not find the benefits so great. There are some topics for which technology can provide a tremendous advantage, and others where application is more difficult to envision and apply.

Pressure for Change

This technology revolution has had a significant impact on colleges and universities. Traditional post-secondary educational organizations now face demands from customers (students, those who employ them, faculty, administrators, and other stakeholders) for greater flexibility and quality of course offerings. The need for flexibility is demonstrated by increased demand for learning from non-traditional learner groups, working adults, and for learning opportunities in technical and other fields that are not readily available to large groups of people. The need for "anytime-anywhere" learning is becoming obvious.(Boettcher 2000)

For-profit organizations of various types are adding to the pressure for change by moving to the forefront of higher education and providing alternatives to those offerings long considered to be the exclusive province of traditional higher education institutions: not-for-profit universities, colleges and community colleges. In response, universities have begun to adapt and to adopt new practices, tools and technologies. The implementation of that change also requires retooling and developing faculty to effectively use the new opportunities.

Both academics and the marketplace have shown that distance learning in various forms can provide acceptable levels of learning. (Chernish and McNeil 2000; Industry Report 2001; Grayson 1999; Bond and Finney 2000). The one challenge is to develop faculty and institutional capabilities to deliver learning which is more effective and more efficient than the current model permits. (Olcutt 1999)

University of Houston

The University of Houston has offered continuing and some limited forms of "alternative education," "continuing education," for much of its history. As an urban institution serving a broad range of student needs in its four campuses, faculty members have been developing different and experimental learning delivery initiatives as a matter of course. Many of these efforts have been independent and only loosely coordinated or communicated among peers. Some might be described as "skunk works" efforts to push the envelope without the sanction or even the knowledge of central administrators.

The University has formally delivered coursework by distance for more than a decade, first using instructional television (ITV), and also using online tools. This outreach has brought about recognition that many of the traditional models, rubrics, and methods from the classroom require rethinking. Use of technology also surfaced the need for new and different skills for dealing with graphics, programming, application of telecommunications and related skills; skills which most faculty members do not have, and do not care to develop mastery.

The university has evolved a collaborative model for distance learning which brings together faculty members (subject matter experts, or SME's), instructional designers, technical support personnel, and administrators in a team. This team develops materials, content, and approaches to move learning from the classroom to cyberspace; and it also provided opportunities for improvement of traditional classroom activity as a valuable byproduct of distance learning efforts.

Faculty Development

Over the past decade, a number of informal and more formal approaches to preparing faculty for changes in educational and learning practices have evolved at the University. Among them are the following:

Moles. In 1994, several faculty began meeting informally to discuss technology issues in education. They chose the name "Moles" not because it represented any acronym, but rather that moles were furry creatures that burrowed underground without the benefit of sight. The Moles group grew to conduct monthly meetings and informal electronic communications to provide peer support and to share developments and challenges. Issues of technology (in distance settings, and in the classroom), sharing innovative efforts, and quiet encouragement had been, and continue to be Mole roles. Much of the leadership and innovation in the Moles came from the late John Butler, associate dean in the College of Natural Sciences and Mathematics who also maintained a Moles web page (http://www.uh.edu/~jbutler/professor/uhmoles.html).

COWS. The University Distance Learning office began more formalized development and support for system faculty several years ago when Sandra Frieden offered an off-site seminars that become known as COWS, Campus Online Workshops. These three-day gatherings for a broad range of system faculty from all University of Houston campuses combined peer-interaction, as well as staff and technical expertise. Peers are able to share experiences, successes, and impediments in a manner that has veracity and applicability to other faculty present. Staff is able to contribute information regarding current capabilities as well as anticipated changes and upgrades in technological capabilities. The workshops also provide an opportunity for introduction of instructional design principles to teachers whose previous knowledge of teaching and learning has come from their own experience in classrooms as students or professors. Finally, the COWS process provides an ongoing opportunity for faculty collaboration, interaction, networking and research.

Technology Grants. The office of the university provost has offered tangible support to faculty involved in distance learning through an annual competition for Faculty Development Improvement Grants (FDIP). This program permits faculty to propose small projects for application of technology to distance learning and to receive funds to implement the projects. FDIP grant funds can be used for hardware, software, technical assistance, multimedia development, and even teaching assistant support to further technological applications. The current round of grants will award up to $6000 to successful proposals.

College staff Support. The information technology side of the University has also contributed to the development of faculty and technical skills for distance learning by creating a system of distributed support personnel in the various colleges. This technical support augments central staff technical expertise by placing knowledgeable and trained support personnel at the college level where they are able to develop working relationships with those involved in distance learning and application of other learning technologies.

WebCT. The University is currently using WebCT™ as the standard learning support system, for both distance and on-campus use. Many users have found the program to be very useful in a broad variety of areas, although the learning curve has been described as fairly steep. To aid new faculty users, and to upgrade those who have been using some of its functionality, the University has provided workshops, online materials, and technical assistance to users. As might also be expected and informal peer support system has evolved within and among colleges to use the program.

Compensation. Faculty who develop and deliver distance learning through the recognized University channels are eligible for, and receive, additional compensation. Current practice provided a fee for developing a course (paid only once, without respect to later revisions, whatever their nature), and a separate fee for delivering the course by distance. This compensation may provide the incentive for inexperienced faculty to address distance learning, and may encourage experienced faculty to develop new offerings, and to continue to participate in ongoing delivery of coursework.

Recognition. Additional incentive for faculty to attempt and to excel in distance learning initiative may lie in campus-wide recognition through naming of one faculty member as having made outstanding contributions to distance learning at the University. The award is of those few announced at annual commencement exercises and carries a handsome financial reward.

Other Issues.

On a less formal basis, many of those interested in distance delivery have worked outside of the formal University organization to team-teach innovative courses, participate in doctoral classes, serve as live case studies for graduate students, and to assist in the development of masters and doctoral research projects.

A number of these collaborative efforts have been used to begin to assemble a set of "best practices" for learning evolution in this new century. The experiences have produced results which range from different course structures, adjustments to the traditional "hours of class" requirements, portability of learning, greater convenience to students, and improved faculty skills.

Development of the collaborative approach has involved the use of several faculty and staff development tools at the University System, campus, college and departmental level. The efforts have involved three-day workshops, shorter and more focused seminars, an informal listserve discussion, and training in specific skills for teachers and technicians. All of these have provided significant development challenges for each of the team components: instructional staff, instructional designers, technical staff, and administrators.

Challenges. Challenges in the application of technology and implementation of distance learning abound. Issues such as economic feasibility, and quality of learning offered remain largely unaddressed. Distance learning is being offered by traditional educational institutions, by proprietary educational organization, and in many other forms and formats within and among industry. International opportunities exist and will present unique problems and challenges. Faculty, and institutions, is struggling with questions of intellectual property, ownership of materials, and residual rights to delivery of instruction that has been recorded for distance delivery.

Circularity. Development of faculty for participation in distance learning cannot be viewed as a stand-alone challenge. Distance learning is changing the very fabric of the higher educational process as it seeks to deliver more anytime-anyplace learning opportunities. At the same time, the lessons, techniques, and technology of distance learning must necessarily flow back into the traditional classroom.(Dollar 1999) More and more, classroom teachers are using technology in the actual classroom, or to support other related learning exercises. Classrooms are becoming paperless, learning resources are available from nontraditional sources (Armstrong 2000), the World Wide Web has become a primary source of information, and learners are becoming more able to utilize the multimedia learning resources and tools available online and otherwise. Those who design and facilitate the learning processes must do no less.

Perhaps the model evolving at the University can serve as a basis for development activities in other settings as well.

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Faculty of Education Staff Development—Support of Tomorrow's Teachers

Cherycl Goodale
Department of Education, University of Alberta
Edmonton, AB Canada
Cgoodale@ualberta.ca

Mike Carbonaro
Department of Education, University of Alberta
Edmonton, AB Canada
Mike.carbonaro@ualberta.ca

Fern Snart
Department of Education, University of Alberta
Edmonton, AB Canada
Fern.snart@ualberta.ca

Abstract: Supported by teacher accreditation organizations promoting technology standards for teachers, and supported by teacher recruiters who are striving to hire new teachers with technology skills, education departments and faculty members are investigating professional development regarding technology. This paper describes an innovative study that collected data through personal interviews from one hundred members of a faculty of education to ascertain views of professional development and professional development needs. Faculty responses provided the field of professional development for educators a more coherent and comprehensive view and linkage with present theory and a foundation for a new model of professional development for faculty involved with educating pre-service and active teachers.

Introduction

Faculty members in departments of education are interested in the impact of technology on education. Faculty members interested in their own professional development regarding technologies to support preservice and inservice teachers are supported by organizations such as the International Society for Technology in Education (ISTE), the American National Council for Accreditation of Teacher Education (NCATE), Canadian provincial governments responsible for education such as Alberta Learning, and by teacher recruiters. ISTE is recommending and NCATE is adopting the inclusion of educational computing and technology standards in the American accreditation for teachers. The Department of Learning in Alberta is including the integration of technology in the provincial curriculum objectives (Alberta Learning), and one superintendent in Alberta is stating a preference to hire only teachers with a strong technology background (University of Alberta, 2001). With interest from faculty, and promotion of technology from accreditation and government bodies and teacher recruiters, this research study was established to better understand professional development for faculty with regard to technology to ultimately support pre-service and in-service teaching/learning.

Wilson and Berne (1998) completed research in the field of professional development for educators, and their work reinforces the need for this study. Wilson and Berne conclude that professional development for educators is only successful if educators drive the content and opportunities themselves. In order to create or enable professional development opportunities for faculty in departments of education in universities, this research study was initiated to investigate the professional development needs.

The Study

The research study used a convenience sample—all one-hundred and twenty faculty and administrative members within one Faculty of Education were invited to participate in the study by meeting personally with one of three experienced graduate student interviewers. Of the 120 invited for interviews, 100 participated. Confidentiality and security measures were implemented and communicated to participants. The interviews were taped and transcribed. The data was then carefully read and sorted and entered into an electronic database where data could be resorted, queried, and classified. Findings were condensed and presented back to the faculty at an open invitation meeting extended to all 120 invitees.

Findings

Responses from faculty member participants (faculty members) in the study provide practical information on what professional development means in their world of work, what they want to learn in the future and how they want to participate. Responses from faculty members also provide the field of professional development for educators a more coherent and comprehensive view and linkage with present theory and a foundation for a new model of professional development for faculty involved with educating pre-service and active teachers.

Perceived Technology Needs of Pre-service and Service Teachers

Faculty members in the study identify technology areas they perceive to be most important to pre-service and in-service teachers. Teachers need to be comfortable learning technology continuously from a variety of sources including their students because technologies are so rapidly changing and evolving. Teachers need to learn to use technology responsibly, to effectively integrate technology with the curriculum, seek creative ways to use the technology to enhance learning, and to use technology to their advantage in their administration. Teachers need to learn to think critically of technologies, to critique materials and equipment, ask what the technology can be used for, question sources of information, consider gaps in accessibility, and consider issues, impact of technology and ethics. To support these perceived technology needs of pre-service and in-service teachers, faculty members seek professional development opportunities. When asked about professional development involving technology, faculty members identified what they are interested in and how they would like to participate.

Faculty Member Participants Choose What to Learn

Participants in the study identify the major barrier to professional development as "lack of time," therefore, when determining what to learn, participants indicate a real need to be selective because there is so much available it is impossible to get to it all. "There is no way in hell you can read it all" (faculty member participant #42). "Need to look real hard for professional development opportunities that will nourish" (85). One participant was appreciative when the technology group selected and recommended training. "Moved to different email and professional development was setup to go with it—that was good" (65). Faculty members state that they are very busy within their own area of interest and want people involved in the technologies to keep them informed; they want people involved in the technologies to be their watchdogs for new and emerging technologies. Participants are also looking to people with experience using any of the technologies to share best practices. In addition to faculty searching for information about technologies, technology specialists and colleagues using technology can help faculty members overcome their lack of knowledge about what is available. "We don't even know what we don't know" (67). Faculty members want a smorgasbord of choices and they want to be sold on the technology. "Someone has to show me good examples and illustrations how technology might be used. A supermarket presented in a way accessible to me. I'd say, I could use that. I'd then need people to help me learn and develop the expertise. I have to see it to see how it would fit what I am doing (67). Faculty members want to learn about everything from "leading edge whatever" (40) to "pretty basic stuff" (28) and they want to use technology "more effectively, more broadly" (27). For example, faculty members want to investigate how to better search and store, communicate, use bibliographic tools and research analysis programs, integrate technology with curriculum, and use technologies in their planning, teaching, research and management.

What Professional Development Means to Faculty Member Participants

Faculty members indicate their professional development is every day, it is self-directed and it is eclectic. Participants practice skills, investigate what is new and what the technology is capable of, what special requirements would be required, and the purpose. Faculty members self-learn and learn from sharing experiences and best practices. "Talk with people, watch what they are doing, figure out if we can do it that way" (22). Faculty members learn by belonging to professional organizations and by going to and giving presentations. Presentations are "invigorating and informative" (36). Participants also identified reading, reflecting and research as part of their professional development. "Teaching is professional development, writing and research is professional development" (19). Faculty members also learn from local events, documentation, help systems, and tools and services.

Faculty members indicate they want to learn and refine their skills using technology to communicate with student applicants, students, cooperating teachers, teachers, administrators, and colleagues worldwide. Faculty members also want to investigate how technology affects teaching/learning, the integration of technology with the curriculum, the relationship between technology and their area of interest, the impact of technology, gaps in access, ethics and issues regarding technology to support pre-service and in-service teachers.

Practical Professional Development Opportunities

From a practical view, participants identify logistics and characteristics of ideal training initiatives. Demonstrations to preview new software. Bring your own projects workshops, "bring your own data and have a website built in a day" (13), for example. Relevant content with immediate application if it is to be learned and retained. Interaction within courses or workshops with an instructor or students rather than a technology. Faculty members want delivery to be hands-on and interactive. Any demonstrations or courses need to be offered fast, one-half day courses for instance, and they need to be offered multi times so faculty members can choose times to fit their schedules. One-on-one is ideal, but small class sizes and homogenous groups. Objectives need to be included in the course description. The instructor should not assume students' skills, experience or levels of expertise. Instructor needs to break away from computer jargon and speak in plain language. An overhead needs to be used to display computer screens and the instructor needs to physically navigate throughout the room to help everyone keep up. Faculty members want instructors to have better facilitation skills to keep themselves and the class on track and to handle questions that typically hold up the class or divert the class from the objectives.

Faculty members are also suggesting that workshops and courses, no matter how good, need follow-up. "The follow-up must be very specific" (98). "Tutors available after the workshop" (76). Follow up by documentation, help, tools and services, or a community of learners to draw help from. "How do I know about the guy in biological sciences working with similar graphics when I want to do something in graphics" (16). Participants also recommend people in the department become champions of processes to turn around and teach or help others in the department. Participants also suggest the need to find training and support from software companies. Help can be from formal sessions, from informal sessions or online. It was suggested that it is not productive to learn without help. "Learning without help is not an effective use of my time" (86).

All colleagues use hallway help by asking their neighbors for quick verbal help at the time they need help, by having a colleague drop by for a few minutes to provide direction, by informal chats to pick up on tricks and tips, and by faculty working and learning together. Participants described extensive use of and appreciation of hallway help, but draw our attention to their feelings of taking up too much of colleagues valued time, thus they are recommending a formal registry of faculty who can help, a help desk, and house call help. Participants want help available when they need help on whatever topic or program they might be stuck on. Help is requested for horizontal or generic programs such as word processing, spreadsheets, databases, presentation packages and website development, and help is requested for vertical or specialized training programs such as the research analysis tools. Help desk help can be a formalized help phone line or email, but it can also include a registry of people with expertise who are willing to share or teach others at a specific time or place. An immediate response is preferred but faculty members recognize replies might be delayed depending on the complexity of the question. In addition to wanting a help desk, participants also request house calls. Participants can see the value of house calls to increase their productivity—for a person to come in and help with a specific application or project, to come in and watch to improve efficiency, or to come in and make technical adjustments. One participant makes us aware that some people do not want to read to learn, they want a personal visit. "No, I don't want a list of steps, I want face-to-face, hand-to-hand, I want to have my private tutor" (22). Others, however, are redefining a personal house help call to include an electronic connection. "Want someone to come into my office by linking by speaker phone to walk me through it - like yesterday C&S [Computing and Network Services] walked me through a complete change, it took about 40 minutes" (23).

Faculty members identify tools and services that could be provided to help them with their use of technology. Tools such as grade management programs, centralized databases, telephone answering equipment, virus protect programs. Templates or forms that are user friendy, and advertised and made accessible to faculty members. Services for one-time or once-a-year projects such as a poster or for one-time long-time tasks such as scanning. Faculty members identify the need to have equipment/software and training available and accessible, and constant technical and application support.

Professional Development Model Emerges

Based on input from faculty members, a model for professional development involving technologies emerges. Participants need a system or infrastructure in place to support training and development and an ongoing follow-up system, professional development activities rooted in constructivism, and delivery in line with andragogical principles.

Just as Moore & Kearsley (1997) raise awareness of the need for systems theory when working with technologies, faculty members identify the need for an infrastructure to be in place. The infrastructure is needed to support access to technologies, technical support, professional development training activities, ongoing follow-up support, and a community of users and specialists to draw on. Drawing a comparison, the faculty members' infrastructure equates with Moore & Kearsley's need for systems theory or an interrelated and interdependent system in place to support the use of technology.

When professional development activities are designed, faculty members are demanding principles of constructivism to learn technology in context with their work and with their prior knowledge (Crawford, 1998). Supporting constructivism and the faculty members' recommendations, Wilson and Berne (1998) conclude that professional development for educators is only successful if driven by the educators themselves.

Faculty member participants demand a learner-centered approach in the design and delivery of professional development activities, an approach Boettcher (1999) claims is relevant to both constructivism and andragogy. The learner centered approach to include relative objectives and concepts, interaction with instructor and students rather than the technology, design and delivery tailored to specific learning styles, in plain language, delivered individually or to small numbers of participants, in homogenous groups, by a facilitator trained to keep the class on task, in short courses offered at multi times. The learner centered professional development activities need to be project based, fixed achievement, variable time (10). Boettcher's (1999) conclusions promote relevance of content, participation of learners in the design and implementation stages of the course, self-directedness, facilitated learning and linking of resources to learners, reflection on experience and knowledge, and collaboration or interaction between instructors and learners and among peers to support problem solving and critical thinking. One participant summarizes with the need for adult education. "Need the basic principles of adult education, they need to know how adults learn and apply that to their education designs" (10).

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Contribution to Tomorrow's Teachers and the Profession

Although this study is limited to faculty members, other faculties of education may be able to identify with what faculty members in this study want to learn and how they want to participate in professional development. The underlying goal being to discover and disseminate knowledge about the impact of technology, and the integration of technology with teaching and learning to tomorrow's teachers and to fellow colleagues.

Faculty members in departments of education are recognizing the need for both pre-service and active teachers to learn to continuously incorporate technology and become comfortable and innovative in their approach to technology throughout their teaching career. Pre-service teachers need to learn to use the technology to meet accreditation standards. As researchers, faculty members are also interested in what the effects and affects are of technology on learning, and they are interested in issues regarding the present and future use of technology. In their own professional development, faculty members are interested in how technology is or can be implicated within their area of expertise, their teaching, and in their research. Faculty members recognize the need to participate in professional development opportunities to extend their learning and to model attitudes and approaches to technology to tomorrow's pre-service and in-service teachers.

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Engaging Teachers in Building Curriculum Webs
A Promising Strategy for Re-Energizing Professionals

By Craig A. Cunningham, Ph.D.
Research Associate
Center for School Improvement, University of Chicago

For the past five years, my colleagues and I have been training teachers to build curriculum webs in the Web Institute for Teachers, an intensive summer professional development experience at the University of Chicago. We have also conducted a professional curriculum development project called Chicago WebDocent that utilizes teachers as curriculum writers in the creation of web-based curriculum materials based on the resources of Chicago-area cultural institutions. Out of these experiences, I have come to believe that the outcomes of teacher growth and engagement are at least as important as web development skills or subject matter knowledge in these efforts.[i]

A curriculum web is is a web page or pages designed to support a curriculum. Building an effective curriculum web is excellent preparation for teaching an effective curriculum unit. Teacher involvement in curriculum development and web design fosters improvements in teaching and in teachers. This is the only way teachers can improve, but it is one way, and it is one that is timely and increasingly available to teachers in schools and in colleges of education.

Curriculum webs are easy to make, given a basic understanding of curriculum development and mastery of the basics of web page creation. Once a teacher or other curriculum developer has produced a few simple curriculum webs, he or she will be ready to incorporate increasingly sophisticated technical and pedagogical techniques. Curriculum webs provide a natural pathway for teacher growth and development, while helping the teacher to keep up with technological and curricular changes.

The availability of information on the Internet and World Wide Web leads to a new role for teachers. In the classroom, teachers who develop their own curriculum webs can become facilitators of learning experiences specifically designed for their students, based on a careful assessment of the students' needs. By engaging in the process of curriculum planning, teachers grow as teachers and as learners, modeling the process for the students as they grow.

Building a web site for learning is itself a process of learning in which meaning is created. Meaning consists of associative relations among concepts or experiences. As people learn, these relations, or meanings, intertwine in complex webs that are built in the medium of ongoing experience. Designing a web site is like creating a mental web of meaning in a set of experiences.[ii] In order to design the site, the teacher who creates a meaningful curriculum web becomes at the same time a more knowledgeable and effective teacher, with a more sophisticated mental map of the subject.

The International Society for Technology in Education's National Educational Technology Standards for Teachers (NETS-T) set forth what teachers should be able to do at three levels: before starting their student teaching; after their student teaching and internship, when they are ready to take over their own classroom; and at the end of the first year of teaching. Among the important things that teachers must learn is to:

- "engage in planning of lesson sequences that effectively integrate technology resources and are consistent with current best practices," and
- "plan and implement technology learning activities that promote student engagement in analysis, synthesis, interpretation, and creation of original products."[iii]

These skills are precisely the ones that can be furthered by having teachers in training develop their own curriculum webs. Additional skills fostered by this process include: critical thinking; data collection; ethical behavior; assessing and selecting resources; planning effective learning activities aligned to standards; creating assessment activities to generate information that can help to improve instructional planning, management, and implementation of learning strategies; and using technology tools to collect, analyze, interpret, represent and communicate data for the purposes of instructional planning and school improvement.

My paper will explore some of the theoretical and practical justifications for promoting the role of teachers as curriculum makers,[iv] and will describe some of the practical issues discovered in our work in the Web Institute for Teachers and in Chicago WebDocent. This is suitable for either a paper session or a roundtable.

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[i] For more information on the Web Institute for Teachers, see "The Web Institute for Teachers: Engaging Teachers in Developing Web-Based Curriculum," with Ellen Diaryko and Frada Boxer. In D. A. Willis, J. D. Price, & J. Willis (Eds.), Society for Information Technology and Teacher Education Proceedings 2000. Charlottesville, VA: Association for the Advancement of Computing in Education. Also available at http://cuip.uchicago.edu/wit/talks/SITE2000.htm See also http://webinstituteforteachers.org.

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Database *for Classroom Plans*

Jesse Drew, ISU, US
Marcia Rosenbusch, Iowa State University, US

The purpose of this poster/demonstration is to clarify the issues that must be addressed in developing a database for teacher-developed activity plans, lesson plans, and unit plans.

Today, classroom teachers are exposed to an abundance of information about instruction much of which is not relevant to their needs. The Internet is an effective means of providing instructional resources to classroom teachers, but the quality of these resources depends on the professional knowledge and skill of the Web site designer. In a collaborative effort among nationally recognized foreign language educators and technology innovators we have designed a Database for Classroom Plans designed to be an effective teacher resource for pre-service and in-service teachers. We will focus on the design process for this database in this poster/demonstration.

We designed this database to help classroom teachers with the planning process. This database is designed to be very flexible. It will allow classroom teachers to view activities, lessons, and units designed specifically for the content area they teach, and, in addition, this database will allow teachers to connect to a variety of content areas, thus, enhancing interdisciplinary planning. The majority of the examples currently on the database are designed for the content areas of foreign languages and technology. Leaders in foreign language education are encouraging classroom teachers to integrate technology into the foreign language curriculum as suggested by the national student standards for foreign language education. More importantly, foreign language educators need resources that will enable them to increase the integration of technology into their curriculum.

After much thought and discussion about what categories of information are essential in planning and communicating the essence of the plan to others, the following were agreed upon and are included as categories in the database:

- Content area (foreign language, mathematics, science, etc.)
- Subject area (Spanish, multiplication, etc.)
- Title
- Grade level (Pre-K – 16+)
- Performance level (beginning, intermediate, advanced)
- Objectives
- Procedures
- Assessment
- Reflection (author[s]'s reflections on the activity in use)
- Author(s)' name(s)
- Author(s)' school, city, state, email and type of author (whether the primary or secondary author)
- References
- Resources
- National standards (currently available only for Foreign Languages and Technology)

The demonstration and discussion of this Database for Classroom Plans will enable the creators to clarify key issues that relate to on-line resources and to receive feedback on this database-and to inform educators about a database that can be effectively used for classroom planning by any content area.

Case Studies of Professional Development

John Fischer, Trinka Messenheimer, Sarah Bombich, Kelly Madger

This presentation is a self-reflective case study of the authors' involvement in a faculty professional development program. This case study of our professional development teases out what might be learned from an innovative program that teams a faculty member involved in teacher education one on one with a "knowledgeable" graduate student. Our experiences over the first year have led us to believe that this form of professional development provides contextual learning in a job embedded manner, such that faculty members leave the experience better prepared to infuse the use of technology into their work with preservice teacher candidates.

For years, the university has struggled to infuse technology in its teacher education programs due to lack of resources and equipment, lack of faculty expertise in technology integration, and lack of programmatic alignment with the ISTE Recommended Foundations in Technology for All Teachers. Recently, the barrier of inadequate equipment and resources has been addressed at the university as well as area K-12 schools. However, program restructuring, curriculum revision, and faculty training are imperative for effective technology infusion in teacher education. The overall goal of the project is to enable preservice teachers to fully utilize modern technology for improved learning and achievement in their future classrooms.

T o describe and support the notions of professional development for technology these cases are framed around the topics of: partnering, structuring the work, characteristics of learners, evolving roles, and impact. The case studies are based on the experiences of two professors and their graduate student mentors for technology training. These case studies represent different learning styles in the professional development process. The similarities and differences will be addressed. Clear indications present us with the need for individually driven / motivated effective professional development.

Standards are only somewhat threatening in the abstract. However, in real practice, especially practice that is reflective, our own work, skills, knowledge can cause us to back away from the enormity of what NET-T means for faculty involved in teacher education. We are not experts. One of us describes herself as having played with a lot of hardware and software at a surface level, but is overwhelmed by the potential for classroom use. The other claims that he plays with the various technology tools, even though they don't work all the time. Sometimes he feels like they don't work at all. And yet as professionals we have been acting to push ourselves and our institution to look at, investigate and struggle with meeting the ISTE standards in one of the largest teacher education programs in the United States. We are seeking to do this by involving ourselves in a PT3 funded program.

Faculty Development Using a Problem-Based Learning Methodology

Penny Ann Garcia, Ph.D.
Department of Human Services and Educational Leadership
College of Education and Human Services
University of Wisconsin Oshkosh
Oshkosh, Wisconsin USA
garcia@uwosh.edu

Abstract: This paper is based on the premise that university faculty will utilize technology when it solves problems they routinely encounter in their profession. It theorizes that the construction of hypermedia case studies by faculty can encourage the extension of basic skills in technology proficiency into high-end production tools. Faculty view both the product and process as beneficial not only to their students' needs but to their own professional requirements as well. A problem-based learning approach is used that both stimulates dialogue across teams representing universities and k-12 schools and allows for individual team enterprise, direction and creativity.

Introduction

Teacher educators voice many concerns regarding technology integration in their courses. These concerns focus on 1) time and resources for learning the technology and considering how it may be integrated into courses; 2) on-going support while in process on a technology enhanced project; 3) an overwhelming frustration at the speed of technology innovation; and 4) valuation of this work in conjunction with promotion and tenure needs. For teacher educators to value, support and model the integration of curriculum and technology with preservice educators, these concerns must be addressed within a framework that allows faculty to consider how technology might address issues routinely faced by teacher educators. Norton (2000) suggests six areas in which technology can assist in solving teacher educators' problems. These include 1) helping students prepare for class, 2) supporting students' grasp of concepts through collaborative meaning-making, 3) publishing and sharing insight, 4) promoting resource-based problem-solving, 5) modeling how theory translates into practice, and 6) communicating with students to meet diversified learning needs. This author suggests the addition of a seventh: facilitating faculty tenure, promotion and merit needs.

Consideration of these seven areas by faculty informs the basis for the University of Wisconsin Oshkosh, College of Education and Human Services (COEHS) *Faculty Developed Hypermedia Case Studies* project. This professional development opportunity is rooted in problem-based learning, traditional case study methodology, and hypermedia learning theory. While the ultimate outcome of the project will be hypermedia case study products to assist preservice students in the observation of, and reflection on, the complexity of the teaching and learning interactions, the process by which those materials are developed is really the focus of the project.

The project fits into a five-year plan for technology integration in the College of Education and Human Services at UW Oshkosh. Over the past two years faculty have availed themselves of numerous opportunities for development of technology skills and the integration and demonstration of those skills with curriculum in their courses. The third year affords teams of university faculty, k-12 faculty and undergraduate students the opportunity to engage in a collaborative inquiry into pedagogy, case study methodology, and hypermedia technologies.

Rationale

As COEHS faculty consider themselves to be students of how technology can be integrated with curriculum, a problem-based approach was an ideal vehicle for delivering this project. Problem-based learning

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proposes that situated learning (Brown, Collin, & Duguid, 1991) in an authentic context (Stepien & Gallagher, 1993) will simultaneously engage students' curiosity, stimulate cognitive mapping, and promote problem-solving and content learning. In the context of the *Faculty Developed Hypermedia Case Studies* project, this approach followed these steps: 1) use of an ill-defined problem that provided the opportunity for dialogue, investigation, collaboration and problem solving; 2) faculty meta-analysis of the big problem leading to identification of specific problem for investigation; 3) infusion of resources - text, mentor, and equipment - to illuminate the processes and theories of case study methodology and hypermedia development; 4) time to collaboratively investigate and collect artifacts; and 5) technical assistance leading to hypermedia case study materials for teacher educators' use with their students.

A problem-based approach was also selected to allow faculty members to again experience the difference between the conventional approach to education and that used both by what Lave (1988) refers to *just plain folks* (JPFs) and experts in fields. Brown (1991) explored the common reasoning processes of these two groups by examining the practices of JPFs and then comparing these observations to those made of highly competent physicists by Roshcelle and Green in 1987. Brown found surprising similarities in the reasoning process of the two groups. Both experts and JPFs have a belief system that treats learning as a sense-making pursuit that grapples with ill-defined problems. Both are heavily situated. Both try to produce reasonable, causal stories about their world. Both negotiate with the situations. Both take as much advantage as possible of their embedded position to help them make inventive and insightful assumptions and approximations.

This is very different from the sort of cognitive activity that Resnick (1987) has shown as being championed in our current educational system. It also differs greatly from past models of problem solving which evolved from the imposition of the discourse method of scientific methodology. While there appears to be a continuum between the JPF and the expert, there is clear discontinuity between the student and the expert (Figure 1).

	JPF's (Just Plain Folks)	**Students**	**Expert Practice**
Reasoning with:	Causal stories	Laws	Causal models
Acting on:	Situations	Symbols	Conceptual situations
Resolving:	Emergent dilemmas	Well-defined problems	Ill-defined problems
Producing:	Negotiable meaning, socially constructed	Fixed meanings, immutable understanding	Negotiated meaning, socially constructed, concept understanding

Figure 1: Learning activity: JPF's, Students, and Experts

Traditional courses for teacher education students often deal with theories that act upon abstract concepts dealing with problems that fall neatly within the parameters of the theory under discussion. In the real field of the classroom, problems teachers encounter can rarely be linked to individual theory much less solved by strict application of any theoretical constructs. Therein lies the conundrum faced by first year teachers. Having been nurtured by years by an educational system that champions learning as an individual process in which opaque and disconnected symbols are manipulated with little connection to the real world, it is little wonder that teachers often express aloud that they learned little in their undergraduate coursework that was of use when they actually started teaching and that the best learning occurred on the job.

Case-based instruction may serve as a means for addressing this problem. Merseth (1999) sets forth four categories in which case study instruction is of benefit to teacher education students. She states that cases and case-based instruction help students to develop skills of critical analysis and problem-solving, encourage the development of higher order cognitive thinking and the generation of multiple pedagogical techniques, foster reflection, and help present a realistic picture of the complexities of teaching.

A hypermedia approach to case study was selected because of the potential for learning afforded faculty members and for its benefit to students as well. Hypermedia is a common methodology today for constructivist learning environments. Its features can support learning as well as learning strategies. It can support learning through enhanced motivation, encoding and retention of the knowledge, and the use of the knowledge. This support is facilitated through the use of good organization and sequence of the hypermedia program. Hoffman (1997) recommends the application of elaboration theory in hypermedia design thus beginning with the big picture and then sequentially adding the depth of details and artifacts. While hypermedia programs may not incorporate actual interactions within their scope, it is important to provide features that support learning strategies. These strategies do not occur solely on-line; rather, they acknowledge the need for a facilitator outside the program to guide students in interactions, reflections and activities that extend the information presented within the hypermedia program.

Project Design

In spring of 2001, the Hypermedia Case Study project was announced at the annual Collegiate Classrooms for the New Millennium symposium. Over the next two weeks, nine faculty members indicated interest in the project. Those university faculty members were asked to team up with a k-12 faculty member of their choice. During the summer of 2001, teams could request funding to begin to consider what direction their individual case studies might take. It was suggested to each team that it was appropriate to think beyond the usual case study subjects and extend their investigations into those areas that are notoriously difficult for teacher education students to grasp, critical to their first year of teaching, and typically not covered in the usual course work

In September 2001, the teams – both university and k-12 faculty – came together at a one-day retreat. Dr. Selma Wassermann, professor emeritus of Simon Frasier University, was scheduled to be the guest facilitator. Unfortunately, the events of September 11 prevented her from flying to Wisconsin. We were able to continue the retreat through the use of on-line video conferencing and phone conferencing with Dr. Wassermann. Each team presented their area of focus. These ranged from student discipline issues in a middle school social studies class, the formation of a charter school within a school at two local elementary schools, ESL techniques with elementary school children, serving special needs students in the regular classroom, technology infusion in curriculum, to a holistic view of an elementary classroom from multiple perspectives of analysis.

Dr. Wassermann led teams through an analysis of a case study that then led to consideration of the critical elements for any case study. Next, teams were introduced to the concept of storyboarding and were asked to consider how the case study they worked on with Dr. Wassermann might have been storyboarded and how it might have been enriched with supporting artifacts. Next, examples of hypermedia case studies were presented and discussion of those examples centered on the format selected and the artifacts needed to bring the case study to life. Teams were given a selection of books for background information. These included *Multimedia for Learning* (Alessi and Trollip, 2001), *Who Learns What from Cases and How* (Lundeberg, et al, 1999, *Getting Down to Cases: Learning to Teach with Case Studies* (Wassermann) and *Introduction to Case Method Teaching: A Guide to the Galaxy* (Wassermann, 1994).

Each team received both a digital video camera and a digital still camera. Brief instructions were given in the use of the equipment with each team signing up for a subsequent longer session with a staff member of the UW Oshkosh Instructional Development and Authoring (IDEA) lab. Faculty were asked to begin to collect artifacts – still photos, videotapes, student work, lesson plans, etc. – for inclusion in a team database of materials available for hypermedia formatting at a later date.

Individual teams also made appointments to meet via phone with Dr. Wassermann to discuss their project's goals and objectives. As was expected, Dr. Wassermann indicated that each group was in a different place on the continuum of the project scope. Some were just beginning to focus on an area, others were on their way with well-defined plans of action and two teams were still seeking k-12 faculty partners. During the following two weeks, the two teams requiring k-12 faculty partners made their connections and conferenced with Dr. Wassermann. She remains available for feedback and support to each group; to date, one group has met with her extensively via phone conferencing.

In January, teams will meet with our instructional designers to discuss alternative software packages available for publication of their hypermedia case studies. The available alternatives have been selected to cover a range of difficulty and include PowerPoint, SuperCard, Flash, Director and Authorware. Teams will be encouraged to push their limits; settling for PowerPoint because it is familiar and safe was not what the grant intended. After the presentations, teams will meet to consider their needs and learning styles. Based on the software selected, they will be matched to an individual IDEA lab staff member for mentoring in both learning the software and preparation of the materials.

During the spring 2002 semester, additional workshops will be held on the use of digital video editing software, photograph manipulation software, and the hypermedia software selected. An additional workshop with Dr. Wassermann is planned in late April of 2002. Undergraduate students will join the teams in the spring as well. They will preview the materials and make suggestions from a user's viewpoint. Some teams may opt to have the undergraduate students ask questions of the k-12 faculty for inclusion in the hypermedia case study. In the summer of 2002, university and k-12 faculty will work with IDEA lab partner to complete their video case studies. Pending availability of funding, additional case study projects will be funded in the 2002-2003 academic year.

Conclusion

The Hypermedia Case Study project has been well received by the faculty in the College of Education and Human Services at the University of Wisconsin Oshkosh because it fulfills Norton's criteria as well as that proposed by the author. The final product – the hypermedia case study – will assist teacher education students to be better prepared for their student teaching experience, will support students' grasp of concepts through collaborative meaning-making and shared insight, promote resource-based problem-solving, and modeling how theory translates into practice. Case study methodology presented in a hypermedia format does meet diversified learning needs. Finally, faculty are pleased to be able to use technology to produce a product that will facilitate their tenure, promotion and merit needs.

Again, the finished product was not the goal of the grant that funded this initiative. Rather, this project was about the process of developing that product. The collegiality and study with fellow faculty members at both the university level and the k-12 level and with those at a distance were fundamental to the process. The experience of participation in a problem-based learning situation, the willingness to grapple with the discomfort of self-selected project scope and sequence, and the assumption of risk in learning new technologies – digital cameras, video editing software, photo manipulation software and hypermedia production software – have proven to faculty that they can be at the cutting edge of technology innovation and utilize those skills in their teaching and scholarship.

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Operationalizing a Technology Standard with Proficiency Skill Sets

David Georgi and Javier Ruiz
Teacher Education Department
California State University, Bakersfield
USA
dgeorgi@csub.edu

Abstract: This paper begins with an overview of the existing program which operationalizes the California technology standard for K-12 teachers with the California Technology Assistance Program (CTAP) Region 8 technology proficiencies. It is supplemented by a link to a PowerPoint presentation and demonstrations of the following web sites: 1) the CTAP Region 8 site (http://www.ctap.org/ctc/) includes a rubric for three levels of certification and digitized video examples of exhibits at Levels 1 and 2; 2) the California technology standard (http://www.csub.edu/~dgeorgi/contents/techstand.htm); 3) the PT3 grant that helped coordinate these efforts (www.projecttnt.com). Next, a description of the process involved in coordinating this certification process with K-12 districts and teacher credential programs. To date, over 500 teachers have been certified including growing a cadre of Level 3 leader/mentors. An interactive discussion on implications for those present will conclude the session.

Introduction

In 1997, the California legislature passed a law mandating the development of a technology standard for K-12 teachers that would be used in the credentialing of new teachers and in the review of teacher credential programs. The Technology Education Advisory Committee (TEAC) was selected from among diverse constituencies to research the topic and develop recommendations for the Commission on Teacher Credentialing (CTC). The TEAC met many times over the next year and engaged the services of the State Librarian to research the efficacy of technology on the teaching and learning process (Umbach Report). A preliminary set of recommendations was sent to all pertinent institutions and individuals for field review. Taking the feedback from the field, the TEAC proceeded to develop language for a technology standard with a number of "factors to consider" that would be used to accredit teacher preparation programs (http://www.csub.edu/~dgeorgi/contents/techstand.htm). The recommendations were presented to the CTC in December, 1998 and were accepted. At first, the new standard was to be made effective in January, 2000, but a number of institutions requested more time and currently the standard will be effective in January 2002. All teacher preparation programs in California have been requested to submit plans for implementation of the standard and a number of methods have been proposed and were accepted. In September, 2001 California adopted a whole new set of teacher credential standards. The Technology Standard was slightly reworded and included as Standard 9 The technology plans written to Standard 20.5 are still in effect under the new standards.

Meanwhile, the California Technology Assistance Program (CTAP), a consortium of regional offices coordinated by the California Office of Education, was working on developing its own technology standards for teachers. Region 8, consisting of four central California counties, decided to build on the work of the CEAP by taking the technology standard's factors to consider and using them as skill sets for technology proficiencies. The CTAP Region 8 Advisory Committee met several times and developed a rubric for assessing technology skills (http://www.ctap.org/ctc/). The rubric has been used by K-12 districts to organize professional development activities and by teacher preparation programs at CSU Bakersfield. A federal PT3 project included a task force on Technology Proficiencies and helped coordinate the effort (www.projecttnt.com).

The CTC technology standard divided its levels of proficiency to articulate with the system for obtaining a teacher credential in California, which is a two level system. Meeting level 1 is a requirement for a candidate must be recommended for a preliminary credential. Meeting level 2 is required for recommendation for a professional clear credential. Level 1 is primarily personal computer skills with some application to teaching responsibilities; level 2 involves the integration of computer skills into teaching responsibilities.

CTAP Region 8 proficiencies have been organized into a rubric based on the two tiers described above and added a level 3 for advanced certification. All certification is done on the basis of portfolios assembled by the teachers. Teachers can be certified at level 3 as either mentors, whose main responsibility is training other teachers, and leaders, who serve as tech coordinators or administrators. Level 3 teachers can certify level 1 and 2 teachers.

Results

As a result of implementing a coherent approach to certifying teachers at various proficiency levels, a number of positive results have occurred.

First, technology skill training is directed toward meeting the levels of certification. This ensures that teachers attending training sessions are at an appropriate skill level and for specified skill development; avoiding some teachers being lost and others bored. This also allows all training at K-12 schools and university teacher credential programs to be articulated on the factors underlying the technology standard.

Second, teachers are encouraged to attain certification at all levels. Some schools offer a bonus for attaining level 2. Level 3 teachers often receive stipends for the training and administrative tasks they perform.

Third, by having level 3 teachers certify levels 1 and 2, the presence of expertise has been greatly expanded. Most local schools have at least one level 3 teacher and many schools are including the attainment of specified percentages of faculty attaining each level by specified deadlines. A strong cadre of level 3 teachers is being developed and will soon be adequate to provide technical support for local schools.

Fourth, by having a common certification system, unprecedented collaboration is occurring among schools and university teacher credential programs. Level 3 teachers are participating in the writing and implementation of a variety of grants and projects involving technology. One example is the Preparing Tomorrow's Teachers to Use Technology Implementation federal grant, which includes a Technology Proficiencies Task Force. CTAP Region 8, local teachers and university professors have collaborated in developing a web site that includes the technology proficiencies rubric, application for certification, and examples exhibits that meet most proficiencies. In addition, a list of certified teachers is maintained at the CTAP Region 8 office and is posted on its web site. This is a further incentive for teachers to attain certification as it indicates that all teachers are expected to have demonstrated technology skills.

In addition to the positive results of this system, a number of problems have emerged.

First, articulation between CTAP Region 8 and instructors in the university teacher credential programs has had difficulties. University professors have been slow to get certified to level 3. CTAP Region 8 has offered to provide such professors with level 3 teachers so students in university classes can have their portfolios certified officially.

Second, it is difficult to ensure that all candidates will have access to certification. The university credential programs have submitted a plan to the CTC stating that by June, 2001, all credential candidates will be required to attain levels 1 and 2 in order to be recommended for the preliminary and then the professional clear credential. Because of the large number of credential candidates, an independent study course in Technology Portfolio Certification is being developed to meet the needs of out of state teachers and others who fall through the cracks. In addition, the state of California has contracted with National Evaluation Systems to develop a test our procedure for level 1, primarily for out of state teachers.

Third, some universities in the region refuse to participate in the system, citing turf issues. They will be required by the state to meet the technology standard in their own ways.

Fourth, other regions and the state level CTAP are developing their own systems, which may have a future impact on the Region 8 system. Similarly, the ISTE standards are seen by some as a model on which to base training. In response, a correlation chart has been developed, which indicates where specific skills are located in each system.

Conclusion

The implementation of a technology proficiency skill sets certification system based on a state technology standard has had dramatic positive effects on the development of technology skills in local schools. The certification of hundreds of teachers at levels 1 and 2 has encouraged many teachers, including those with life credentials, to develop technology skills that enhance the teaching-learning process. The increasing presence of level 3 teachers is providing that most commonly missing element in technology professional development: adequate and accessible technical support. As an added benefit, the awareness of the importance of technology in schools among level 3 teachers has produced that second most commonly missing element: equipment and training as a result of grant writing activities. As the new technology standard goes into effect, the system described in this paper can be expected to continue to promote the development of technology fluent teachers in local schools.

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You can access all the documents for this presentation at
http://www.csub.edu/~dgeorgi/pres_refs/SITE2002.doc

California Technology Standard 20.5
http://www.csub.edu/~dgeorgi/pres_refs/technology_pamphlet.pdf

California's New Teacher Credentialing Standard 9 for Technology
http://www.csub.edu/~dgeorgi/pres_refs/standard9

CTAP Region 8 web site http://www.ctap.org/ctc/

An overview of the certification process is at http://www.ctap.org/ctc/TechCert.html

Download the Application, Checklist and Portfolio Suggestions from
http://www.ctap.org/ctc/download.htm
This page also has links to lists of Level 3 certified Mentors and Leaders

Online training of attaining the proficiencies, including video based instruction, is at
http://www.ctap.org/ctc/training.htm

All credential-granting institutions are required to plan to meet the Technology Standard
http://www.ctc.ca.gov/codcor.doc/999916/999916.html

Correlation chart of ISTE and California Standards
http://www.csub.edu/~dgeorgi/pres_refs/NETS-CEAPclr.pdf

Digital High School Project Formative Assessment Report on Highland High School describes exemplary skill development among faculty and students as a result of having the resources and the proficiency framework to organize the skill development.
http://www.csub.edu/~dgeorgi/pres_refs/DHSEvalRepDr.doc

Teaching with New Technologies, a federal PT3 project www.projecttnt.com

Technology Leadership Community - Students as Teachers

Scotty Govaars, Department of Defense Dependents Schools -Europe, US
Pat Ridge, Department of Defense Dependents Schools - Europe, US

This poster session will focus on case studies of students and teachers from several of the Department of Defense Dependents Schools throughout Europe who are currently offering a new course, entitled "Technology Leadership Community" or "TLC".

TLC Course Description

The course is about teaching, learning, and learning to teach. The domain of information is technology and technology skills.

Technology Leadership Community (TLC)

Grade Level: 7-12

Length Of Course: 18-36 Weeks

Recommendations:

Experience with PCs, strong working knowledge of applications used in school and capacity to learn newest technologies, interest in education and teaching. Students must be self-motivated and have a high level of personal responsibility.

Major Concepts/Content:

The TLC class merges learning the newest computer technologies with learning how to effectively teach others those technologies. Students collaboratively study and learn new software packages and computer skills while learning how to become effective trainers and educators. In addition to raising the technological knowledge of the school community, TLC students examine their own roles as teachers and learners, increasing their learning abilities in all other classes.

Major Instructional Activities:

This course is designed to train students to become effective teachers and learners by complementing the technology support in their school community.

Technology study includes Internet navigation and searching, web page creation, server management, desktop publishing and graphics applications, GIS, CAD, and other specialized software. Pedagogical study includes methodology of teaching, materials preparation, presentation strategies, evaluation techniques, and formalized self-reflection activities such as log-keeping and using videotape to observe, analyze, and improve their own teaching efforts.

Teaching activities include weekly one-on-one mentoring sessions with faculty, staff, students or community members; teaching in larger group situations (such as another classroom learning a single application); and preparing manuals and other instructional materials for their "clients." Other activities include regularly assessing the school's technology learning needs and developing strategies to effectively meet those needs.

Major Evaluative Techniques:

Students will create their own assessment rubrics and goals. Doing so enables them to set learning objectives and have a clear understanding of what is expected of them. They do this individually with the teacher. The students will also be graded on completion of tasks and participation and there will be several take -home essays that reflect what the student has learned at different points in the semester.

Assessment Will Be Based On:

How well they learned to identify, analyze, and improve their teaching abilities through their video and writing work. This will be based on survey and writing assignments, comparison of pre/post surveys, and essay writing.

How well their mentees learned the technology material. Teachers and other mentees are asked in survey form to assess their experiences with the TLC students. The TLC student assesses himself and a combination of this data describes how the student performed.

The degree in which a student's technological knowledge improved. The TLC teacher, along with the student, will examine the pre/post surveys and determine how much of the technological knowledge the student learned. Students are expected to attain a high level of competence in one or two applications, rather than learning only a little about as many applications as possible.

Essential Objectives:

Upon completion of the course, students should be able to

Demonstrate how teaching others enhance one's own learning abilities and styles, in any subject.

Demonstrate technological competency on at least one application. Competency is defined as thorough knowledge of the program, fluency with operation, and ability to explore with the tool.

Design a teaching unit or activity, including an assessment piece about a specific software or technological application.

Demonstrate growth in communicative, developmental and social areas. For example, students learn how to become articulate, develop confidence to communicate clearly with adults and youngsters, become methodical in their learning styles, attain a very high degree of responsibility.

Help the school use the complex technologies already in place, working with and complementing the training tasks of the Education Technologist, and also develop new training programs to meet changing demands.

Demonstrate that work of this nature is directly tied to real-world workplace skills.

This is a course that engages the student in the learning process. The content and activities serve to get students to think of themselves as learners, identify their own learning patterns and styles, and improve as learners. They do this by studying how to teach, by teaching others, and by reflecting upon themselves as teachers and learners.

The topic they teach is technology. This is not a technology learning class per se; it is not a computer education, application, or programming course. Those topics may be included, but it is primarily about learning how to teach technological information to others.

This is also not a "students-as-techies" course or program. While students in the TLC may learn how to service an LCD projector or a printer, their job is not to visit a classroom and change a printer cartridge, but rather demonstrate to the faculty in one-session maintenance procedures on a range of common technological equipment. TLC students are the leaders of the school, and presumably the leaders of tomorrow; therefore it wouldn't make sense to exploit their knowledge by having them tasked to fix problems everywhere.

The TLC course contains rigorous academic activities as well as demanding technological experiences.

Expanding Teachers' Literacy in Science and Mathematics: Basing Technology Professional Development on Histories of Classroom Practice and Beliefs

Lisa L. Grable
College of Education
NC State University
Raleigh, NC
United States
grable@unity.ncsu.edu

John C. Park
Mathematics, Science, and Technology Education, College of Education
NC State University
Raleigh, NC
United States
park@unity.ncsu.edu

Abstract: One hundred four middle school mathematics and science teachers committed to participating in a professional development summer institute with approximately 90 hours of instruction in the use of educational CD-ROMs, calculator-based laboratory, and microcomputer-based laboratory. Prior to the institute we were able to make classroom observations of teachers and collect various types of data in order to construct a rich description of the teachers. This paper will describe the types and frequencies of activities in the classroom.

Introduction

As pressure is exerted upon educational systems to implement instructional technologies, teachers' abilities to accept change and adopt innovations become key factors for success. Finding successful methods for educating teachers to use new technologies and working with them to adopt new pedagogical approaches is a widespread concern.

Evaluation of summer professional development institutes often takes the form of collecting data at the beginning of the institute, in the form of tests or surveys, and collecting data again at the end of the institute (Fenstermacher & Berliner, 1985; Lock & Dunkerton, 1989). Recently, more studies have been designed to follow the teachers during the school year after the institute (Barrow & Sawanakunanont, 1994; MacArthur et al., 1995; Shroyer & Borchers, 1996). The impact on teachers participating in summer professional development institutes has often been reported without definitive knowledge of the teachers' performance prior to the institute. Using a constructivist framework, evaluators would recognize that teachers do not begin the institutes as "blank slates," rather they begin with a history of classroom practice and beliefs that become part of the institute.

This study is based on work with a group of rural middle school teachers assigned to teach mathematics and science in eastern North Carolina. The intensive, 3-year, high support program began with a summer workshop with 90 hours of instruction in the use of CD-ROMs, CBL, MBL, and inquiry techniques. These technologies were not previously widely available in our state's middle school classrooms, particularly in rural areas. The teachers entered the EMPOWER program in math-science teams from 41 schools. Teaming teachers was important for potential interdisciplinary cooperation, social environment necessary for diffusion of innovation, and support structure for adopting math and science reforms (George, Stevenson, Thomason, & Beane, 1992; Rogers, 1995; Sparks, 1997).

Design of the Study

The study's focus was the generation of a rich description of the entering characteristics of rural middle school mathematics and science teachers prior to entering a long-term inservice program. Data collection procedures involved observation of participants, document analysis, an open-ended essay questionnaire, a personality type instrument, and a questionnaire investigating the type and frequency of activities in teachers' classrooms during the spring before the initiation of the inservice program. This paper will highlight the type and frequency of classroom activities.

Sample

EMPOWER was an inservice program for middle school mathematics and science teachers sponsored in part by the National Science Foundation (NSF). One hundred and four practicing teachers participated in the workshop instruction. The participants represented a wide range of backgrounds, years of teaching experience, and teaching assignments. The teachers were primarily from rural middle schools in eastern North Carolina. Some participants had used computers and calculators in the classroom before, but many had never used MBL, CBL, or graphing calculators.

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Types of classroom activities

A self-report questionnaire was used to measure the activities of instruction for an 8 week period of the spring semester. The instructional activities listed in the questionnaire were based on the *Local Systemic Change through Teacher Enhancement: 1997 Teacher Questionnaire, K-8 Science* (Horizon Research, 1996) and the *1997 Local Systemic Change Classroom Observation Protocol* (Horizon Research, 1997). The teachers were instructed to use their lesson plan books or planning calendars to categorize activities and count frequencies with a 1*(daily)* to 6*(never)* scale. The teachers were asked to do the counts on the first math or science class taught each day. A wide range of possible classroom activities were included along with open-ended items.

Data analysis and results

Although participants had used computers and calculators in the classroom before, many had never used graphing calculators and none had used MBL or CBL to collect data. The 10.87% of the teachers who had never used calculators in teaching were all assigned to teach science. Graphing calculators were used by over half of the teachers for computation. Computers were used by the largest percentage of teachers for word processing, drill and practice and spreadsheets.

Conclusion

Middle school mathematics and science teachers may need more experience with the many uses of graphing calculators and computers. In particular, using them as tools for data collection should be addressed. Providing experience and practice in many facets of calculator and computer use should be considered in designing professional development programs. Teachers need time to develop a comfort level with the technology and time to consider and develop teaching strategies to accompany the technology. The many possible uses of graphing calculators and computers for data collection and problem solving should be introduced to teachers, particularly when large numbers are teaching out of field. Their methods courses as preservice teachers would not necessarily touch upon these subjects. The instruction in these technologies could be used as an anchor for introducing subject matter content.

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Effective schools, Effective learning, Effective tools

Merrell Hansen, Brigham Young University, US
Robert Gentry, Provo School District, US

The interest in technology has been altered substantially. It is now seen as a critical application of effective teaching and learning strategies. It is a facilitative experience in using and acquiring knowledge and information. This represents a study and examination of a school committed to renewal and improvement. It has carefully initiated teacher leadership activities and practices. It has sought ways of incorporating meaningful change within the classroom context of teaching and learning. Technology and its wise and appropriate use are critical to this enterprise. This session will consider the application, analysis, interpretation, and summary of technological strategies to promote student learning, increasing the effectiveness of the teacher and the teaching process. Specifically it will consider the use of the IPAQ computer in a middle school talented and gifted program. Data and information will be shared that exemplify best practices for teachers, students, prospective teachers, and administrators. As a part of the report, the impact that technology and this specific program will be examined as these relate to preservice and inservice dimensions of professional growth.

Using Video Ethnographies for Professional Development of Educators

Carl Harris, Brigham Young University, US
Peter Chan, Brigham Young University, US
Ping Zeng, Brigham Young University, US
Carol Greene, Virginia Tech, US
Susan Magliaro, Virginia Tech, US

Purpose

This panel will provide an extensive examination of an emerging approach to profession development--video ethnography from four different perspectives: pedagogical foundations, demonstration, national and international applications, and current research studies.

1) "Pedagogical Foundations of Video Ethnography" by Carl Harris

The pedagogy for video ethnography is based in specific principles of constructivist learning. According to learning scholars there are at least four critical elements of learning that must exist if learners are to be fully engaged in the learning process and develop deep, reflective thinking patterns that will transfer to other contexts. First, learners must be confronted with problems and frame questions that genuinely mirror the world beyond the classroom. Second, the problems and questions must come to have personal meaning to the learners. Third, the process of teaching learners how to frame questions and inquire after solutions must model active inquiry pedagogy (i.e., practice in inquiring about and finding their own answers). Fourth, the display of learning must be to real audiences, for example, those who can benefit from and who have a vital interest in the problems and questions, in addition to teachers and peers. In developing the pedagogy for the use of video ethnography and in the development of video ethnographies, Harris has attended carefully to the inclusion of opportunities for students to engage in learning tasks that address these four critical elements of learning. While scholars might log on to the video ethnography web site and use the case to illustrate points in their lectures, the deep learning that can accompany this work emerges only as one embraces not only use of video ethnographic cases but the pedagogy of video ethnography as well.

2) "Demonstrations of Video Ethnography" by Peter Chan

This part of the presentation will focus on demonstrating the actual CD-ROM interface. The Video Ethnography CD-ROM consists of three main parts: (1) Exploration, (2) Creation, and (3) Supporting Functions.

Part 1: Exploration

This part of the CD-ROM includes several study buttons. Each button launches six to nine "probe" buttons, which represent the study of the case teacher from a general educational principle. Each "probe" button brings a video clip showing classroom activities that illustrate a particular aspect of the principle. A video slider is located at the bottom of the video screen so that users can slide to any part of the video when they choose to repeat part of it. At the bottom of the display are the perspectives (commentaries) on what happened in the video clip. The perspectives may come from the case teacher, another teacher, a student, a teacher educator, a school administrator, and professional literature depending on the nature of the case. Each of the perspectives is in both audio and text formats.

Part 2: Creation

The second part of the CD-ROM allows users to create their own video ethnographies by manipulating the provided video clips into any desired order and commenting on what they perceive to happen in these clips. This part of the CD-ROM may be used for recording personal reflections, comments, elaborations, and new insights related to what they have studied in the Exploration part. It may also be used as an instructional, researching, and demonstrating tool.

Part 3: Support Functions

The CD-ROM has supporting functions such as text transcriptions, Internet connection, tutorial, and general help.

3) "National and International Applications of Video Ethnography" by Carl Harris, Peter Chan, & Ping Zeng
This part of the presentation will show various applications of video ethnographies from elementary to higher education and from Utah to Beijing and Xian, China. It will be broken down further into three shorter sections

(a) *"Julene Kendall Case Study: A Video Ethnography of Teaching in an Elementary English as a Second Language (ESL) Classroom"* by Carl Harris
The Julene Kendell Case Study allows teachers to explore strategies and principles of teaching ESL students. Furthermore, the case study engages learners in building and documenting their own interpretation of the Kendell case from various perspectives. Students share and seek feedback from peers as well as the course instructor. The cases, while interesting in and of themselves, are most interesting because they allow students to see the theory in practice and the practice of theory. This duality is made visible for and accessible to students through the pedagogy of video ethnography.

In the Julene Kendell Case Study the strands of focus articulated by the case author are 1) Building Community in the Classroom; 2) Visual Cues; 3) Hands-on Activities; 4) Guarded Vocabulary; and 5) Classroom Management. Each of these strands is represented by a study button that links to seven probes: 1) Use of Names; 2) Chance to Share; 3) Comfort Zone; 4) Social Skills; 5) Use of Space; 6) Friendly Environment; and 7) Cooperative Learning.

(b) *"Experiences from using video ethnographies with teachers from Beijing and other parts of China"* by Peter Chan
Besides the applications in the United States, video ethnography CD-ROMs were also developed in Chinese for professional development of Chinese teachers. The first two Chinese CDs focused on developing thinking skills of elementary and secondary students. Ten teachers in Beijing were asked to extensively evaluate these CDs over a four-day period. Multiple methods were used in the evaluation. The CDs were also used as the parts of the key instructional materials in two consecutive Chinese conferences on teacher education and received positive responses from the participants. An American video ethnography on persuasive writing was translated into Chinese earlier this year for intercultural studies, which will also be demonstrated at the conference.

(c) *"Content Design of A Video Ethnography of the Pre-service Student teaching in A Foreign Setting"* by Ping Zeng
Normally, pre-service students have little idea about the countries where they would have their teaching experience. What they would prepare as the possible teaching plans, instructional and assessment tools may not fit the target cultural settings. Similarly, the host schools in the countries other than America need to know about how, on the one hand, to utilize the resources of the student teachers and their teaching methods to benefit the local students, and, on the other hand, to make the environment more favorable for the career development of the pre-service students. Without some background training, these students will have to face some possible cultural barriers and difficulties in their teaching and their social life in the unfamiliar cultures.

This paper aims at introducing a combination of a new technological tool, a video ethnography and some constructive principles of content design to serve the purpose of solving the problems listed above. The template, developed by Dr. Carl Harris and David Baker, is chosen to be the instructional tool and its content format is designed to contain the substantial data about the real teaching experiences of the BYU students in Xi'an, China. The final product can be used to acquaint the future pre-service students in advance in the aspects of educational system, prevailing pedagogies, problem-solving skills, cultural traditions, and customs. It should be able to help not only these students adapt to new cultures quicker and easier, but also benefit the host school administrators, providing them with information of the educational performances in North

America, and of how much and in what aspects such performances are constructive to the local curriculum development. Consequently, the co-teaching and the cooperation between the student teachers and the local teachers can be more successfully executed. Moreover, teacher educators may also use it for academic studies, particularly in the areas of comparisons of educational systems and the teacher education in foreign settings.

4) "A Technology-Enhanced Field Experience" by Susan G. Magliaro and H. Carol Greene
This part of the presentation will show a research study using video ethnography.

This project added an experimental field experience component to an existing educational psychology foundations course for pre-service teachers that is offered at Virginia Tech. This was done through the use of video-based case studies. The focus was on the solving of authentic video-based cases that highlighted the psychological, emotional, cultural, and social dimensions of teaching and learning.

The specific objectives of this discussion are to focus on:

1. the learning outcomes related to principles of educational psychology,
2. the learning outcomes related to teaching practices, and
3. the enhancement of participants' learning about and appreciation for diverse educational settings

While a full report of the findings will be shared at the presentation, a sample of the results is highlighted here. Preservice teachers noted several advantages of having the electronic field experiences. Among those mentioned were: opportunities to see classrooms and teachers from diverse communities; opportunities to see outstanding teachers from their respective fields; and opportunities for them to critically analyze a lesson. One student even mentioned the "bird's eye view" the camera offered, allowing them to see the classroom and students from various angles and perspectives, rather than simply the view from the back of the room. Comments about the case studies increasing their understanding of educational psychology concepts occurred frequently. The students cited the videos as helping them to make concrete the concepts that seemed very abstract when read from the textbook alone. They also stated that seeing teachers perform the methods and strategies talked about in class served as a good modeling agent. This was enhanced by the fact that the "field experience," because it was electronically offered, was both immediate and coordinated with the classroom discourse. The case studies immediately followed a topic or concept that was under discussion in the course.

Changing the Role of the Teacher: Promoting Meaningful Learning Through Collaboration between Teachers, Students, Technology and Professional Development.

C. Richard Hartshorne
School of Teaching and Learning
University of Florida
rhartshorne@coe.ufl.edu

Introduction

The problem of inappropriate integration of technology into the classroom is not the fault of the teacher, rather it is the current model of teacher training. Regardless of fault, the problem must be addressed. While education resorts to improving teacher use of technology through training, it is necessary that the current model of teacher training with technology be abandoned. A series of one-day seminars, or periodic after-school instructional sessions will not keep teachers at the pace of current school reforms (RAND, 1995). While the scope and scheduling of training must change, the content and approach to teacher training with technology must also be addressed. This paper will discuss the current model of teacher training with technology, technology and meaningful learning, and guidelines for teacher training with technology.

Current Model of Teacher Training with Technology.

Current teacher training involves the development of skills associated with various software. For example, at one rural school, each teacher was given a laptop computer. Prior to receiving the computer, each teacher had to attend a workshop on "How to Use PowerPoint". While presentation software can be helpful in creating meaningful learning experiences, it was obvious that the focus of the workshop was to improve teacher presentations. There was no mention of methods to apply the computer to assist in student learning. Also, some software that would have more potential in creating meaningful learning environments are database programs, spreadsheet programs, concept mapping software, hypermedia construction software, and microworld environments software (Jonassen, 1996). While many of these could obviously not have been discussed in two or three after-school sessions (the length of the PowerPoint workshop), possibilities for their use in the classroom and the relevance of technology in education could have been introduced, discussed, and modeled. It is the modeling and implementing of relevant learning environments, in order to promote meaningful learning, using technology that must move to the forefront of training teachers with technology.

Technology and Meaningful Learning

"Students do not learn from teachers, they learn from thinking." (Jonassen, et al, 2000). Activities that facilitate "thinking" can provide meaningful learning experiences for the learner. These activities should be active, constructive, intentional, authentic, and cooperative. (Jonassen, 1996) Active learning involves tasks in which the learners manipulate objects in the learning environment and observe the consequences of their actions. Constructive learning involves learners reflecting upon their learning experience, and articulating those reflections. Learners construct their own "mental models" to explain their experiences. Intentional learning occurs when learners are attempting to achieve a learning goal of their own. Authentic learning activities occur when learning tasks are modeled after real-world problems or situations. Cooperative learning occurs when individuals work with others in formulating "mental models" and communicate their findings to others (Jonassen, 1999). Each of these must be addressed as teachers are developing meaningful learning activities and environments for students.

There are a number of learning environments that promote the partnership between students and technology (Jonassen, 1999). One of these learning environments involves Internet Learning Activities. These include students creating home pages (student, class, or school), role playing on the web, cybermentoring (communicating through the Internet), and supporting scientific experimentation through the Internet. Video Learning Activities can also promote meaningful learning. These include activities such as video press conferencing, producing student talk shows, creating video documentaries, and developing video theater. Multimedia Environments, including multimedia environment software (*Exploring the Nardoo*) and constructing hypermedia, can also be used to foster meaningful learning with technology. Other examples include constructing databases, semantic networks, and expert systems. The purposes of all of these activities is to promote active, constructive, intentional, authentic, and cooperative learning environments

Guidelines for Teacher Training with Technology

In order to change teacher training with technology, a number of guidelines should be implemented. The following is a list of guidelines for teacher training with technology. Teacher training should focus on:

1. the development of meaningful learning for the student.
2. the changing role of the teacher in a technological age.
3. methods of promoting student production.
4. implementing technology as a partner in the learning process.
5. methods in which teachers put students in the appropriate learning roles.
6. the implementation of technology.
7. fostering teacher-teacher and teacher-student collaboration, not just the student-student collaboration.

Conclusion

In this paper, numerous deficiencies in teacher training, with regards to the integration of technology into the classroom, have been addressed. Guidelines for general changes in in the model of teacher training have been discussed. These guidelines cover the following topics:

- **The types of activities currently occurring in Teacher Training with Technology.**
- **The new roles of the teacher and student when technology is integrated into the learning environment.**
- **The implementation of technology into the classroom.**
- **Collaboration between teachers and students, with respect to implementing technology.**

In order for these guidelines to be implemented, the current model of teacher training must be abandoned. Activities that promote meaningful learning must be modeled for teachers. These activities must be modeled in a way that the teacher assumes the role of the student. This not only aids in modeling the types of activities that promote meaningful learning and provide teachers with a relevance for the implementation of technology in the classroom, but also models the actual implementation of the technology into the classroom. Collaborative activities are essential for meaningful learning. In order to promote and model collaborative activities, teacher training sessions need to promote collaborative environments. Collaboration between the instructor (trainer) and the students (of the training session) must be modeled and discussed. For teacher training to be successful, the scope and duration of workshops must be addressed. Technology training takes time, and the current model of teacher training with technology does not appropriately address the time issue necessary to appropriately implementation of technology into the classroom to promote meaningful learning environments.

While there are many issues related to the training of teachers with the use of technology, this paper addressed some issues that need to be addressed. By discussing the shortcomings of the current models of teacher training, it is hopeful that teacher training and technology become a much more potent partner in creating collaborative, meaningful learning environments, in the future.

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Weekly IT Teacher Training: A Model for Success

Lorrie Jackson
Lausanne Collegiate School
U.S.A.
ljackson@lausanneschool.com

Abstract: Lausanne Collegiate School in Memphis, Tennessee (USA) has created and implemented a weekly, after school IT training program for faculty and staff called Tech Tuesdays. Since the fall of 1999, this program has met the needs and schedules of teachers at a school where hardware and software availability and usage was rapidly evolving. This paper documents the rationale behind the Tech Tuesday model, its origins, topic selection, process, and successes as evaluated by increased teacher skills and administrator feedback. Of particular note is the impact the school's recent move towards laptops in grades 7-12 has had on the training needs and interest levels of teachers and staff. Tech Tuesdays is an easy-to-replicate faculty development program with a proven track record and the flexibility to adapt to the changing training and platform needs of K-12 teachers and staff.

K-12 schools are constantly faced with the need to train and retool their faculty and staff, as technology changes and the need for technology integration in the classroom grows. While administration and technology personnel recognize this need, time and resource constraints often impede effective training from taking place. A short, on-site, after school training model called Tech Tuesdays has proven a successful solution to the challenge of ongoing staff development for one school struggling with this issue. In this paper, the history of Tech Tuesday, presentation format, topic selection, and successes will be discussed, as will the impact of the new laptop program on Tech Tuesday. Finally, challenges and opportunities for future growth will be offered.

Lausanne Collegiate School (LCS) is a diverse, co-educational, private college-preparatory school for students in grades preschool through 12. Like many schools, LCS wanted to increase the technology skills of its staff so that the teachers and staff would in turn integrate technology, but found that existing technology training models were too long and not tailored to individual needs. Therefore, in the fall of 1999, Tech Tuesday was created as a way to provide very short and specific serving the faculty's varying ability levels and interests.

Each week, an e-mail is sent to all faculty and staff announcing this Tuesday's topic. Five minutes before each Tech Tuesday begins, an announcement is made over the public address system. Teachers and staff meet in the Lower School computer lab immediately following carpool and school dismissal. The Lower School technology integration specialist then begins a fifteen-slide PowerPoint presentation on the week's topic. The PowerPoint explains why a topic is important and outlines very basic steps to achieving the skill or task. Each participant practices the skill on a lab computer or on a school-owned laptop while observing the presentation on the Smart Board. The presenter takes attendance and e-mails that attendance to each of the division heads (the administrators in charge of Lower, Middle, and Upper Schools). The PowerPoint presentation is then attached to an e-mail sent to all attendees and other staff who could not attend but who asked for materials. Finally, the presentation is uploaded to the school's web site for later reference.

Topics vary widely. The topics for fall 2001 included: viruses, computer maintenance, web quests, finding lost files, hardware and software basics, adding pictures and hyperlinks on teacher web pages, and creating address books in the school's e-mail program, among others. Administrators, teachers, and technology staff request topics to be covered. Because the specialist who teaches Tech Tuesday is also responsible for one-on-one training of teachers on a daily basis, she has a good understanding of staff skills and interests.

How successful have Tech Tuesdays been? Given that the sessions are "off-the-clock" and completely voluntary, attendance has been high, with over a third of all faculty and staff (includes librarians, development, and administrators) coming to at least one Tech Tuesday. Of these attendees, one-quarter has attended over half the fall 2001 sessions. Average attendance at Tech Tuesdays was ten, with weekly numbers varying from six to nineteen attendees.

Yet these numbers only tell half of the story. In a recent survey of faculty, staff, and administration, administrators report increased competency and confidence from their staff. Teachers cited "computer confidence" and e-mail proficiency as the two greatest improvements made by attending Tech Tuesdays. Increasing their knowledge and topics that were relevant were the two primary reasons for attending the sessions. The faculty responded that having the training on-site, keeping training short, having a dynamic and helpful instructor, and focusing on only one topic at a time made Tech Tuesdays convenient for them.

Beginning in the fall of 2001, all seventh and eighth graders purchased IBM Thinkpads to be used in classes. A campus-wide wireless network figuratively broke down the walls of the traditional classroom, while middle school teachers revamped their curricular and activities to take full advantage of the flexibility and freedom the laptop provides. With this new opportunity, however, came a need for retraining. Non-math teachers needed Excel training to use spreadsheets creatively. Teachers with limited computer skills faced a classroom of eager and competent students with the world at their fingertips.

LCS refocused its Tech Tuesday topics to help faculty meet the needs created by the laptop program. For example, Upper School faculty are preparing to teach next year's entering freshmen who will have had a year of laptops in the classroom already. Yet, many of these teachers have limited computer skills themselves. The four technology department employees gave each one of the upper school faculty a hands-on practical assessment in six areas of technology: operating system (PC), First Class (LCS' e-mail program), Internet Explorer, Microsoft Word, Microsoft Excel, and Microsoft PowerPoint. Teachers attempted to complete tasks in each portion of the assessment, and staff evaluated their ability or inability to do so.

Administration required faculty whose skills in a given area were average or below to attend a Tech Tuesday held on that given software or hardware topic. Once again, the presentation was limited to a 15-minute format with a PowerPoint presentation and handouts that gave concrete examples on how to use Excel, Word, etc. in a variety of content areas. Technology staff re-evaluated the faculty within weeks of a given session to see if skills had improved.

Replication of the Tech Tuesday model at other schools would be simple. Given the brevity of the training, sessions can be taught before or after school or during lunch or other free time as needed. Technology staff need not teach sessions if none are available. Keeping sessions short and targeted to the teachers' needs, with step-by-step presentations and electronic texts (or paper handouts) for later use are the most important components.

At LCS, the ongoing challenge will be to keep pace with the advancing skills and needs of our laptop faculty while still offering basic instruction for new teachers or those with only basic skills. Recently, the school began requiring three technology professional development (TPD) hours this year, and five TPD hours in the following years. This new expectation will undoubtedly increase the numbers of teachers attending the sessions, but will they be motivated to learn or simply be present to fulfill a requirement? LCS tech staff must therefore double their efforts to ascertain and address the needs of the new "reluctant" attendee. Plans are also being made to open up sessions to other independent schools in the area. Finally, as teachers become experts, they too can begin leading Tech Tuesdays, providing technology success stories and inspiration for their peers.

Tech Tuesdays have met one school's needs for short, on-site, relevant IT training for K-12 faculty and staff. With only a minimum of time and effort, this success can be duplicated elsewhere to provide effective staff development in a variety of educational settings.

Motivational Processes in the Integration of Technology into Teacher Education

Deborah L. Kalkman, Northern Illinois University, US
Corenna C. Cummings, Northern Illinois University, US
Lisa Mehlig, Northern Illinois University, US

For the past three years, the College of Education at Northern Illinois University has required all new faculty members to take a course - Integrating Technology in the Curriculum. This course is designed to assist faculty to more fully develop skills with respect to the meaningful integration of technology in the curriculum so as to serve as models for the use of technology in classrooms for teacher education students. This study examines the influence of the mandatory nature of this course on the motivation of the faculty to integrate technology into their teacher education courses. Self-determination theory provides the basis for understanding the process of internalization from externally regulated reasons for faculty taking the course to increasing degrees of internally regulated motives for these same faculty using technology in meaningful and effective ways in their courses.

Theoretical Perspectives: Self-determination theory suggests that intrinsically motivated behavior occurs when one acts autonomously - under their own volition (Deci & Ryan, 1985). Therefore, we would not expect someone who is *required* to take a technology course as a condition of their employment to be intrinsically motivated to do so. Likewise, we would not expect a technologically *incompetent* faculty member to be motivated to integrate technology into their coursework. Thus, the goal becomes one of creating a learning environment that promotes perceptions of competence and autonomy.

A person feels most autonomous when his behavior is internally regulated; that is, when the behavior is intrinsically motivated, or engaged in for the pure enjoyment of the task (Ryan & Connell, 1989), however, experience and logic tell us that it is not practical to assume all activities will be intrinsically motivating. Therefore, we need to consider the process of internalization as progressing on a continuum from external to internal regulation (Deci, Vallerand, Pelletier, & Ryan, 1991). Internalization "refers to the process by which an individual initially acquires beliefs, attitudes, or behavioral regulations from external sources and progressively transforms these external regulations into personal attributes, values, or regulatory styles" (Ryan, Connell, & Grolnick, 1992, p.171). The greater the internalization, the more it is perceived as being "caused" or endorsed by the self (Ryan et al., 1992).

Deci, Ryan, and others (see Deci & Ryan, 1985; Deci et al., 1991) have identified four types of extrinsic motivation: external regulation, introjected regulation, identification, and integration. The least autonomous behavior would be controlled via external regulations, such as following a rule merely to avoid punishment or to achieve a reward – "I will take this course and use technology so that I can get and keep my job." The primary "cause" of the behavior is external to the individual. Behavior that involves acting to avoid disapproval from self and others is referred to as introjected regulation – "I like my department chair, so I'll take this course and do what I can to integrate technology into my courses so I can please him." There is no inherent value to, or interest in, the activity or behavior itself, but neither is it controlled by external contingencies. More internally regulated, and therefore more autonomously engaged in behavior would be labeled as either identified or integrated regulation. An identified regulatory style involves acting because the goal itself is valued or personally important – "I might learn something valuable from this course, so I think I'll get the most out of it." The most advanced form of extrinsic motivation is integrated regulation – "As a teacher, it is important for me to use technology in meaningful ways to be more effective; therefore I believe taking this course is a valuable opportunity." "When regulatory processes are integrated, behavior is an expression of who the individual is -of what is valued by and important to the individual" (Deci et al., 1991). Each type of regulation involves a greater degree of internalization. The more internalized the reasons for acting, the more autonomously regulated, or self-determined the behavior.

Purpose: The goal of this study becomes one of understanding the relative influence of a mandated technology course for all new faculty in the College of Education on the integration of technology into teacher education courses. It begins with the question: To what extent and for what reasons have new faculty become engaged, behaviorally, affectively, and cognitively in the integration of technology into their courses? It ends with understanding the characteristics of this course that promote the internalization of reasons for technology integration in teacher education courses.

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Participants: Nine of the course participants, three from each of the past three years, will be selected at random from the pool of new faculty in the College of Education (N = 41) who took the course each year. Only faculty currently teaching teacher education students at NIU will be eligible to participate in the study.

Data Collection: Structured interviews will assess each faculty participants' use of technology in their courses, their attitudes and feelings about technology, and the degree and depth of their reflection on their integration of technology. The interviews will take a developmental focus beginning with the thoughts, feelings, and actions of the participants prior to taking the course, during the delivery of the course, and since completing the course. The participants will be asked to reflect on how the course may have influenced their behavior, attitudes, and thoughts. The initial cohort will have taken the course two years ago, so some longitudinal data will be available.

Observations of class sessions and review of course syllabi will provide information regarding each participant's integration of technology in their courses.

Value of Study: In an ever increasing technological society, it becomes imperative that current prospective P-12 teachers acquire the knowledge and skills to effectively and meaningfully integrate technology into their instruction. To better prepare teachers for this task, teacher educators need to model and value the meaningful integration of technology in their courses, yet college faculty are often unprepared for this task themselves. This study seeks to explain how one mandated course on the integration of technology in the curriculum provides a catalyst for motivating new college faculty to use technology in their teacher education courses.

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'Surviving' Web Based Professional Development (or, How Not to Get Kicked Off the Island): Lessons Learned from the Learning to Teach with Technology Studio

Jamie Kirkley, LTTS, Indiana University, US

Introduction

Organizations and institutions are increasingly offering online professional development opportunities to educators (Mather, 2000). This is especially true for teachers must keep up with new teaching strategies, the latest professional standards, and constantly changing technologies. Coincidentally, new technologies promise to facilitate access to learning at times and places chosen by the learner (Albion and Gibson,1998). These web-based environments have the potential to transform teacher professional development through the use of new models of teaching and learning. They also have the potential to facilitate a sustained culture of sharing, collaboration, mentoring, and support for K-12 teachers.

In the design of these web-based environments, there are not only technical challenges, but perhaps, more importantly, there are social and cultural challenges and norms which must be addressed in order for these new models to succeed. While initial attraction and interest may be high, establishing long term, high quality learning opportunities is a much more difficult goal to reach. This is the story of one such environment.

The Learning to Teach with Technology Studio (LTTS) is a web based professional development system to integrate technology into their classroom. The goal is to provide short focused mini courses or modules that teach teachers to develop a technology-based classroom project for use in their own classrooms. The LTTS is a five-year project funded through the Department of Education/FIPSE. It is currently in year three of development at Indiana University and with partner organizations (University of Georgia, PBS Adult Learning Services, and IMS).

Challenges

As with many online systems, there are challenges with designing and scaling the LTTS system. These include:

- Technical issues with designing an online learning anytime, anywhere environment
- Instructional design issues with developing high quality problem based learning modules that are designed not only for teachers but by teachers
- Supporting teacher developers of modules who have content expertise but little or no skills in instructional design or experience with adult learners
- Scaling and sustaining such a system past the grant funding.

Technical Issues

First, the technical issues of designing an online learning anytime, anywhere environment are numerous.

We need to understand the strengths and limitations of the online environment and learn how to operate within these.

Instructional Design Challenges

In designing LTTS, the developers chose to use inquiry based learning framework as it best matches the goals of the type of instruction we wish to model. Since there are few models of online inquiry based learning, LTTS designers face the challenge of first developing a new instructional model for Web-based PBL. The goal was to take the best of PBL learning and develop a new instructional model that would work within a Web-based learning anytime, anywhere environment. Designing an interface and instructional model that not only used inquiry but modeled it was key. This choice impacted not only the instruction but the technical challenges the strengths and constraints of web-based instruction, learner characteristics, and the purpose of the LTTS, which is professional development.

We also have to understand what aspects of PBL will work in these environments. Since most commercial course delivery systems did not support inquiry, LTTS developed and implemented its own inquiry based interface and learning environment that models the type of teaching that was being promoted. This included making an interface that modeled the inquiry process with a problem posed, a collection of resources, activities to scaffold the learning, and assessment guidelines that are provided as part of the module package. Designing all of this to work in a learning anytime anywhere environment has proved to be challenging because there is no instructor present. This is one of the trade offs of designing professional development in the context of learning anytime anywhere.

Supporting Non Instructional Designers

Perhaps the most difficult challenge of LTTS is to support teacher developers of modules. These teachers often have excellent content expertise but little or no skills in instructional design or experience with adult learners. LTTS has designed a support system with guidance, mentors, and resources to support teachers through the process of module development. However, there are still many challenges faced with helping teachers understand how to translate their content knowledge into high quality modules for other teachers. Since teachers are most often designing for preK-12 students and material for a specific content, LTTS has to provide scaffolding that will help teachers become designers of online instruction for other teachers focusing on teaching strategies and not necessarily content.

Through research completed with LTTS teacher developers, we have found they have particular challenges with learning to design modules for LTTS. These include: translating the projects or units they complete in their classroom into an instructional package that will help teachers go through a design process of developing such a project for their own classroom; finding high quality resources online that will support their module; and obtaining appropriate mentoring from instructional designers who often have little classroom teaching experience.

Scaling and Sustaining the System

Scaling and sustaining such a system past the grant funding is critical if these projects are to survive. LTTS is designed with an e-commerce model. In the future, royalties and usage agreements with schools will help keep the LTTS sustained and in use by preK-12 schools and preservice teachers. LTTS also plans to design an added component to support school- or district-wide professional development efforts in technology integration. Challenges include knowing the market for such a system with few examples to learn from and designing one system that can meet the needs of both preservice and inservice teachers.

Conclusion

In the design of these web-based environments, the technical, social and cultural challenges as well as the challenges of providing high quality learning opportunities is not easily done. Designers of such systems must have a critical understanding of the online learning environment and how to design inquiry based learning environments. Perhaps the most critical understanding is that of one's audience and how to involve them in this ongoing design and development process. As professional development increasingly goes online, designers of such online learning environments will be challenged to build environments that are enticing, high quality, and ongoing.

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Faculty Development by Design

David Knowlton, Southern Illinois University Edwardsville, US
Wayne Nelson, Southern Illinois University Edwardsville, US

Across the academy, preparing faculty members to teach is a pressing need. A doctoral degree in a discipline does not necessarily prepare a faculty member to effectively teach that discipline (Soder, 1996). While we agree that faculty members are sometimes unprepared for teaching, we also note that they often have even less experience with areas related to teaching, such as the design of curriculum or the development of instructional materials. But recently, new problems have arisen with the introduction and integration of technology in the teaching and learning process. Faculty members now have a new set of skills to acquire, but no more incentive or time to do so.

The axiom that "people tend to teach the way they were taught" may not always be the case, but the U. S. Department of Education has recognized the need for changing the ways that new teachers are trained to integrate technology into the classrooms around the country. And one of the areas identified as critical by the Preparing Tomorrow's Teachers to Use Technology Program (PT3) has been the development of skills and modeling capabilities of the faculty who teach these prospective teachers. But if traditional faculty development approaches are used, it is likely that the same problems will persist. With the luxury of extensive resources and personnel provided through a PT3 grant, we have been able to establish a model for faculty development that is organized around the metaphor of design studios, employing principles of "learning by design" as a means of helping faculty integrate technology into their teaching, and effectively modeling technology integration strategies for their students.

Learning by Design and the Design Studio

Design is a human activity that has been described by some as the solution of unstructured, or "wicked" problems (Rittel, 1984) through the specification of artifacts or systems meant to achieve emergent goals that are continually generated and refined throughout the design process (Lawson, 1990; Malhotra et al., 1980; Mayer, 1989; Newell & Simon, 1972). Others view design as an experiential learning process where an individual constructively shapes the problem and solution through cycles of situated action and reflection (Schon, 1991; Suchman, 1987). But when viewed as a social process, design involves both shared and distributed cognition (Lanzara, 1983), with the design team developing through conversation and representations a shared understanding of the problem, and through individual and collaborative efforts, a solution to the problem (Hutchins, 1991; Walz, Elam, & Curtis, 1993).

Design is increasingly seen as an activity that can be used to facilitate learning in a variety of content areas and contexts. Perkins (1986) has proposed a description of learning based on the notion that design is a fundamental characteristic of human thinking that arise naturally from human social and cognitive activities. From students learning through the design and production of multimedia (Kahn & Taber Ullah, 1998), to students learning science by constructing and testing solutions to problems (e. g. Harel & Papert, 1991), project-based and problem-based learning that incorporate design tasks have become effective models for teaching and learning. Proponents agree that the effectiveness of learning by design comes from a variety of necessary elements, including context, collaboration, reflection, and inquiry.

To organize and manage learning by design activities, educators have adopted the model of design studios common in the practices of the visual arts, architecture, and other fields that emphasize design. Studios provide an open learning environment where the students use design tools and processes to complete various projects (often self-selected, or at least open to selection within some set of parameters), and the teacher offers assistance and critique when asked, or at various pre-determined points in the process. This collaborative atmosphere lends itself well to the self-organized and self-paced learning that occurs in studio design activities. While design studios are common in other fields, the application of the model to education is just beginning to emerge (Orey, Rieber, King, & Matzko, 2000; Rieber, 2000). Since this model supports many of the principles of adult learning recognized by various theorists (e. g., Knowles, 1989), as well as the theories of learning and instruction discussed earlier, we felt that it could be easily adapted to our faculty professional development efforts.

The Faculty Technology Design Studio

To assure that our faculty members develop the skills necessary to effectively model technology integration strategies to their students, the design studio model is being employed within the School of Education at Southern Illinois University Edwardsville as part of our PT3 program efforts. The design studio fits particularly well with the unique teacher education partnerships that have been developed recently. University faculty members work in a two-year, field-based program with the teacher education students and K-12 students, supervising teacher education students

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and providing effective models of best practice, as well as delivering weekly content seminars where students are given opportunities to discuss various theories and methods. "Courses" are non-existent. Instead, various content areas are completely integrated across the two-year program. Students prepare portfolios to demonstrate their growth and competence in standards set by state and national certification and accreditation agencies.

There are several other reasons that we felt the design studio model was particularly appropriate for our faculty development goals. First, the faculty participants possess varying levels of skill development with respect to technology utilization and integration. Second, the faculty participants are already organized as teams to deliver the teacher education program at partnership schools, and therefore have developed a high degree of camaraderie and are used to collaborating. Third, a small core of faculty members who are highly skilled and experienced with various learning technologies were available to act as facilitators, or "lead designers" for each team. Finally, resources from the grant have allowed us to expand an already well-developed technology infrastructure and support system for development of various types of applications and resources. In other words, if the faculty technology design teams can dream it, we will be able to make it happen for our teacher education students.

The Faculty Technology Design Studio process began early in the fall of 2001. Faculty from the School of Education and the College of Arts and Sciences were invited to attend a kickoff meeting where the studio concept and plans were shared, along with information related to the new Illinois teacher certification standards for technology integration and utilization. Eight design facilitators and three project staff members facilitated the design studio activities as "lead designers", challenging the thirty seven faculty participants to identify opportunities for technology integration in their teaching activities, especially activities that might model appropriate practices or help teacher education students meet some of the new state certification standards. After much collaboration and discussion, more than 15 design projects were identified and described in written "design briefs".

Following the kickoff meeting, design facilitators continued meeting with the faculty participants to refine and elaborate the designs, and to identify available technologies or elaborate on specifications for technologies to be developed. Support personnel hired with grant resources are currently working to develop and assemble the custom-designed technologies to meet the design goals specified by the faculty participants. Faculty participants will then implement the technology applications and strategies with their students during the rest of the academic year, culminating in a "showcase" event where K-12 students, teacher education students, mentor teachers, and university faculty will come together to demonstrate and share with their communities the results of the year's activities.

Two examples taken from the 15 design projects being completed as part of the grant activities may help the reader to better understand the design studio effort and the expected results. It should be noted that by the time of the conference, several of these design projects will have been implemented, and the preliminary results will be shared with colleagues attending the conference session. For example, one group of faculty members is working with teacher education students to design and publish a research journal focused on teaching activities at the partnership school. Each student will be required to submit at least three manuscripts for the journal, with mentor teachers and university faculty will serve as editors for the journal, along with some of the students. An online article submission system is being developed, along with facilities for editors to communicate with students regarding revisions to the manuscripts. In addition, an artist will be working with the editorial staff to create graphics for the journal, which will be published as a traditional paper product, as well as in an electronic version.

A second group of faculty is developing a video-case library of teaching examples that illustrate various issues related to educational psychology and educational foundations. Students will be able to access the video cases through the web, participating in asynchronous discussions about the cases, as well as submitting their own analyses of the cases. Faculty members are preparing content that elaborates on the principles being illustrated by the video cases. In addition, teachers shown in the video as well as university faculty will be participants in the discussions, allowing students to ask questions about the video cases, and presumably, identifying issues for further learning and discussion.

These are two examples of the many design projects currently being completed. Faculty are participating not merely as designers, but as developers wherever possible, thereby increasing their technology skills while working on something of utility for their teaching and their students learning. Again, an assessment of the growth of faculty knowledge and skills related to the various technologies and tools being employed in the Design Studios is currently being undertaken, and will be available and discussed as part of the presentation at the conference. Informal observations and comments to date indicate that the Design Studios are successful in promoting the kinds of faculty development we had envisioned.

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"Views of an Online Course From the Participants at Morehead State University"

Dr. Lesia Lennex, Leadership and Secondary Education, Morehead State University,
USA, l.lennex@morehead-st.edu

Abstract:

Online courses are becoming common for university offering. Some argue that the online courses are not well suited for the average student. Those same faculty would tend to agree that one needs to be at a perceived proficient level before under taking an online venture. In this case, 60% of respondents believed that EDUC 599 is best suited to someone with a perceived apprentice level of technology.

Critics might again argue that grading standards are not rigorous enough in online courses. Respondents in this study stated differently. The graph below shows the college identification compared to the perceived difficulty level of the course. Grading in the course was conducted by the individual instructors. The instructor responded to e-mail reflections and gave students scores of 0-7 points. The final project web page, was valued at 15 points. 100% of the respondents stated that they felt feedback from the instructor was individualized.

Introduction and Background

Morehead State University (MSU) is known for ground-breaking in the field of technology facilitated classes. The institution was one of the first subscribers to industry leader Blackboard, and Internet Classroom Assistant, and has again shattered the limits with technology assistance in offering from Teacher Education Institute (TEI) an Internet-based course, "Teachers Discovering Computers."

The Internet-based course (hereafter referred to as EDUC 599 or "the course") is the result of a partnership with TEI in the Preparing Tomorrow's Teachers to Use Technology (PT3) grant awarded to MSU in July 2000. As with many institutions, several faculty were pioneering the use of technology while others waited for the trend to end. The purpose of the course within our grant was to deliver more opportunities for undergraduates to use technology in the teaching environment. MSU's PT3 grant focuses on undergraduate, preservice teachers. To offer this course to others, individuals must be directly involved with training preservice teachers. EDUC 599 is offered to MSU faculty, MSU teacher education students, K-12 cooperating teachers with student teachers, and K-12 administrators and technology coordinators in a five-county partnering region. The course is given with a tuition-waiver and students in the course receive a free textbook. Students eligible for graduate credit may elect to receive graduate credit, waiver-free. Faculty were given an additional incentive of $500 for completion of the course. Later, awards of $1,500 per person were made available for MSU faculty to apply their newfound knowledge. This award could provide release time to restructure courses, purchase equipment, support travel to conferences, etc. Students were given the option of applying the course toward program requirements for undergraduate or graduate degrees.

The class was initially offered in Fall 2000; a special section was started for K-12 administrators and technology coordinators in November, 2000. Students were given information for enrollment through classroom solicitation and word-of-mouth. Registration occurred only through the PT3 secretary. Pre-registration for Spring semester was conducted both through the PT3 secretary and MSU's registrar. During Fall semester, EDUC 599 sought to prepare students to actively incorporate Internet and its resources, common educational software, and basic skills in web editing. Undergraduate students and K-12 personnel were asked to construct lesson plans complete with scoring guides. Students were allowed to visit Web sites in many different discipline areas to explore the potential for their classrooms.

Statistical Information from surveys

Despite many obstacles to enrollment for Fall semester, MSU Registrar records indicate 148 students were enrolled. Of these 113 completed the course with either an incomplete or final grade recorded. 107 persons from the completion group were sent an online survey in March 2000 (see http://people.morehead-st.edu/fs/j.lewis/educ599_survey.html). The 107 persons are broken into the following categories: 30 undergraduates, 13 student teachers, 11 K-12 cooperating teachers, 11 K-12 administrators or district technology coordinators, and 42 MSU faculty, staff, and administrators. A 20% return was seen on the survey with 21 people responding; 20 surveys were usable. At least one person from each category responded to the survey. It is important to note some reasons that the return was so low. Foremost, the email requesting participation was sent at an inopportune time. Although the request was sent from an America Online account, the MSU mail server was malfunctioning for many of its mailboxes. Mail was undeliverable , mail was eliminated, and mail was sometimes not returned properly from an MSU origination. The MSU server email accounted for a large portion of our potential responses. Students who were student teachers during Fall semester likely graduated and would not have had access to their MSU accounts. Finally, the specially created class from November, 2000 had not had grades posted to the Registrar at the time of this survey. It is possible that anyone receiving an incomplete or not having completed the course chose not to answer the survey. Only students having withdrawn were omitted from the survey.

This survey was designed to test the null hypothesis, "students will not demonstrate perceived increases in technology use or improvement in performance as a result of having taken EDUC 599." This paper focuses on key components related to the null. For a lengthier discussion of the survey results, please see http://people.morehead-st.edu/fs/l.lennex/jump.htm

Before displaying some relevant results, it is important to note the following. The survey consisted of 5 males and 25 females. 100% liked to use computers ; 95% reported access to a home computer; 95% were satisfied with the course and had their expectations met with the course; 90% had more than one e-mail account; and 41% accessed the Internet five or more times per day. The table represents a distribution of respondents by academic area.

academic area

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	business	3	13.6	15.0	15.0
	ed and behavioral science	13	59.1	65.0	80.0
	humanities	1	4.5	5.0	85.0
	science and tech	3	13.6	15.0	100.0
	Total	20	90.9	100.0	
Missing	System	2	9.1		
Total		22	100.0		

This survey used definitions for skill level from the Kentucky Department of Education. The levels were novice, apprentice, proficient, and distinguished. The definitions are as follows: novice- demonstrates minimal and/or incorrect knowledge, apprentice- demonstrates basic knowledge, proficient- demonstrates broad knowledge, and distinguished- demonstrates extensive knowledge of the content area. The tables below show the results of a one-way t-test comparing the perception of skill level before and after taking the course. The perceived skill level increased from a mean of 2.2 to 3.0, or from apprentice to proficient level, after taking the class.

One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
where would you place your skills	11.804	19	.000	2.2000	1.8099	2.5901
where do you place your skill after the class	26.723	19	.000	3.0500	2.8111	3.2889

USD's Web Group:
Its Contribution to Faculty/Staff Development

Luby Liao and Jane Friedman
Department of Mathematics/Computer Science
University of San Diego
San Diego, CA 92110
liao@sandiego.edu, janef@sandiego.edu

Abstract. This paper is a companion to the paper we presented at AACE M/SET 2000 entitled *USD's Web Group: A Service Learning Experience in Computer Science.* It focuses on the web group's contribution to faculty/staff development. The web group is a friendly and accessible computing resource for faculty and staff across campus which complements the services provided by the Academic Computing whose main concern is the infrastructure of the campus computing. The web group does not limit itself to web-related problems. It promotes computer literacy by advising users, solving problems for them and wherever possible, training them to solve problems for themselves. The USD web group could be easily duplicated on other campuses and therefore this paper should be of interest to many.

This paper is a companion to the paper we presented at AACE M/SET 2000 entitled *USD's Web Group: A Service Learning Experience in Computer Science.* Interested readers can find out how the web group contributes to the USD community in many ways from the afore-mentioned paper. This paper focuses only on its contribution to faculty/staff development.

The web group was founded in the spring of 1999 to help the USD community with their computer-related problems. It consists of Computer Sciences students working under our supervision. We meet regularly for seminars on technical issues. Three years after its inception, the USD web group has become a respected institution on campus. The members of the web group are helping a variety of people and groups on campus and in the process educating themselves. The first author was honored with the *USD Innovation in Experiential Education award* in 2000 and *Davies award for teaching excellence* in 2001, both related to his web group activities. The USD web group could be easily duplicated on other campuses and therefore this paper should be of interest to many.

The web group is a friendly and accessible computing resource for faculty and staff across campus which complements the services provided by the Academic Computing whose main concern is the infrastructure of the campus computing. The web group helps users solve problems ranging from the most basic such as how to construct a web site, or how to convert a data set, e.g., an address book, from one format to another, to very challenging problems such as how to build an enterprise class web site.

To help faculty/staff develop their own web sites, we give 40-minute web site construction classes with web group students on hand to help the participating faculty and staff. We use a utility program to create a rudimentary web site for the participants instantaneously. We then use the Netscape editor to beautify their sites and make sure that they know how to publish on their own.

For more involved web projects, web group students are assigned to faculty and staff to design and construct the sites and train the users. This is particularly successful when we use systems that are amenable to collaboration such as Zope Web application server[1]. As an example, we are creating a web site for the Dean's office of the School of Arts and Sciences. This site will have many sub-sites that will be managed by different people who need not have any web sophistication other than some brief training. These managers can in turn train sub-managers to work under their supervision. To fix the idea, you are invited to visit a Taiwanese Forum/News site[2] that we put together for a SDSU Psychology professor Dr. Raymond Lee. Even though Dr. Lee did not have any prior web construction experience, he is able to manage the site after a 30-minute training. We are only needed occasionally to provide technical assistance. He trains other people to manage sub-sites.

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[1] http://www.zope.org

The web group does not limit itself to web-related problems. It promotes computer literacy by advising users, solving problems for them and wherever possible, training them to solve problems for themselves. In the following, rather than giving a laundry list of all the things that the web group has involved in, we give some example cases to show that it will help wherever help is needed:

- Helping re-organize user data stored in spreadsheet files or even word processing files into a database using free and open source DBMSs such as MySQL[3] and Postgresql[4]. We have found that users are so strongly influenced by their spreadsheet programs and word processing software that they will use such tools even when they are not the right tools to use. Even after they migrate from spreadsheets to databases, they continue to think in terms of spreadsheets. This can cause them to use one huge universal table or to have difficulty designing their databases efficiently. With our help, they are able to come up with better designs and understand the importance of normalization.
- Advising users on
    - the merits of different operating systems such as Linux, MacOS and Windows
    - different Linux distributions and their licensing
    - hardware upgrading and the merits and demerits of double boots
    - different languages such as Java, Perl, Python and Tcl/Tk. Different technologies such as applets and servlets, ASP, PHP, JSP and application servers.
    - different web site construction software such as Dreamweaver and FrontPage
    - content and presentation as two different concerns in web site construction
- Writing programs to help users with tasks such as data formatting, conversion or look-up. Even if the users cannot fully participate in the programming projects, they can be educated. As an example, a user tried to construct a 500 plus member mailing list in the Pine mailer by typing one address after another. However, the data file already existed, although in a not readily usable form. We wrote an *Expect*[5] program that automated the creation of the mailing list. The program took minutes to write and seconds to execute.
- Customizing and gluing existing software to meet the users' needs for online calendars, threaded discussion forums, mailing lists and Wiki[6]-style collaboration.

This spirit of *help wherever help is needed* has led the web group to expand beyond USD campus. Some of the beneficiaries now include elementary and secondary school classes and faculty members from SDSU.

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[2] http://holycow.sandiego.edu:8080/isota. The site was put together by using the Squishdot product with minor customization. You need a browser that can display Chinese in order to see the site displayed correctly.

[3] http://www.mysql.com

[4] http://www.postgreql.org

[5] http://expect.nist.gov

[6] http://www.wiki.org

Technology and Careers: A Period of Transition

Lori Lindley
Department of Psychology
Louisiana Tech University
United States
LLindley@latech.edu

Jon Schwartz
Department of Psychology
Louisiana Tech University
United States
Schwartz@latech.edu

Walter C. Buboltz, Jr.
Department of Psychology
Louisiana Tech University
United States
Buboltz@latech.edu

Steve M. Jenkins
Department of Psychology
Louisiana Tech University
United States
StevemJenkins@yahoo.com

Abstract: Technology continues to grow in today's society and its influence on individuals is staggering. Research appears to have focused primarily on the use of technology to enhance education and productivity. Little research has focused on how technology is changing other aspects of the environment for individuals. As the educational and work environment change that pre-requisite skills and knowledge required for vocations changes. This article reviews current career theories, the changing nature of work and what can be done in the educational environment to deal with these changes.

Technology continues to grow in today's society and its influence on individuals is staggering. Research in this area appears to have focused primarily on the use of technology to enhance education and productivity in the workplace. Little research has focused on how technology is changing other aspects of the environment for individuals. As the educational and work environments adopt technology the question is, How has the technology changed the nature of the work and the pre-requisite knowledge and skills required for successful completion of a occupation?

Technology is responsible for the birth of many brand new careers each year, most of which are related to the rapidly evolving and expanding capabilities of computers in many areas. In addition, however, technology is rapidly changing the faces of many established careers. Careers that recently required no knowledge of computers at all now depend heavily on computer proficiency. In addition to the direct effects of computers on the specific tasks of a vocation, technology is changing many careers drastically through its promotion of globalization. Organizational structure is changing faster than ever, and many workers are finding their jobs to be much less predictable and secure than they are accustomed to. Although it appears that the educational environment is doing an adequate job of integrating technology into learning, it appears to be doing less than an adequate job of relating technological skills and knowledge to the work place

These changes are having a drastic effect on the world of work and the skills and knowledge that one needs to be competitive in the new work place. The question now appears to be, How does the educational environment address this issue to facilitate the school-to-work transition and provide students with the technology, knowledge, and skills to be competitive? Additionally, how does this change in the world of work and education influence the career

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development and decision-making of students?

John Holland (1997) developed a theory of vocational behavior based on the idea that people express their interests through their work choices and experiences. Holland assumed that people's impressions and generalizations about work, which he referred to as stereotypes, are generally accurate. However, with the recent advances in technology many of the stereotypes and knowledge that individuals have about the work environment may not be accurate. Without accurate stereotypes of the world of work, individuals may have difficulty expressing their interests in a choice of an occupation. Through utilization of these stereotypes, people and work environments are assigned to six different typologies. Within each of these typologies researchers have described sets of behaviors and knowledge that individuals typically possess. Additionally, researchers have examined the work environments and described the skills and knowledge required to be competitive in that environment. To make an adequate career choice an individual can examine the fit of his or her individual interests, skills, and knowledge with that required by various environments. Research on this approach to career counseling has shown that indeed a close fit between an individual and their work environment leads to many positive outcomes. However, with the changing world of work and the technological changes in education, are individuals getting an accurate picture of their unique skills and at the same time getting the information from educators about the changing skills and job requirements? Without accurate knowledge about themselves and the work world career decisions become more difficult and lead to more mismatches between individuals and their occupation.

Surprisingly few writers have tackled the daunting issue of the changing nature of the vast majority of careers that have for many years been thought of as consistent and immutable. Additionally, few if any researchers have examined how the changing educational environment with its incorporation of technology into almost all aspects is affecting the individual and how this change in educational practices may be influencing the career decisions of individuals. Clearly, research needs to focus on all areas of the changing educational and work environment and how these are affecting the career decision of individuals.

Despite the current lack of knowledge, based on theory there are many things that can be done in the educational realm to help individuals with career decisions. First, educators need to not only use technology to help students learn and master material, but they must demonstrate the link between learning technology itself with requirements of occupations. For example, an educator may be using a computer program to enhance math skills. While using the computer the instructor can remind children that they are not only learning math skills, but are also learning computer skills that may be important for future career endeavors. At the same time the instructor may point out a few occupations that use or require computer skills. This process would not only allow students to learn the math material, but also to start to make links between technology skills and the world of work. Along these lines, educators can develop plans to help students learn technological knowledge and skills specifically. It appears that in the educational realm, technology is being used to help students learn and master other material and not being directly taught to students. With the reliance on technology in the world of work, it behooves educators to not only use technology, but to teach students how to use technology. If students can learn technology skills and develop knowledge in this area, it may open many career doors for them.

On the other side of this issue is for researchers to begin to explore the changing world of work and provide information about how the requirements and skills that are associated with occupations have changed due to technology. Without this information educators will have no idea what technology skills are related to what particular occupational field. As researcher conduct these job analyses and delineate the skills and requirements for the various occupations this information can be relayed to educators who can in turn relay the information to students.

These are just a few of the many strategies that educators can employ to help students with the career development and decision process that they will face as they complete their education and enter the workforce. Technology is not only changing the educational and work worlds, but is having an impact on how the two interact. Without a clear understanding of the interaction and how the two complement each other we may be doing an injustice to our students and future workers as they struggle with careers and occupations.

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Evolving with Technology in the Preparation of Teachers (Lost in Cyberspace: A Trek in Technology)

**Norene Vail Lowery, Department of Curriculum & Instruction,
University of Houston, United States (nlowery@uh.edu)**

Abstract: Most teacher educators advocate and value the use of technology. Too often teacher preparation programs are negligent in modeling the implementation of technological applications. This paper highlights the implementation of technology into graduate level education courses and a field-based undergraduate course. The teacher educator (once lost in cyberspace) and students report gains in confidence and competence. Discussion follows the struggles and successes of implementing the use of hypergroups in these courses.

Researchers agree that understanding teacher knowledge and teacher thinking is critical to understanding teaching and learning how to teach (Fenstermacher, 1994; Grossman, 1995; Leinhardt, Putnam, Stein & Baxter, 1991). White (1996) advocates the use of technology to facilitate understanding and problem solving and critical thinking skills for preservice teachers. Advances in constructing teacher knowledge are needed. The importance of technology is emphasized in all areas of education. Most teacher educators advocate its value and use in the classroom for all content areas. Keeping pace with the technological advances can be overwhelming. Too often teacher preparation programs and graduate programs are negligent in modeling the implementation of technological applications. This paper highlights the implementation of technology in preservice teachers' methods courses in a field-based context, and in graduate courses in education. "Falling through the cracks" refers to those that have not had the opportunities to experience and/or master basic concepts in education. Discussion follows the evolution of the technological trek from traditional instructional strategies to approaches that successfully incorporate more technology. For those that are confident and competent in their technological explorations, there is merit in this story. Merit in the fact that not all have successfully made the passage and would benefit from patience and shared expertise.

The Context and Inquiry

One objective of this teacher preparation program is to provide professional development for faculty to implement components of technology into courses. Initial learning experiences and a support system in technology were provided. However, it is imperative that relevant, real-world application be experienced to facilitate learning (Brooks & Brooks, 1993). Merely attending in-service training does not provide the needed "real-world" context, as did this inquiry. The hypergroup was chosen to support the weekly learning environment for both the preservice field-based course and the graduate level courses. This allowed an ongoing dialogue and communication regarding course information while sharing experiences and creating a support system. Participants were 27 graduate students and 18 undergraduate students. Technology tasks included emails, posting reading reflections, and Internet website research (creating an annotated bibliography of websites). The abilities and experiences with technology, and in particular the use of a hypergroup ranged from expert to novice. The teacher educator had never used the hypergroup. Expertise was shared and much was learned by trial and error through the semester.

Data collection spanned a semester. A case study was chosen for this context-specific inquiry (Lincoln & Guba, 1985). The use of multiple data sources and methods triangulated information. Context-rich materials provided background meaning to support data analysis and interpretations. Norms of qualitative methodology were observed and facilitated the discovery and extent of knowledge construction in the use of the hypergroup. The teacher educator kept a reflexive journal. Small interactive discussion and information sessions were informally conducted throughout the semester during classtime along with anecdotal records. Those that were more savvy with the hypergroup shared information as a means of promoting knowledge construction. Time in the computer lab was available during all class periods. For evaluation, all students responded to the following: Describe your "technology trek" through the semester. Address these points: Things I already knew; Things I learned; Things I would like to know; Advantages and Disadvantages; Improvement; and, Overall comments on using the hypergroup. (The undergraduate class also responded to this: Overall comments on creating the professional resource file in electronic format.)

These excerpts are indicative of the many positive responses that were reported in the data.

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I do plan to make use of this type of curriculum planning in some form or fashion. ... Other technology in use within my future classroom will hopefully be a class web site, e-mail for use with administration, other faculty, and parents, and a spreadsheet for grading purposes.

... I found this project useful both in incorporating technology into the classroom and planning effective lesson plans or curriculum. Thanks for coming up with such a forward-thinking plan about which all pre-service teachers need to learn.

I was very comfortable with the technology used in this class. I work in a very technology-rich environment where almost everything is e-enabled. I am on the Internet and use email on a daily basis. My team even has its own website. However, this was my first exposure to a hypergroup and I liked it. The biggest advantage was the ability to read the writings of the other students. This helped me to learn more about them as people and to learn about the real challenges facing teachers today. ...One side benefit was that the hypergroup became an easily accessible archive of all the work I had done during the course.

Wow, what a trek this course has been, and still is for that matter! ... I am not very comfortable with using the Internet and the only emailing I had used before this class was inter-district email at school. ... At the first of the semester I was not sure why we had to post our reflections to the hypergroup, why not just turn them in like last semester. It would be so much easier for me. ...I guess I should not be ashamed for falling behind in the game of technology, and not be afraid of asking questions. But the time it takes to become familiar with all that technology can offer is very consuming. ...I enjoyed reading the reflections and even discussed various points with other classmates. So in the very end it was worth the effort. So now that I am reflecting on my journey through technology land, I can say that I have leaned so much. I am feeling more comfortable with using both the web and email. ...it has been a great learning opportunity and being able to read the thoughts and views of my classmates has made the class that much richer. Thank you for pushing me to grow in an area in which I was not willing to go.

Summary

Reports indicate that the hypergroup learning experience was valuable. As the teacher educator, I believe the advantages of the hypergroup out weigh the struggle at the onset. The hypergroup is now a permanent component of all my courses. I am more comfortable with its use and its frustrations. The confidence achieved opens venues for implementing more technology. Being technological literate should be a goal for all education programs. The importance of this reflective inquiry helps in structuring appropriate experiences and encourages those that have fallen through the technological cracks. To those feeling Lost in Cyberspace and struggling along the technology trek, it can be accomplished, keep on trekking. It is possible to attain a level of competency and successfully implement technology components into teacher preparation programs. To those leading the way, be patient and diligent in your efforts to share knowledge and forge the way for those of us on your coattails. It is worth all of our efforts.

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A Beginner's Guide to Publishing in Technology Journals

Cleborne D. Maddux, Ph.D.
Counseling and Educational Psychology
University of Nevada, Reno
United States
maddux@unr.edu

Abstract: This paper is intended to furnish advice for beginning professors who work in "publish or perish" environments. Publishing can be highly rewarding and enjoyable, but is an odious task for many beginners. The paper provides ten tips for establishing a productive scholarly agenda. The paper begins with advice about the importance of maintaining a positive attitude about publishing, and covers topics such as how to choose a topic, how to prepare a manuscript, and how to cope with and respond to rejection.

Introduction

Academic publishing is a condition of employment in most U.S. colleges and universities, and decisions related to promotion, tenure, and merit pay are heavily influenced by the quality and quantity of published articles. Many beginning professors fear that they may not be successful in the typical "publish or perish" environment, and regard publishing as a necessary evil and a major hurdle on the way to professional success. Such attitudes are unfortunate, since some of us find writing and publishing to be one of the great joys of academe, and look forward to the entire process of writing, submitting, revising, and eventually publishing our ideas and our research results.

There are probably various reasons why so many neophytes fear and dread the need to publish. One important reason, however, is that their doctoral programs and doctoral advisors did not provide the guidance and the practice needed to clarify what may appear to be a difficult and mysterious process. Therefore, this article will present a number of guidelines aimed at providing some of the basic information and advice beginners need. It is hoped that this advice will be of use to beginning professors, both in helping them to become successful writers, and, just as importantly, to enjoy the entire process.

Maintain a Positive Attitude Toward Publishing

One of the most important pieces of advice for beginning professors is to strive to maintain a positive attitude toward scholarship and publishing. Every department in every college in every university in the land has a number of cynical, perennial complainers who consume incredible amounts of time, energy, and enthusiasm telling (and retelling) whoever will listen about the unfairness of the requirement that they publish. A favorite refrain of these chronic complainers is that "the rules have changed" since they were hired, when, they maintain, publishing was not important.

There are many reasons for not paying attention to these pessimists. In the first place, their arguments, even if they were true, are completely beside the point. The fact is that most of us *are* required to publish, and no amount of whining or protesting will change that fact. Therefore, continuing to assert the unfairness of this requirement is simply an outrageous waste of time. In fact, if most of these individuals devoted even half the time, energy, and enthusiasm to their research and writing agendas that they currently spend complaining about the need to publish, many could become successful writers with nothing about which to complain.

Another reason to avoid the trap of becoming a chronic complainer about publishing is that it is self-defeating. Not only does it take time that could be far better spent on publishing-related tasks, but it becomes discouraging and debilitating, since it is difficult to become accomplished at anything about which one is negative and pessimistic. Thus, the complainers find themselves participants in a vicious circle in which their hostile attitude mitigates against scholarly productivity, which makes them more negative and hostile and less likely to even attempt to succeed.

Then too, the argument that "the rules have changed" is not itself reasonable. In the first place, the publishing requirement has been in place in American universities for many years. Even if the rules did change, however, is this grounds for a complaint? Where is it written that those in any job have the right to expect that job requirements will never change?

Be Alert to Publishing Opportunities

I am frequently asked for advice on how to select the subject of scholarly writing efforts. There is no one best answer to this question, but there are some strategies that many successful writers find to be useful. I always carry a small, pocket-size notebook in which I jot down ideas for future articles, which often come to me in odd moments. In my office, I keep a file folder where I compile such ideas. As this article is being written, the file contains about a dozen different ideas. I periodically review this list, prioritize the topics, and add any details I have thought of that might help further define the article.

Where do these ideas come from? They come from many diverse sources. One piece of advice to help find research ideas is to make it a practice to spend several hours a week reading the research reports of others in the field. As I read such reports, I often think of ways a study could be improved, or get an idea for a new, but related research strand. My classes provide another source of ideas for articles. Anything my students find especially controversial, difficult, or interesting may make a publishable "how to" article or a good position paper. Position papers of professional organizations also sometimes provide a topic for an article. As I read such papers, I am alert for statements or ideas about which I agree or disagree strongly. Observations made in public school classrooms are another source of potential ideas. Sometimes I write about something I have seen and admired, while other times I am inspired to write about something I have seen about which I disagree strongly.

I have never found it difficult to find a topic to write about. On the contrary, I usually have more topics than time, and find that I can only write about a fraction of the things that interest me.

Consider Writing A Literature Review

Beginning authors should consider writing articles that are literature reviews. Good literature reviews are extremely valuable, but are rarely submitted. Every editor I know says they are constantly on the lookout for good literature reviews, seldom receive one, and would move a good one to the top of the list of articles waiting for publication. A good literature review summarizes the literature in a given area, identifies what is known or suspected, criticizes what has been done with an eye to common errors, and concludes with a description of needed future research.

Write for A Specific Journal

Once I decide on a topic, the next step is to decide where I will submit the article. The best way to do this is to inspect a few recent back issues of the journal under consideration. As research editor for Computers in the Schools (CIS), I find that many assistant professors make the mistake of sending articles to me that are clearly not appropriate for CIS, a fact they would have easily surmised if they had spent a few minutes looking through a few previous issues of the journal. Sometimes these articles are much too lengthy, or do not contain enough statistical detail. I even receive a few articles each year that have no relation to the use of computers in schools. Very often articles are not written in the proper style (American Psychological Association).

There are a number of commercially available books written for aspiring authors. These books summarize the requirements of many different academic journals. Such volumes can be helpful, but they are not good substitutes for examining recent back issues as they quickly become outdated and many are full of errors.

If there is any doubt about the appropriateness of a manuscript for a given journal, authors should feel free to telephone or email the journal editor. Most editors enjoy talking with potential authors, and can often provide valuable information not found in the formal journal author guidelines printed in back issues. More importantly, such a call may prevent an author from wasting several months by submitting an article to an editor who will eventually reject the article as inconsistent with the mission of the journal. If the editor indicates that such is the case, authors should feel free to ask for a recommendation of some other journal that might find the article to be appropriate.

Use Writing Strategies That Work For You

Only trial and error can determine which writing strategies will work for a given individual. Some writers like to formally outline the article before beginning, some make a few notes in narrative style, and others jump in "cold," begin writing, and let the article go where it will.

I find that for me, it is best not to begin writing immediately after I decide on a topic and select a journal. Instead, I do better if I defer doing any actual writing for a couple of days and let the article idea "percolate" in the back of my mind. I don't know why this works, but I think perhaps my subconscious mind works on the idea, because I find that after a few days, I often have a good idea about the structure of the article, and a fairly clear notion of what the beginning, middle, and end of the article will look like. I have no idea if this will work for anyone else, but I have been told by others that they also find this a useful strategy.

Prepare the Manuscript

Manuscript preparation is extremely important. Authors should find, and rigorously adhere to the specific target journal's guidelines for authors. These guidelines can be found in recent back issues or, increasingly, on the World Wide Web.

There are two separate, but equally important aspects of manuscript preparation that require very careful author attention. The first is the publication style specified by the journal. CIS, for example, requires that manuscripts be prepared according to APA (American Psychological Association) guidelines. However, very rarely do we receive manuscripts that even come close to rigorous conformity to these guidelines. Sometimes, manuscripts employ a totally different style, or, more often, a curious mix of several different styles combined with completely idiosyncratic elements of style. Failure to accurately employ the proper style is a grave error, because it conveys the covert message that the author is careless and lacks concern for precision and accuracy.

The other critical aspect is that of correct grammar, spelling, and other mechanical elements. I am constantly amazed at how many manuscripts I receive in which the first sentence makes no sense because a word or phrase has been omitted. Very careful proofreading and subsequent revision is essential. Improper spelling, bad grammar, or inadequate proofreading prejudices editors against a manuscript before its content has been evaluated.

A related problem involves the reference list and textual citations. APA style calls for textual citations that include only the authors' last names and date of publication. The reference list at the end of the article contains full details about the article. A very common problem occurs when the reference list does not include all articles cited in text, or vice versa. Such problems routinely delay publication of articles and are a major source of frustration for editors. A word processor provides an easy way to ensure that the reference list agrees with the articles cited. As soon as the author completes the manuscript, a copy of the reference list should be printed. Then, the author performs a global search, first for "19," then for "20." These searches will find all the citations in text, and each can be marked off the reference list as they are found. Any omissions will then be apparent and can be corrected.

Submit the Manuscript

The manuscript should then be submitted according to journal guidelines. Some journals will require multiple hard (paper) copies, some require files submitted on diskette, and some require both. Any diskettes submitted should be carefully labeled with the authors' names, the article name, and the format (such as Word for Windows). Some journals require a stamped, self-addressed envelope if the author wants the manuscripts returned in the event of rejection. An increasing number of journals are charging a publication fee. Authors unwilling to pay such a fee should not send manuscripts to these journals. Most journals require that submissions be exclusive, and simultaneous submission to multiple journals is regarded as unethical.

Checking the Status of a Manuscript

Authors wishing to check on the status of a manuscript should use email or the U.S. mail, but should not telephone the editor. Editors often enjoy discussing a potential article with an author, but few, if any, welcome telephone calls to check on an article. Editors are busy people, and most are volunteers who receive no remuneration for their efforts. Checking the status of an article is a time-consuming, routine, record-keeping function, often requiring laborious file searches, and authors should refrain from interrupting editors with such inquiries. By using the mail or email, editors can assign the task to an assistant or perform it at their leisure.

Coping With Rejection

Every author experiences rejections. It is vital that authors strive to avoid the error of taking rejection personally. Most manuscript rejections occur because the submission was not appropriate for the chosen journal, not because the article was faulty or uninteresting. I have published somewhere in the neighborhood of 200 articles and 15 books, and I have been rejected on numerous occasions.

Unfortunately, higher education is full of professors who have been so devastated by a rejection or two that they have never recovered from the humiliation. Many of these individuals subsequently abandoned or greatly restricted their publishing attempts, and their careers have suffered greatly from this reaction.

The best attitude to have about rejection is that it is completely natural and unavoidable, and the best practice is never to give up on a rejected article. Be willing to edit, revise, or completely rewrite, but resolve that every article will eventually be published.

It is also important to be aware that there is more than one type of rejection. By far the most common rejection contains a statement that if listed deficiencies are addressed and corrected, the article should be resubmitted. Upon receiving such a rejection, authors are best advised to carefully read through the criticisms and set the letter aside for a day or two. It is unwise to use the heat of the moment to decide what to do about a rejection. After a few days, the rejection should be read again. If resubmission seems the best course, then authors should decide which of the criticisms are legitimate, and which, if any, are the result of poor reviewing or misinterpretation by reviewers.

The article should then be revised in response to each of the criticisms provided. Once the revision is complete, the article can be resubmitted along with a detailed letter to the editor. Authors should maintain a polite tone in this letter, and list each criticism and how that criticism has been responded to in the rewrite. Each point should refer to a specfic page number and paragraph in the rewrite. If the author feels any of the criticisms are not legitimate, the letter should unemotionally state this fact and provide a complete justification for retaining the original, criticized sections. Finally, a photocopy of the original manuscript, plainly marked "original" should be provided, as well as a photocopy of the original rejection letter. These photocopies will make it easy for the editor to see what changes have been made in the rewrite.

A word needs to be said about the unlikely possibility that the original rejection letter is abusive, rude, or otherwise unprofessional. Authors should bear in mind that reviewers are volunteers who are almost never paid for their refereeing services, and that tenure, promotion, and merit committees typically give little, or any, credit for refereeing. Therefore, good reviewers are difficult to recruit and retain, and arrogant or abusive reviews sometime slip past an editor and find their way into the hands of a potential author. This is unprofessional and unfortunate, but probably unavoidable. If this occurs, authors should resist the impulse to shoot off a reply in kind. Some editors have long memories, and it never pays to alienate a colleague. The best course of action is simply to shrug off such a rejection as undeserving of comment, write off that journal for the present, and send the article someplace else.

Be Generous with Co-Authorships

It pays to collaborate. Not only does it bring added expertise to an article, but also often paves the way for future publishing opportunities. Beginners should choose experienced authors with whom to collaborate, and should carefully provide second or third authorships to anyone who had anything whatsoever to do with the article. I am always surprised at how many publishing and consulting opportunities have come my way because I was careful to include as an author someone who helped a little with an earlier article. While everyone needs a few articles with sole authorship, especially at the beginning of an academic career, most committees and potential employers regard multiple authorships as an indication of willingness to collaborate and an sign that a professor lacks a selfish, or overly competitive approach to scholarship.

Conclusions

Writing can be one of the great joys of academic life. Writing confers a little chunk of immortality that most of us find immensely rewarding. There is something comforting in the knowledge that many years after we are gone, some scholar, in some library, may stumble across something we have written that will prove to be exactly what was needed to inspire a new idea or begin an entirely new line of inquiry. Those of us who are privileged to work in universities need to remind ourselves that we stand on the shoulders of our predecessors, and that we owe a debt of scholarship to our successors. It is hoped that the advice in this article may prove useful to some new professors who are availing themselves of this unique privilege and striving to fulfill this important debt.

Lessons Learned from Project ImPACT: Graduate Student Perspectives on Implementing a Student-Faculty Mentoring Initiative

Michael D. Martin, Project ImPACT, The University of Tennessee, USA, mmarti13@utk.edu

William Wishart, Project ImPACT, The University of Tennessee, USA, wwishar1@utk.edu

Thilla Sivakumaran, Project ImPACT, The University of Tennessee, USA, sthilla@hotmail.com

Abstract: Project ImPACT, a new PT3 awardee, contains several elements that are designed to systemically address the goal of producing technology-proficient teachers who can appropriately infuse technology into curriculum and instruction. Achieving this goal requires a collection of interwoven strategies within the preservice teacher education program. One such strategy, faculty modeling, is crucial for producing preservice teachers who possess adequate knowledge of educational technology applications, current educational technology standards, and effective practice. Project ImPACT includes a student-faculty mentoring component that provides one-on-one training and support to participating teacher education faculty (Thompson, Hanson, & Reinhart 1996) for the purpose of facilitating institutional change at the university level by promoting the infusion of technology into the preservice teacher education curriculum.

Professional development opportunities may not be widespread or individualized enough to meet the ongoing and specific needs of teacher education faculty (Bentley & Mumma 1999). Typically, universities' professional development strategies consist of offering faculty a variety of generic technology-related workshops; this model of professional development is not effective. First, faculty must see the relevance of the content as it applies to their area. Generic workshops often include participants from a range of subject areas and levels of expertise, and as a result, the content is targeted to meet broad needs of a general audience. Secondly, in order for faculty to take advantage of newly acquired technology skills, adequate follow-up support is critical. This support must be timely, convenient, and presented in supportive ways so faculty members are encouraged to continue taking risks. This kind of support is often lacking in a generic workshop format.

Project ImPACT 's mentoring component is built upon a foundation of collaborative learning and best practices in mentoring. It utilizes a team of mentors, comprised of graduate students from the department of Instructional Technology, Curriculum, and Evaluation, who possess expertise and experience in educational technology applications. Each mentor works one-on-one with three to four members of the University's teacher education faculty. The faculty members represent a cross-section of content areas and mentor-faculty pairings are made with consideration to the knowledge and skills of the mentor and the specific needs of each faculty member. The primary purpose of this mentoring process is to facilitate the infusion of technology into teacher education courses. This work focuses on enhancing each faculty member's ability to integrate relevant technology applications (Thompson, Hanson, & Reinhart 1996). The approach addresses two shortcomings associated with generic workshops by focusing on faculty needs that are relevant to their course curriculum (Zachariades & Roberts 1995) and providing continuous support (Levin & Buell 1999).

During the fall semester, each ImPACT Mentor and his assigned faculty members develop individual professional development plans. Each plan serves as a road map for developing and/or selecting professional development opportunities that are aligned with the needs of the faculty member. These opportunities are diverse in scope, ranging from individualized one-on-one sessions to small group training sessions focusing on specific technology applications.

Session content and format varies with the need of each faculty member. Some faculty members require short sessions of direct instruction on specific technology applications that integrate with course content to meet specific objectives. Examples of these include:

- Digital imaging
- Presentation software
- Small scale digital video production
- Web publishing
- Productivity software

Other faculty members require series of sessions over time that focus on a variety of applications needed to achieve larger, long-term objectives. Examples of these include:

- Web-based and web-enhanced course development
- Larger scale digital video production
- Assistive technology course development

The mentoring component of Project ImPACT has produced a wealth of information that can be utilized in future systemic planning initiatives within the College of Education. Much of this information is documented within session logs that are maintained by the mentors. These logs serve as mechanisms for reflection and strategizing during biweekly meetings. Insights gained from these reflections can be categorized as follows:

- Perceived relevancy of technology applications
- Faculty commitment and prioritization
- Scheduling issues
- University support
- Issues related to mentoring roles and knowledge-base

While each mentoring relationship is unique and presents its own set of challenges, these areas provide a focal point for review of the mentoring process. In subsequent years, proactive strategies grounded in reflection will lead to continual improvement of Project ImPACT's student-faculty mentoring program.

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Coaches and Players Perspectives on Faculty Development In Technology: It's a Whole New Ballgame

Leroy Metze, Pam Petty, Steven Wininger and Charmaine Mosby

Western Kentucky University

Western Kentucky University's College of Education and Behavioral Sciences has received an Innovation Challenge Grant from the United States Department of Education. The project, called e-train express, is designed to implement programs and strategies that increase the number and quality of new teachers who are highly effective in using technology to facilitate, assess and communicate learning for all students.

Since only 20% of current teachers feel comfortable using technology in their classrooms and over two million new technology proficient teachers will be needed in the next decade, Western Kentucky University (WKU), along with partner schools [schools in the 28 districts of the Green River Regional Educational Cooperative (GRREC)], the Compass Learning Corporation and NetTango are implementing programs and practices designed:

- To ensure that all teachers who graduate from our teacher education program can use technology to increase student achievement;
- To ensure that all graduates can use technology to assess student learning;
- To ensure that all university faculty from both teacher education and the arts and sciences departments can model effective technology-assisted instruction for prospective teachers;
- To ensure that electronic portfolios are used as the primary means of gathering data used in the evaluation of teacher performance;
- To use technology to show K-12 students that teaching is a good career option; and
- To set up an electronic clearinghouse that will give teachers and teacher educators throughout the country access to exemplary technology-assisted lesson plans and assessments.

Western Kentucky University believes that technology has the potential to make teaching and learning far more efficient than in the past. Technology not only gives people access to new information, it gives them more opportunities to work together. The e-train express will enable WKU to integrate technology in teacher preparation courses and use technology to spread the best practices that develop from them.

During the first year, e-train has focused on faculty development. Faculty development began when thirty faculty members, called technology advocates, attended a day long institute. The plan was to excite, educate and obtain a commitment from the advocates who came from teacher education and the arts and sciences. During the institute, the advocates learned about the NETS standards from one of the co-authors and explored examples of the integration of technology into instruction. After a long day of work each advocate was surprised when they received a PDA. Each PDA was labeled as belonging to an e-train technology advocate. This has had the intended effect of identifying them as a member of a 'special' group and increasing interest in faculty who are not yet involved. Finally, each advocate made a commitment to advocate the use of instructional technology, help their peers use technology in their instruction, model the use of instructional technology and participate in groups that investigate instructional uses of technologies. These groups focus on topics including:

- Personal Digital Assistants
- Web Design
- Presentation Software
- Digital Cameras
- Scanners
- Electronic Portfolios
- Web Quests
- Video Production
- Electronic Classrooms
- Online Classes
- Online surveys
- Ethical use of technology

The primary objectives relative to faculty professional development in technology centered on breaking the traditional mold of staff development characterized by one-shot, one-size-fits-all, trainer-driven presentations that lack follow-through. Studies show that most educators do not learn to use technology from taking courses, attending seminars or workshops, or through traditional professional development programs. Our training plan works on the premise that a team effort toward technology training can promote effective technology learning. The model of technology training we developed utilized the Project Director and the University Coordinator for the grant to act as coaches and facilitators, serving more to guide understanding than to follow pre-defined agendas. Instead, the people who attended the sessions defined the training agendas based on their needs and were active participants rather than passive listeners receiving knowledge from an "expert."

The training sessions were social in nature, yet very goal oriented. We limited the sessions to one hour and scheduled them frequently, either weekly or bi-weekly, with attendees deciding when the next session would occur. The sessions were inquiry-based as attendees set goals for the content of each session based on a "need to know" scenario. Trainees moved quickly from information synthesis, to application of the new technology skills as personal production tools, to integration of the new skills into coursework.

After the first six months, it was determined that the advocates were still excited about their roll and most had gained significant knowledge and enthusiasm. Individually or as a member of a group, all advocates have been asked to make a presentation at an e-train conference using instructional technology. The purpose of this activity is to transition the advocates from learners to mentors and/or teachers, to build their confidence and to recruit new advocates.

Panel members include the Project Director, the University Coordinator, a faculty member from the Arts and Sciences, a faculty member from Teacher Education, a 'new' faculty member and a 'seasoned' faculty member. These members will present their perspective on the activities described above from varied points of vies.

For more information about e-train express, please see www.etrainexpress.com.

With a Little Help from Your Students: A New Model for Faculty Development and Online Course Design

Punyashloke Mishra, Matthew J. Koehler, Kathryn Hershey, & Lisa Peruski
Michigan State University
punya@msu.edu, mkoehler@msu.edu, hersheyk@msu.edu, peruskil@msu.edu

Abstract: We describe an approach to faculty development that brings together senior education faculty and graduate students to design online learning environments. This approach forces course designers to confront beliefs about what constitutes good teaching, in conjunction with the roles of technology in effective pedagogy. Our experiences, supported by observation and interview data, show that faculty have explicitly considered pedagogical, technical, and practical aspects of course development; learned new technologies and their application to good education; considered the perspective of graduate students in ways they often do not in traditional courses; and to reconciled their views of education in traditional classrooms with what they would be doing online. Likewise, graduate student co-designers learned new technologies; gained insights into how faculty design courses; and considered how pedagogical ideals get translated into specific features of the course.

Introduction

In order to prepare university faculty to meet the demands of teaching and learning in an online environment, institutions of higher education must find ways to develop the expertise needed to teach in the online world, while meeting several very real constraints (e.g., limited faculty time, limited college budgets, fear of technology, etc.). Faculty members who are to teach these courses are key to the successful implementation of these online courses. However, faculty development is often a difficult task particularly when it comes to technology. Research in the area of faculty development indicates that attitudinal issues, such as how people perceive and react to technologies are far more important than structural and technical obstacles in influencing the use of technology in higher education (Dillon & Walsh, 1992; Clark 1993). As one of the faculty members who was to develop an online course said:

> "I don't know a lot about the technical stuff of the computer. I don't feel like I want to know that, or need to know that.... other people can do that. That's not what I want to do. I don't know how the telephone works either. Nor do I care."

Other obstacles include extensive investments of time for course preparation and development something most faculty find burdensome (Harris & DiPaolo, 1999; Loeding & Winn, 1999).

The standard approach to confronting these problems is to separate roles i.e. enlist the help of technical experts (e.g., web-programmers and designers) for the technical aspects of online course development, while leaving the development of course content to the faculty. The technology experts develop suites of tools, templates for course layouts, and then apply them to the content they receive from the instructors.

We see a variety of problems with this separation of roles approach. Most importantly faculty members do not have any ownership over the design of the course and the technology being used particularly if they are not intrinsically interested in learning technical stuff. This is in direct contrast with every day faculty experience with face-to-face courses where they have far greater ownership and control over the design of the course materials. In addition, the faculty members' lack of knowledge about the technology and its possibilities limit their ideas to those offered to them by the technology experts. Since form and function are intimately related, leaving these design decisions to technical experts can have a significant impact on pedagogy. Faculty members need to be the ones making these decisions rather than leave it to the technical experts, who may not have any background or expertise in instructional design and education. Ironically, the fact that faculty do not need to learn any technology is often touted as being the main value of this separation of roles approach.

Another consequence of this strategy is that it often leads to uniformity and an one-size-fits-all approach towards course development. In other words most online courses begin to look like clones of each other. Institutional practices get stabilized as producers present incoming faculty members with existing online course designs and since the faculty do not know better, they continue to replicate what they have been told "worked before." This, once again, is in sharp contrast to the immense diversity we see in regular face-to-face courses. Courses taught face-to-face often differ drastically from each other when taught by different faculty members and even when taught by the same faculty member at different times. Instructors bring their personality, their individuality to the course, its presentation and its execution. However, in online instruction, the individual faculty member is often missing from the presentation of the course, or at the best delegated to a corner of the web site (the corner that contains the mandatory instructor's picture and bio).

Finally, the separation of roles approach treats faculty development as being the last stage in the process, i.e., faculty use the technology only when they get to teach it. First time is real-time, and this denies faculty members an opportunity to reflect on the process of online instruction prior to teaching it.

Our Design-based Approach

There are many different strategies that have been used for faculty development in higher education. Menges (1994) lists the different approaches that have been found to be successful. These are (a) workshops and seminars; (b) individual consultation; (c) grants for instructional improvements; (c) resource materials, such as books and newsletters; and (d) colleagues helping colleagues. Rather than use any single of these approaches our strategy of learning by design, incorporates all of the above and more. The design approach attempts to avoid the problems we listed above by developing the technical and pedagogical skills needed by the faculty members within the context of designing the online course. Instead of handing web-programmers a set of materials that worked in the face-to-face classroom, we advocate that expert teachers take a hand in the design of the technology to support the learning. We rely on the process of design to develop the necessary skills and relationships for understanding the nuances of integrating technology and pedagogy. Our emphasis on design has been informed by long-standing research on the use of design for learning complex and interrelated ideas (Dewey, 1910; Perkins, 1989; Blumenfeld et. al. 1991; Harel & Papert; 1990; Kafai, 1996; Mishra, Zhao, & Tan, 1999; Vyas & Mishra, in press). Design-based activities not only provide a rich context for learning, they also lend themselves to sustained inquiry and revision that we hope will help designers to come away with the deep understanding needed to apply knowledge in the complex domains of real world practice (Mishra & Koehler, in press).

At Michigan State University, this design approach is represented in an educational technology Master's level course taught by the authors. In this course, master's students design technology to help solve a problem of educational practice. That is, participants learn education technology in the context of real world problems. To accomplish our goals for developing skills in faculty members responsible for the development of online courses, we extended the course in design to include faculty members. During the Spring 2001 offering of the course, six tenured faculty were enrolled as "students" in the design course. Teams consisting of one faculty member and three or four master's students worked on designing an online course that would be taught by the faculty member in the following year.

There were various motivations for faculty and student participation. The faculty received a laptop computer and $1000 for developing the course. Graduate students were attracted to the opportunity to work with faculty members on an authentic project, as well as to learn about educational technology, specifically as it applied to online learning and teaching. For us, the faculty members teaching this course it was an opportunity to build on our research agenda on learning through design. It allowed us to take our ideas about technology proficiency and what teachers need to know and actually apply it (Mishra & Koehler, in press; Mishra, Zhao & Tan, 1999). This was also an important service that we offered to our college and university.

The major activities of the course consisted of readings, explorations with technology, prototyping of the online course, online and in-class discussions, and peer review and feedback. A typical class period had a whole class component that was used to discuss readings and issues that applied to all groups, and a working group component in which the design teams worked on their projects.

Data Sources

For this study we collected a range of data. We interviewed the faculty members about their experience. The average length of the interviews was around one hour. We also collected the final papers written by the students. In this paper students were asked to describe their learning and experience in this course. We also conducted a student email survey (after the grades were handed out). We combined this with our observations in class, postings made by faculty and students to the discussion groups as well as the artifacts created by the groups during the design process.

Outcomes for Faculty Members

Each of the six groups successfully designed an online course. Five of the courses have already been taught, and one will be taught during the Spring 2002 semester. More importantly, we believe that faculty members have learned a lot about designing online courses that they would not have using the traditional approach. First, faculty took control of over design decisions about when, why, and how to use technology. No longer were decisions about technology made by programmers who did not realized the pedagogical impact of those decisions. Also, faculty development happened *before* they taught the course – instructors thought about and used the technology before the class went live. Finally, the faculty learned about technology and developed skills that they would not have had they simply left the details to the technology experts.

Through an analysis of the interviews conducted after the course was over, postings to the online threaded discussion, statements in the class, and the courses developed by the design teams, we found that the faculty developed in a number of ways. First, because faculty had to talk out loud to their design team, faculty had to explicitly confront pedagogical issues in ways they have not had to in traditional courses.

> "One of the most challenging and confrontive (sic) groups I ever worked with and that's been very healthy and refreshing. I've confronted them about the way I want to do things and they've confronted me like 'you can't do it that way,' or 'it doesn't make sense to do it that way,' so that's been very refreshing. It hasn't been personal at all, ... not challenging in a negative way but it's been stimulating the group process"

Designing courses for a face-to-face environment was something that all faculty members had a lot of experience with. However, like most experts, firmly established work activities were characterized by automatic routines and tacit knowledge and practices. However, the introduction of a new context for course design, where the rules of face to face teaching do not necessarily apply, presented new challenges to established practices. It required the development of new procedures, new tools, and new artifacts to represent and teach content in new contexts. The faculty participants quickly realized this and sought new forms of support and collaboration required to support their solutions to these new problems. For example, a major concern of all faculty members was how to engage students with the text online. Faculty used their student group members to test out their ideas and make revisions as needed. One faculty noted:

> "I was shocked because I had given everybody a sample chapter. I boxed it, bolded it, the things that I wanted to be salient. They still didn't see it. So that told me it was only when we sat face to face and I said okay, here is a little pretest I'm thinking about, answer that one question and they couldn't. And they didn't even know they'd read it and they didn't even know where it was. That was a very poignant test for me, it said, we have to think much more carefully about how we're going to signal the students relative to what is really salient here."

However, the struggle was not without merit – the instructors were able, through their experiences in the class, to successfully reconcile these differences between their past teaching experiences and the challenges posed by the new online environments.

Faculty also developed a broader understanding of technology. Teaching online courses requires a level of familiarity and comfort with technology that many faculty members lacked. Although faculty members were the "content experts" they typically were not the technology experts. Consequently, developing an online course required collaboration with individuals who are experts in technology (the course instructors and knowledgeable graduate students). Accordingly they not only became more knowledgeable about various technologies, their understanding of technology became realistic, and was more likely to inform the relationship between technical decisions and the impact on pedagogy. For example, one faculty member mentioned how the class discussions increased her knowledge of what is possible with technology: "I think there were applications I hadn't seen before. I'd seen streaming video but I'd seen how it could be linked... used in a course so I kinda thought about them concretely for the first time. We spent some time almost every week talking about something technical and those were very interesting to me."

Finally, the faculty members benefited from their interaction with the graduate students. The graduate students proved to be a valuable source of ideas. For example, one faculty member found:

> "I think It's... going to be simpler and clearer (for students) than I thought at the beginning and one thing that a couple [of] people (in my group) recommended to me is for those discussions, don't leave them open ended. Connect them to a text chapter and have some very

> focused items or, or questions or focus points for each web talk conversation.... In the past I would have tended to be more loose and students kind of pick up indirectly and maybe that's been one of the things that hasn't worked real well for me so that's an example of being very explicit in terms of today, based on this content, we're having this discussion."

Furthermore, by bringing to bear their own experiences as students, and by imaging themselves in the online class they were developing, the graduate students were able to give faculty members feedback about the likely effect the design would have on prospective students. For example, all faculty members commented on the value of the collaborative process of course design with students. One noted, "I think that was one of the most interesting things is that what was actually produced was largely their (students) work. I mean, they, they actually did the design, the graphics and all that stuff was all their work."

Outcomes for Graduate Students

In many ways, this design course was a typical graduate class experience for the students – they read articles, discussed ideas, and were responsible for meeting course deadlines. However, there were some important differences. Like faculty members, students learned a lot about technology – they were exposed to several technologies, they assessed their usefulness, and potentially used them in the design of the online class. In more traditional technology courses, students explicitly learn target technologies as part of the course (e.g. web design, digital video, etc). In contrast, the design approach made learning about technology implicit – students learned about technologies as they needed to in order to fulfill some desired feature of the course they were designing. However despite this "implicit approach" students were exposed to a range of different technologies and managed to focus their attention on particular technologies that were most appropriate for the task at hand. For instance, one student wrote, "This course was a wonderful experience for me, and I gained a lot of new knowledge and information that I found very useful for. The best thing that I learned from this course was about FTP and Digitizing Videos."

The task of designing an online course was a unique opportunity for most students. Most of their experience in graduate education has been as students in graduate courses. For those who had some experience teaching a graduate course, their experience was mainly limited to being a teaching assistant, or enacting someone else's ideas. None of the students had previously had the opportunity to design a graduate course from scratch. Opening up the process of graduate teaching for students gave them the chance to apply their knowledge of educational theory to a real context, and to further their own development as future lecturers, instructors, and professors. As one student said, "This class has been one that I will never forget. From how much work building, maintaining, and revising an on line course is to learning how to work in a group again, this experience has been one that has reshaped many things that I have held to or thought about teaching."

Also, the chance to work with tenured faculty provided novel experiences for most of the students. Too often, graduate students' experiences with their professors seem opaque – they only get to see final products of their thought processes (e.g., research papers, courses they take, etc.). By working with expert educators, they got to interact with ideas in ways that they are seldom allowed – they worked over a whole semester with these ideas, got to influence the experts' ideas, and apply them to a real problem. As one student said, "Working with a faculty member, as a team to create an online class had been a wonderful experience to me especially in thinking about a particular course structure, it's syllabus, schedule, grading systems, forms, the layout of the web, video presentation about the course." Another said, "It was fascinating to see how the faculty thought about curricular design, teaching strategies, and student learning. As I was concurrently enrolled in HALE (Higher, Adult, and Lifelong Education) core course focused on teaching, learning, and curriculum, I learned a tremendous amount through listening to the faculty discuss their ideas and concerns." Most students reported that this course was one of the best courses they had ever had in their graduate program. Working on an authentic design problem, within a group led by a faculty member made the experience a unique one—one very different from most courses the students had been in before.

Conclusion

The design approach to faculty development has proved to be a fruitful lens for considering the many avenues of professional growth required to enter the world of online teaching and learning. Instead of turning over the development of their courses to web-programmers, the designers of these courses experienced something quite different. They worked together to design the courses themselves. Along the way, they not only learned new technology skills, they also thoughtfully considered how the technology could be leveraged to accomplish higher-order learning goals for their potential students.

Did faculty develop? Consider the following quote we had offered at the beginning of the paper.

> "I don't know a lot about the technical stuff of the computer. I don't feel like I want to know that, or need to know that.... other people can do that. That's not what I want to do. I don't know how the telephone works either. Nor do I care."

And a quote from a web programmer helping the same faculty member as she implemented the course having gone through the course:

> [She] has been changing with that stuff all semester and it's great, it's been nice to watch when she first started she just changed text, now she puts in links, she adds papers up to the server and then links to them, she changes different html things. One of the things that she does is she records her weekly feedback to the students and then converts that to a real audio and puts it on the server. She doesn't have to bother about sending it to me and then worrying whether I did it right or not and she can also do it while she's on vacation or what ever.

Clearly, this faculty member had changed her stance about her own learning about technology and indicates what is possible in the design approach. As the same faculty member summarized her experience with this course "My goal was to really give myself, force myself the luxury of thinking critically about teaching in, in this format and in any other format. That was really a luxury of the course and that's what I wanted and that's what I got. I made that happen for myself."

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"Surviving" Web-based Professional Development (or, How Not to Get Kicked off the Island): Lessons Learned from the Inquiry Learning Forum

Julie Moore, Indiana University, US

Background

Organizations and institutions are increasingly offering online professional development opportunities to educators [Mather, 2000 #56]. This is especially true for teachers who must keep up with new teaching strategies, the latest professional standards, and constantly changing technologies. Coincidentally, new technologies promise to facilitate access to learning at times and places chosen by the learner. These web-based environments have the potential to transform teacher professional development through the use of new models of teaching and learning. They also have the potential to facilitate a culture of sharing, collaboration, mentoring, and support for K-12 teachers.

In the design of these web-based environments, there are not only technical challenges but, perhaps more importantly social and cultural challenges and norms which must be addressed in order for these new models to succeed. While initial attraction and interest may be high, establishing long-term, high-quality learning opportunities is a much more difficult goal to reach.

The Inquiry Learning Forum

The Inquiry Learning Forum (ILF) is a NSF funded research and development project that seeks to support a community of K-12 math and science teachers interested in inquiry-based teaching. The original research aspect of the project seeks to understand how to build and sustain an online community of practice. From a service perspective, we are trying to support teachers, pre-service teachers, administrators, and teacher educators come together in a resource and context rich web-based environment to explore, challenge, and expand their notions of inquiry-based teaching.

This paper and presentation will focus on the first two and a half years of the Inquiry Learning Forum project. Specifically, this presentation will address key design features based on a community of practice model, challenges consequent from both our original conception of the project and it's design, and how the project and the design of the website has evolved to meet these challenges.

The concept of "community of practice" has come out of sociology literature [Lave, 1991 #43], [Wenger, 1998 #40]. Barab, MaKinster, and Scheckler [Barab, in press #46]. define community of Practice as "a persistent, sustained social network of individuals who share and develop an overlapping knowledge base, set of beliefs, values, history and experiences focused on a common practice and/or mutual enterprise." The ILF was originally conceptualized as an attempt to create such a community through an online environment. When we approached teachers and asked them what they would most like to do for their own professional development, the answer we received overwhelmingly "I'd like to go see how that person teaches." With that in mind, attention focused on creating online "classrooms" - video-based examples of actual inquiry-based lessons that acted as anchors to discussions, teacher reflections, resources, connections to standards, lesson plans, and student work. The original thinking was that these resource-rich videos provided teachers with a mechanism for sharing their history and experiences, would provide a common practice upon which to discuss and challenge each others notions' about inquiry-based teaching and learning. The site launched in March of 2000 and seemed to be well received whenever shown or demonstrated.

The Journey

As time went by, however, the ILF project team realized that the type of interactions that were occurring were very superficial and not very sustaining. Groups using the system for workshops would be excited to use it, but not return and continue in any long-term conversations. Additionally, teachers who were featured in the videotaped classrooms were disappointed with the lack of critical dialogue around their classes that they had hoped would provide them ideas and avenues for improvement.

So why wasn't this working? As we examined the project at the end of year one we began to reach several conclusions. In many ways, we realized that we were battling more than the normal diffusion issues. We were battling long-held cultural conditions, a realization that the building of community requires more scaffolding than we originally wanted to give, and the inability for the project in it's current form to reach the person to person aspect that was needed.

First, while we sought to meet teachers needs by providing the type professional development they said they wanted, we were still fighting an uphill battle with regard to the culture of schools. To fully engage in a discussion around a classroom required a large chunk of time -- time their day didn't allow for. Also, while the web offers the promise of "anytime, anywhere" the reality of a teacher's day and the continuing lack of pervasive technology in teacher's classrooms makes this promise an illusion. Another cultural issue had to do with the way in which teachers traditionally interact with one another. Teachers traditionally work in extremely isolated situations, rarely get to see other teachers teach, and hardly ever engage in critical dialogue about one another's teaching. If they don't do this in their current situations, it was perhaps naive of us to expect them to do it in an online environment, where their words were captured for all to see -- forever!

Second, in our exuberance to have "community" evolve and blossom, we designed a space without much scaffolding for engaging in the space or in the dialogue. Discussions were distributed throughout multiple classrooms and general discussion areas. In our hopes for the notion of "inquiry" to bubble up out of the community, members were left to wonder, "what is inquiry, anyway?" Additionally, we did not provide any real mechanism for structuring people's experience with the ILF. They came to the website and were left to their own devices as to where to go and what to do. An aspect of the project that was overwhelming for many. Lastly, many users felt that the only way they could really contribute to the community was to contribute a video lesson - a daunting task for almost all. We did not have any low-cost ways of engaging in and contributing to the community.

Third, while we designed well for usability, we did little to design "sociability" into the ILF. It was difficult for people to "find" others with common interests. In our concern in protecting anonymity, we dehumanized many aspects of the site. In our attempt to build an online community, we failed to realize the importance of face-to-face, human interaction.

Changing our Course

We have attempted to meet all of these obstacles in a variety of ways. First, we have shifted our focus from "building online community" to "supporting community online." As such, we have developed group work spaces that allow pre-established, school-based, subject-based, or course-based groups to work together, build and share documents, and have their own private discussions. To address the issue of scaffolding, we have developed printable "guides" for the ILF as well as activities that utilize the features of the ILF to help teachers answer their own questions about inquiry-based learning. We have refocused the project and, quite literally, the site on inquiry-based teaching, putting our own stake in the sand as to what inquiry-based teaching is and how it can benefit students. We have tried to make entry into the community more accessible by providing lower cost ways of contributing and gaining from participation. The library, formerly a list of relevant links, is now a place where teachers can contribute and download lesson plans, the currency of the classroom. To reduce the overwhelming nature of the project, we have created a personal portal where members can store bookmarks to their favorite classrooms, lesson plans, discussion groups, and group spaces. To help encourage connections, we have developed personal profiles that are accessible from discussion forums, a members' list, and contributed resources. Members can now see, send email to, and leave guestbook comments to other members with common interests. Lastly, we have developed a model for bringing groups together to support one another in their common interests that focuses on both face-to-face meetings as well as online support.

Conclusion

While we can't say with complete assurance that we have "survived" the world of online professional development, we have certainly learned, and continue to learn a great deal. Breaking the mold with new professional development models is a very enticing challenge, but one that must be taken only with the proper respect for current culture and constraints.

Technology Committee Function: Holly Jolly Technology Folly

Betty Nelson, University Of Alabama At Birmingham, US
Lois Christensen, University Of Alabama At Birmingham, US
Jiang Lan, University Of Alabama At Birmingham, US
Karen Dahle, Unversity Of Alabama At Birmingham, US

This session will be an interactive session in which panel presenters will discuss their functions on a technology committee and present the ways that they incite technology infusion and training with university faculty. Digital photos of two technology extravaganzas and the varied technological themes involved in both events will be featured in a PowerPoint presentation and accompanied by a description outlining committee endeavors. Conferees will interact and share some of the ways in which they enthusiastically provide technological professional development for university teacher education faculty.

A Collaborative Faculty Technology Development Initiative

Dept. of Language Reading and Exceptionalities

Bill Barber, barberwd@appstate.edu

Nancy Mamlin, mamlinnl@appstate.edu

Gary Moorman, moormangb@appstate.edu

Connie Ulmer, ulmercj@appstate.edu

Dept. of Curriculum and Instruction

Cheryl Knight, knightcs@appstate.edu

Pat McCarthy, mccarthypr@appstate.edu

Linda Pacifici, pacificilc@appstate.edu

Sara Zimmerman, zimmermnsj@appstate.edu

Dept. of Leadership and Educational Studies

Richard Riedl, riedlre@appstate.edu

John Tashner, tashnerhjh@appstate.edu

Instructional Technology Support

John Spagnolo
spagnolojt@appstate.edu

Appalachian State University
United States

Abstract: The Technology Advisory Committee and the Faculty Development Committee of the college of education at Appalachian State University began a Faculty Technology Development initiative that involved faculty from across departments. This initiative had the following goals: (a) to have ongoing, sustained conversations on identified instructional technology issues within the college; (b) to create, promote and share a faculty vision on the role of technology in teaching and learning; (c) to collaboratively inquire into continuous improvement and sharing of what faculty were doing with instructional technology; and (d) to promote and share models of effective technology enhanced teaching and research. Funding for this effort is provided by the Appalachian Rural Teacher Technology Alliance, a PT3 grant from the U.S. Department of Education. This paper will include a discussion of the processes used by the Faculty Technology Development group to promote and support educating college of education faculty in appropriate technology integration into curriculum and will share lessons learned as well as the products produced to date.

Introduction

Recent national reports and research (CEO Forum Report, 2000; Uttendorfer, 2001; Carbonaro, Snart & Goodale, 2001) note that while computer technology is in place in higher education settings, the integration of technology into teaching lags behind. In K-12 teacher training programs, state boards of education have adopted technology standards for their teachers. North Carolina's State Board of Education

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(http://www.ncpublicschools.org/tap/techcomp.htm) mandated a set of basic and advanced technology competencies for pre-service and experienced teachers. As a result, faculties of education need to develop and strengthen their technology skills in order to model and facilitate these skills for pre-service teachers. Much research has been presented on the use of technologies in post-secondary learning environments in an effort to bridge the gap between available technologies and the integration of those strategies (Bohannon, 2001; Glennan & Melmed, 2000). Yet, little research exists on formative ways of training faculty to use this technology appropriately (Dutt-Doner, Larson, & Broyles, 2001). The focus of this paper is to present the work and lessons learned from a college of education Faculty Technology Development initiative.

This initiative began with six faculty members from across departments within the college of education in the fall of 2000, selected by the College's Technology Advisory Council and the Faculty Professional Development committee. The group, the first of the Faculty Technology Development (FTD), had the following goals: (a) to have ongoing, sustained conversations on identified instructional technology issues within the college; (b) to create, promote and share a faculty vision on the role of technology in teaching and learning; (c) to collaboratively inquire into continuous improvement and sharing of what faculty were doing with instructional technology; and (d) to promote and share models of effective technology enhanced teaching and research.

Activities and Products

The faculty team initially used attendance at a national professional conference as a catalyst for meeting the FTD goals. The team met to select a conference to attend as a group, and to assess the current state of affairs within the college on instructional technology issues. Points, concerns and issues raised during these initial meetings became woven throughout the pre, during, and post-conference meetings. Pre-conference meetings included identifying key questions to be researched during the selected conference, establishing team and individual roles and goals, setting an overall team agenda for the conference, establishing travel arrangements, setting meeting times during the conference, and brainstorming post-conference dissemination activities to be implemented within the college. The team met during the conference to share experiences from different sessions attended, review goals and revise plans for future sessions, and raise new questions. Participant meetings during the conference were designed to connect the conference experiences to the college's instructional technology issues. During post-conference sessions, the participating faculty discussed lessons learned, determined and planned additional dissemination activities, and planned for the next team.

Principles Guiding the Implementation of Instructional Technology (below) written by the participants on the first team has become an initial working document for the group as well as a statement for the college.

1. Above all we value effective teaching. We believe that technology can enhance effective teaching. Technology is fulfilling when it helps make us more effective teachers.
2. The learning curve and dynamic environment of technology don't alienate or separate technology from teaching and learning or curriculum & instruction. All principles of pedagogy and learning apply to technology-based instruction as well.
3. The rate of change in the information age is immediate and the impact is dramatic. Long-term plans must be flexible. We must stay focused on our learning goals so that we don't lose our way when new technology becomes available.
4. We believe that computer/telecommunications technology can improve the culture of the college. We must emphasize the importance of computer networks and what they offer. Interdependency via computers increases the importance of viewing ourselves as a learning community. Social-constructivist theory supports the use of technology to increase the levels of collaboration and innovation in our teaching. Computer networks are extensions of human networks. We must strive to include all our colleagues as well as our students in technological innovation.
5. We need to keep a clear understanding of the role of technology in activity construction; we also need a better understanding of when ***not*** to use technology in our instruction (Just because we can do something with a computer, doesn't mean that we should. We must ask ourselves why we are using the technologies we are and how it will benefit our students.).

Often, we will need to resist technological innovation that is imposed from the outside (distance learning, for example) when the pedagogy may be compromised. Conversely, we must not blame the technology for bad pedagogy.

6. Integrating technological tools in instruction is tricky business. We must learn how to separate out real improvement in learning from temporary or illusionary learning. Instruction utilizing technology may make an activity fun, but may not actually accomplish learning goals. Technology innovation in instruction should take the following into account:

   The student may find the activity to *be fun* – but is learning taking place?

   The students may enjoy the *novelty and excitement* of the activity – but is it just because it's something new or are students really learning something?

   The students may be *engaged* in the activity – but is the engagement because of learning or because of the excitement of the technology tool?

7. There are dual objectives in selecting technology tools in our teacher education programs:

   a. Using technology to enhance concept and content acquisition in the teacher education curriculum.
   b. Helping students learn and acquire skills in the use of technology as an effective part of the teaching act or other professional role for which they are preparing.

In addition, a second document, *Actions needed to Sustain the Growth of the Effective Use of Technology* (below) has been used to assist the planning process for creating new forms of learning environments.

1. Faculty members in Reich College of Education are already doing great things with technology. We must develop an awareness of the quality, types and levels of technology in instruction. We must be more conscious about the way we collaborate.
2. We should conduct research on our practice. We must think of new ways to capture what we are doing. Case studies, ethnographies, experimental design studies, and other research techniques can be applied. The current literature on researching technological innovation supports creative multiple approaches. We cannot know our deficits if we don't know what we have.
3. We must acknowledge that we learn through our interactions with all people. While there are mismatches between people and developmental differences to take into account, it is crucial to recognize the worth and potential contributions of all of our colleagues.
4. We need to seek ways to sustain research, conversations, sharing, and explorations related to the use of technology in learning settings. How we reward effective work with technology and encourage the continued effort to explore and share the results of using technology will be critical to our efforts to prepare our graduates for the roles they will take on after completing our programs.

The first team of the FTD returned from their first conference experience and invited new members to participate in team activities. The new members joined some members from the first team to attend a second conference. This second team began by discussing the two documents above before attending a conference and then, at the conference, used their experience to expand upon the discussions and actions initiated at the first conference. Thus, the faculty team currently consists of new as well as previous faculty members.

A key recommendation of the team attending the second conference was to hold a retreat for the entire FTD group. This activity was held before the beginning of the fall 2001 semester. From the retreat several key activities emerged. Colloquia have been held to provide faculty opportunities to share their uses of technology with each other. Plans are being made to provide faculty with opportunities to visit K-12 schools in which technology is being used effectively. And plans to develop resources to support case studies of technology use in the college are being formed.

The FTD will be expanded further this year with additional participants who will attend other professional technology/education conferences this spring to continue the foundational work started previously.

Lessons Learned

Retreats and conferences allowed faculty members to take time to learn about and discuss current issues and goals for this project. Out of this planned discourse came the realization that collegiality is an important factor for participation in this initiative. This coupled well with the concept of social constructivism that is the focus of our conceptual framework within the college.

The first team to participate in this effort quickly realized that a number of faculty members within the college of education were currently implementing state of the art technology in their teaching. After arriving home from the first conference, plans were discussed about how to more effectively share methods of instructional technology between colleagues.

Forming teams to participate in this project created a sense of ownership. From this sense came renewed feelings of belonging and commitments to attendance and further contributions toward common goals. Leadership also emerged in the form of school-based issues, policies, and politics on the use of effective technology in public schools.

Conclusions and Future Directions

Clearly, educating the professorate to understand the issues, tools, processes and products needed for a technology-based society is difficult at best. Transforming the faculty in our colleges of education who prepare our future teachers has proven just as challenging. This project has explored a model of professional development designed to provide faculty of a college of education strategies for investigating various technology-based learning environments. Experiences to date in developing and implementing this model support several conclusions:

1. Cross-discipline teams of faculties of education are very interested in learning about appropriate technology integration strategies for their programs.
2. Creating a college-wide vision of teaching and learning in technology-based learning environments is paramount in order to guide our future efforts.
3. Engaging faculty teams in asking appropriate questions concerning new technology-based learning environments is critical.
4. Opportunities to measure specific progress in our own college against that demonstrated within the national community are very useful in furthering faculty dialogue.
5. Planning specific small and large group pre- and post- activities is a necessary to insure continuity of purpose and dialogue.

As we continue to explore the implementation of this model, several future trends and directions are discernable within the faculty-teams.

1. Identifying and visiting exemplary technology-based instructional sites will serve as models for further discussions.
2. Collaborative cross-discipline research projects will be designed and implemented.
3. Additional faculty within the college will continue to be invited to participate in this program.

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Technology Integration in Teacher Education: Changing the Way Learners Think About and Do Their Work

Jacqueline Peck
Mary Tipton
Kent State University

The Linking the Future to the Present PT3 grant at Kent State University is now in it's third year of implementation. With a keen, questioning eye on our progress and insightful feedback from our evaluators, we are learning a lot about technology integration in our teacher education program. With this insight, we might simply say that in Year I we learned what didn't work, in Year II we learned what did, and now in year III we're learning why.

Linking the Future to the Present supports faculty development of technology integration models by providing student assistants, consultants, materials and supplies, field visits to technology-rich learning sites, and stipends only in restricted instances; university conditions prevent our support through release time, which is the most frequently requested faculty incentive at our institution. During Year I, our incentives were apparently not attractive enough to generate the degree of faculty participation we originally expected. Also during Year I, faculty participation was limited to a triad, structure, involving education faculty collaboration with liberal arts and sciences faculty; the idea of collaboration was not a barrier, but timing of courses and workload was. PK-12 collaborations were already in place for faculty in education *and* arts and sciences so that was never a challenge.

In Year II we expanded faculty opportunities to include individual and program-level projects. This successfully increased faculty participation so that by the middle of Year II we were on track with originally targeted numbers. We also found faculty could now better articulate how their technology integration was changing their students' learning, and more importantly, their own. Concurrently, the evaluation feedback helped the project implementation team consciously recognize and attend to the role informal networks were playing in our complex process of innovation. Now that we have begun Year III, we are intentionally exploring, nurturing, and examining these networks; we believe a new model of faculty development is emerging. We too are changing the way we think about and do our work!

To effectively Link the Future to the Present, we situate our technology integration in the context of highly intellectual and compelling inquiry work for learners. We have chosen the research of Newmann, Secada, and Wehlage (1995, also www.consortium-chicago.org/acrobat/Intellectual%20Report.pdf) to frame this type of work for learners.

In this paper, we invite you to visit our virtual gallery of faculty technology integration models, listen to their commentary on how this integration is changing their own and their student's thinking and learning, and hear our preservice teachers' firsthand comments about the same.

The gallery includes work such as explorations of digital photography and language development in early childhood, critical examination of new literacies in middle childhood language arts, sophisticated imaging techniques in middle childhood biological sciences, case study in WebQuest format in early childhood intervention, authentic application of mathematical processes through inquiry into Rock and Roll Hall of Fame data, and examination of urban sprawl using real data in geography. These projects involve education faculty, liberal arts and sciences faculty, student assistants, and consortium partners.

Coaching Faculty for Technology Integration

Denise M. Peterson
College of Education and Counseling
South Dakota State University
United States
Denise_Peterson@sdstate.edu

Abstract: This paper examines various staff development strategies used to integrate technology. This university received part of the statewide technology challenge grant referred to as LOFTI. Using this grant, both technology integration and change has been addressed through strategies such as intensive training sessions and coaching. This paper focuses on the bridge from intensive group training to a coaching mentality for technology staff development. The paper will also examine the potential effectiveness of coaching as a strategy.

Introduction

Faculty development is an important step in technology integration in higher education. Trying to keep faculty members updated in new technology developments and encouraging them to use technology in their teaching is a never-ending job. While staff development opportunities abound, there hasn't been an effort to make the opportunities relevant to individual faculty members. Thus, it may now be time to move into a "coaching" relationship with faculty members to encourage them to stretch their technology integration ideas.

Because South Dakota is currently in year four of a technology challenge grant, development opportunities have been numerous. The grant called Learning Organizations for Technology Integration (LOFTI) focuses on using technology as a change agent for the educational systems in the state through increased skills, knowledge and technology integration (Parry et al., 1997). As a representative of a local LOFTI group, the challenge has been to provide opportunities to faculty members without spreading myself and our other technology staff too thin as a resource. This session focuses on the opportunities provided and the realization that coaching may be an effective strategy for continuing the learning of university faculty members.

Past Faculty Development Opportunities

LOFTI has provided the funding for the College of Education and Counseling faculty members to learn about technology and determine how best they could integrate it into their curriculum. The goal of LOFTI for higher education has been to improve preservice curriculum to provide "in-depth, contextual learning opportunities for integration of content, pedagogy, and educational technology which incorporate engaged learner and process portfolio strategies" (Parry et al., 1997, p. 15). In order to do meet this goal of the grant, faculty members needed tot model technology use in their teaching. Locally, it meant that faculty members needed to learn how to integrating technology effectively. The issues came with time and know-how amongst faculty.

In order to get faculty members to feel comfortable, a needs assessment was conducted the first year of the grant. In this assessment, faculty members indicated that they needed skills in everything from file management to web page design. In accordance with the expressed need, a weeklong intensive faculty development academy was designed providing opportunities to learn various programs applications and to grow comfortable with the computers in their building. This academy went a long way toward meeting the needs of faculty members who had little or no expertise in a variety of programs.

The second year was spent on reviewing some of the skills and taking more time with the integration tools available to our faculty members. Sessions during this weeklong intensive faculty training centered on distance learning using both interactive videoconferencing and internet, courseware products, and brainstorming opportunities for integration of these tools. This session went well and built a community of faculty members committed to at least trying to integrate new technology. As the school year progressed, however, time and technology failures discouraged some of these faculty members.

The third year has been spent building a community atmosphere rather than focus on the various technology skills. Individual faculty members were granted monies to develop curriculum for interactive video conferencing delivery and technology integration within courses. However, this was a loyal core developing the materials so another avenue had to be tried.

Potential for Faculty Coaching

As the third year progressed, the LOFTI coordinator had the opportunity to work with an individual faculty member to enhance her technology skills. Using some coaching strategies, the coordinator noticed a real gain in that individual's abilities and confidence level. The stretch came from incorporating technology in a meaningful way not skill building for skills sake – this was an important discovery to the coordinator.

At about the same time, the coordinator began conducting coaching training sessions for business in the community as an independent project from the grant. Through the training sessions developed, the coordinator realized that coaching could be one strategy that may possibly be effective in working with faculty members. The concepts in coaching that would be useful include gathering information about the needs of individual faculty using surveys, and informal conversations. A second concept in coaching that is useful is dialogue with individual faculty members to determine what type of technology skills and integration projects can be useful to the department and the students they teach (Vella, 1997). Goal setting than could occur on an individual basis as faculty and their coach could set up some projects that move them to the goal of technology integrated curriculum. In this stage, the coach can help the faculty member to think and act differently as technology integration can require some redesigning of teaching practices. The last step is in following up with the coachee to assist them in reaching their goals by providing resources and helping them around barriers (Hargrove, 1995).

Realizing that this might become a possible model for faculty development, the coordinator has started formulating a plan to try using a coaching approach as faculty indicate a difference in needs. The plan consists of holding conversations with faculty to find out what they truly want in terms of technology integration and their curriculum.

Conclusion

The ultimate goal is to create opportunities for various faculty members to coach others that have the need for someone to help them stretch their technology goals. This can be completed through teaching other faculty coaching skills as well as encouraging continued growth in technology integration skills. The fourth and fifth years of the local LOFTI grant will be dedicated to this philosophy of staff development.

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GRANT WRITING INFORMATION AND THE INTERNET: EFFICACY OF STATE EDUCATION WEB PAGES

Susan Peterson, Ph.D., Associate Professor

Secondary Education and Foundations of Education Department

Slippery Rock University

Susan.Peterson@sru.edu

Slippery Rock, PA 16057

Abstract: The Internet can provide a valuable resource for teachers and others seeking information about grants and funding resources. Ideally, state department of education homepages should provide information to assist teachers and administrators who are interested in writing grants and finding education funding sources. This paper offers several state education homepages that provide easy-to-locate information on grant writing or unique features for those seeking information about grants. Chief state school officers should assist in making such valuable information easily accessible.

State education agency web sites are important tools for disseminating relevant information to educators and to the public residing within their respective states. A review of department homepages reveals many similarities. Generally, they contain some form of welcome or introduction from the chief state school officer, information about offices within the department, special initiatives or reforms; links for students, parents and administrators; recent news releases; and special links for those seeking employment or desiring information on state certification. Many sites use pull-down menus to help classify sub-categories of information, and most, but not all, have site search capabilities to help users locate specific topics or information that may be difficult to classify or otherwise uncover intuitively.

Ideally, state education web pages can, and indeed should, be powerful resources for educators and others interested in finding relevant information about education grants. In addition to providing information about public in-state grants, such sites should offer links to private and federal grants and offer tips and resources on the grant writing process specially designed for teachers who are novice grant writers. Grant information should be well maintained and up-to-date. Links should be available to such sites as the Foundation Center (www.foundationcenter.org) and the U.S. Department of Education at www.ed.gov ("Grants and Contracts").

Problems with locating state education grant information fall into several categories:

1) Grant information is easily located but is outdated *(Once Upon a Time)*
2) Information is found within various offices (*Find Me If You Can*)
3) No information exists (*The Nil Factor*)

All fifty state education departments and state jurisdictions now have active web pages; however, there is little consistency on the type and amount of grant information found within the sites. If the topic of "grants" does not have its own button on the homepage, under what category should information about this topic be placed? Unfortunately, information about grants is generally not easy to locate on most state education sites and is often buried under such headings as *Programs and Services*, *Initiatives*, or *For Educators*. Site search availability also varies considerably.

All state education department/agency sites are readily available at the Council of Chief State School Officers (CCSSO) site via a point and click map (www.CCSSO.org); however, few sites contain information that is easy to locate, up-to-date, and useful to both the novice and experienced grant writer. A review of state education homepages reveals some state sites that could serve as models for those wanting to provide grant information that effectively reaches its intended audience. Examples of sites with useful information include:

Texas

The Texas Education Agency (TEA) homepage has a link to "Available Grants and Contracts" that is listed under the School Finance and Grants heading. Grants are accessed using a drop-down box on a page administered through the TEA Division of Grants Administration. The downloadable documents may be completed on the computer, another valuable tool. In addition to the grants and contracts, there are a number of other useful links: "A Grantseeker's Resource Guide to Obtaining Federal, Corporate, and Foundation Grants," "The Grantee Handbook" (a procedures manual for TEA grant recipients), "TEA Grant Process," "Information Links" (federal and state links, including the Texas Register) and other TEA Grant Programs. The Resource Guide has a separate chapter on foundations, including information on starting a school foundation that would enable a public school to seek funding through a nonprofit foundation. Another positive aspect to this site is the "Join the Grant Announcements" listserv. Subscribers to this free service receive automatic notification of newly available grants and contracts. This means Texas educators who sign up for this service are getting notification of grant announcements delivered to their mailboxes regularly!

Pennsylvania

Unique to the Pennsylvania Department of Education grants page is the Peer Review Team Nomination Form, asking for parent, community member and educator volunteers to serve on grant review panels.

New Jersey

The New Jersey Department of Education Office of Grants Management and Development maintains an up-to-date web page with several unique elements. The site offers links to approximately 100 foundation-sponsored grants, which in turn provide direct links to detailed information about proposal submission for each foundation. In addition, there is a link to current federal discretionary grants. A unique element on the New Jersey site is an online survey for educators, asking for feedback on usefulness of information on the site.

Alaska

Listed under the obvious heading of *Forms and Grants*, the Alaska Department of Education provides a link to over forty topics of interest to teachers and administrators. Those using the site are encouraged to download the forms and fill out and return the forms electronically. Grants and special recognition programs are available from this site.

Summary: The Council of Chief State School Officers is a nationwide, nonprofit organization composed of the public officials who head departments of elementary and secondary education in the states and other jurisdictions. In 2000, the CCSSO announced six objectives, among which was to strengthen leadership at the district and school levels within each state. State school officers must realize that one way to strengthen leadership is to provide adequate and up-to-date resources using the Internet. States interested in encouraging a pro-active approach to grant writing should review and revamp their sites to make them user friendly to those interested in launching activities through grant writing. Billions of dollars in grants are available annually from thousands of funding agencies, but only a few select sites actually assist educators in uncovering information about them.

The Barat Program for Learning With Technology: Real Teachers, Real Students, Real Learning

Bernard Ricca, Barat College of DePaul University, US
Beth Gudbrandsen, Barat College of DePaul University, US
Leo Wells, Barat College of DePaul University, US

Despite the investment of time and money, it is not true that technology has reached its fullest potential as a tool for learning. To fulfill the promise of technology as a learning partner, three crucial issues must be addressed:

1. Teachers must be adequately prepared to use technology to assist student learning. This preparation includes appropriate content knowledge, understanding of and comfort with technology, and insight into student cognition.
2. Classrooms must be adequately supported. This support includes not only monetary support, but also support by knowledgeable people to assist teachers as they design, deliver, and evaluate instruction.
3. Curriculum materials must reflect the best understandings of content, cognition, and technology.

In order to address these issues, the Barat Program for Learning with Technology (BPLT) was established to provide a comprehensive approach to technology use for learning in classrooms. The goal of the BPLT is to improve student achievement in content areas, using appropriate state and federal standards for technology. In order to accomplish this goal, the BPLT will increase the readiness of teachers to use technology in the classroom by providing training and support, and create appropriate curriculum materials, including software, to aid student learning.

Increasing teacher readiness requires different approaches for pre-service and in-service teachers. Work is underway to change pre-service teachers' technology experiences. First, we are working with education and content area faculty to help them appropriately integrate technology into courses, thereby putting technology into a curriculum context. This is important because teachers teach as they have been taught. Second, a new lab has been constructed to help students experience appropriate uses of technology. In doing this, we are balancing between the current realities of technologies in schools and helping students realize what some of the possibilities are for technology use. A required course, EDU 212, has been repurposed to expose pre-service teachers to a variety of software typically found in K-12 schools.

With in-service teachers, our goal is to create learning communities that continue to evolve past the BPLT's involvement. We began with an assessment of needs and teacher abilities. We then, with the participating teachers and administrators, decided on appropriate emphases for our involvement, and began an initial design of our participation. Our efforts involve helping teachers develop action research projects so that they can assess the effectiveness of technology in their own classrooms. Our support for teachers includes graduate courses and other professional development opportunities, technology support, software development, and a lending library of software and hardware. Some examples of support include reduced-tuition graduate courses offered at local schools, technical support for teachers in classrooms, and loaner computers for teachers to work with at their homes. Special sections of EDU 525 and EDU 592 give in-service teachers both graduate credit and greater experience in integrating technology into their teaching.

So far, the program is involved with several different schools and school districts in northeastern Illinois, on projects ranging from early childhood language arts through middle school social studies to high school math and science. Both public and private schools are involved in this project. In all cases, we have found it important for curriculum needs to be generated by the teachers, and then work toward finding solutions, using technology where appropriate. All efforts are evaluated for effectiveness and to help guide future projects.

This presentation will present examples of our efforts, along with preliminary findings from some of the projects along with some of the early software development and online professional development offerings.

Implementing and Sustaining a Successful Faculty Development Initiative in a College of Education

Gail Ring
University of Florida, College of Education
Gainesville, Florida, USA
Sebnum Cilesiz
University of Florida, College of Education
Gainesville, Florida, USA
Naglaa Ali
University of Florida, College of Education
Gainesville, Florida, USA
Mnchu Chen
University of Florida, College of Education
Gainesville, Florida, USA

Abstract. This presentation outlines a three-level model of faculty development: workshops, support mechanisms, and consultations, and dissemination.

Beginning in the fall of 2000, the College of Education at the University of Florida recognized the importance of promoting technology integration throughout the college. Committed to doing more than simply paying lip service to the idea, the college hired an Assistant Director of Technology to develop and implement a faculty development program throughout the college. The first year began slowly, most of the faculty members had little or no motivation to attend these workshops, and consequently our faculty development initiative did not have a wide audience. However, the audience we had during this first year provided diffusion to the wider audience in the college and in this second year the program has expanded considerably. We believe that successful faculty development must include a variety of components such as workshops, continued support (physical and virtual), and individual consultations. We approach faculty development as a three tiered model (figure 1).

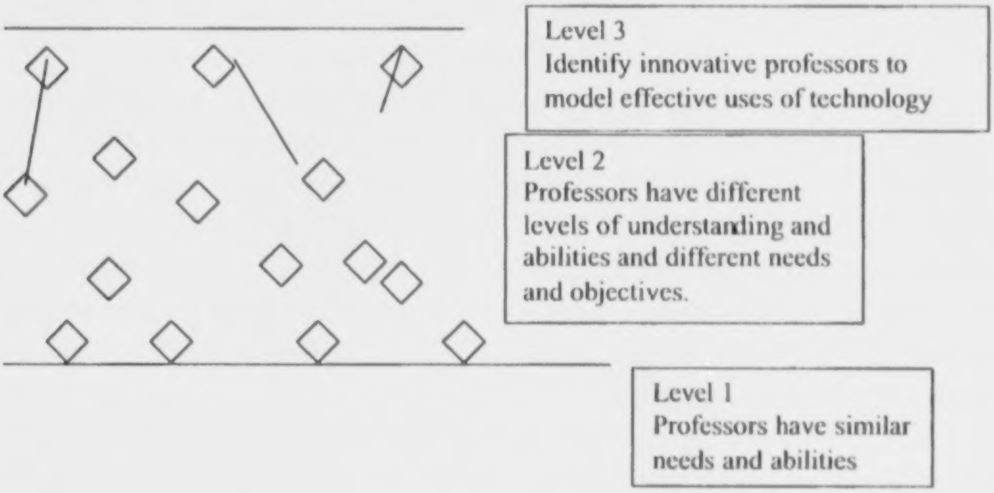
Level 3
Identify innovative professors to model effective uses of technology
Level 2
Professors have different levels of understanding and abilities and different needs and objectives.
Level 1
Professors have similar needs and abilities

Figure 1: three levels of faculty development

Workshops

Workshops (Level 1) are broken into individual modules rather then as a step-by-step cookbook-type approach to technology training. Workshops begin with a brief brainstorming session where participants are questioned about their particular objectives for the workshop. This approach makes each workshop context specific for the group of faculty in attendance, and consequently everyone leaves the workshop feeling like they "got their monies worth." In addition, at the end of the workshop we probe further to determine which concepts should be expanded into online support elements. Each workshop is high energy where each person is both a participant and a contributor.

Support

In addition to these workshops we have an online support center which includes the workshop handouts as PDF downloads, tutorials that serve as prompts for concepts that might be forgotten after the workshop has ended, and frequently asked questions. We have learned that handouts, online tidbits, and downloadable documents contribute to the self-sustaining element of faculty development in the college.

Consultations

Once the faculty has gotten the basics from the introductory workshops, they may request additional time with a consultant (level 2). This element of our faculty development initiative has been very successful. When the consultants work with faculty the following issues are considered:

Context - All consultations occur in the professor's office using their computer and software.

Student teaching Teacher - Student consultants must remember that in this environment they are the experts and as such must understand how to effectively use their expertise to instruct their professors, through probing, modeling, patience, and practice.

Learner's goals - Prior to beginning a consultation the consultant discusses the professor's short-term and long-term goals. In addition, the consultant questions the professor to ascertain their current level of understanding.

As the consultants spend time with faculty a bond quickly develops between student technology consultant and faculty. This bond is dependent upon mutual trust and respect, and once developed, student and professor work together on many projects over time.

Faculty Modeling

The third level of our faculty development program is faculty modeling effective use of technology. We have found that once they learn how to use the technology, faculty are extremely innovative ideas for technology integration. Through college and university wide poster sessions we hope to share our faculties innovative uses of technology within the college of education community as well as the university community. It is our belief that faculty sharing ideas, strategies and techniques with other faculty motivate other faculty members to integrate technology in their teaching and research.

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Facilitating Technology Integration In Teacher Education

Stephen Rose, University of Wisconsin Oshkosh, US
Thomas Fischer, University of Wisconsin Oshkosh, US
Penny Garcia, University of Wisconsin Oshkosh, US
Lenore Wineberg, University of Wisconsin Oshkosh, US

This paper session will present a description and analysis of an ongoing project that has facilitated faculty, students, and their cooperating teachers coming together to participate in a variety of projects that help them integrate technology into their teaching within a constructivist framework to promote powerful teaching and learning. Keys to this process are meeting the needs of post-secondary faculty to become proficient with the integration of technology into instruction in the teacher education curriculum at the University of Wisconsin Oshkosh, and having an effect on preservice teachers' use of technology at field placements. The four part project: address faculty and academic staff skill levels with technology, have faculty develop technology-rich instructional projects, identify technology rich field experience placements, and collect information and data about faculty perceptions of instruction that utilizes technology to help promote powerful teaching and learning in the teacher education curriculum.

Faculty and academic staff technology integration workshops are offered to assist faculty to become skillful with, and model, a variety of electronic tools that can be added to their instructional repertoire to a) help students prepare for class, b) support students' understanding of concepts through collaborative meaning making, c) promote resource-based problem solving, and d) model how theory translates into practice. Workshops also serve as a forum where faculty can reflect on shared concerns and collaborate in modeling the development of technology-rich instructional practices. Workshops are led by core team members, as well as other university professionals with technology expertise. Core team members also are available on an ongoing basis to provide one-to-one assistance to faculty members.

Electronic teaching portfolios are being developed to model authentic assessment strategies and to create linkages between the College of Education and NCATE standards, to contribute to preservice teachers' professional development and lifelong learning, and to develop faculty and student technological skills.

Faculty instructional projects are the outcomes of the workshops on technology integration. Projects are examples of instructional innovations that employ a variety of technologies to promote greater student understanding of course material and to integrate technology via faculty modeling. Projects are developed by individual faculty for their courses and by teams of faculty associated with secondary learning communities.

Student teachers are placed with cooperating teachers who can facilitate the integration of technology into instruction at the PK-12 grade levels. Student teachers are to develop and teach technology-rich lessons collaboratively with their cooperating teachers. All student teachers submitt at least one lesson plan featuring technology-rich instruction. Selected examples of technological instruction are collected and disseminated via CD-Rom to all cooperating teachers and preservice student teachers.

A College of Education symposium "Collegiate Classrooms in the New Millennium", was held for faculty, invited student teachers and cooperative teachers so these related but diverse groups in terms of needs and experience could share and reflect on their instructional rich technology projects. Faculty/student teacher/cooperating teacher teams came together in table sessions to engage in substantive conversations about the instructional effects of their projects and changes they would make in the future. Student teachers demonstrated their lessons and faculty members discussed their technology-related projects.

Evaluation of the project involves collecting data and information about faculty who are in the process of changing their teaching to incorporate technology, gathered through both qualitative and quantitative methods. Faculty interviews were conducted about different elements related to integrating technology into their teaching.
The research sought to understand the following propositions:

1. How are faculty using technology and how is it impacting their teaching?

2. Has the integration of technology in teaching resulted in students demonstrating an improved understanding of course subject matter, deliberation skills, and/or pedagogy?

3. Has the integration of technology change the way faculty teach?

4. Has the integration of technology facilitated preservice teacher's deeper understanding of pedagogical knowledge?

5. How have faculty's increased skill and use of technology impacted their personal view as self as teacher?

6. What are faculty perceptions of the climate in the college of education toward the use of technology in instruction?

Faculty teaching projects also are evaluated to determine the range and sophistication of uses of technology.

Quantitative data collection concerning faculty change over time in attitudes toward teaching methodology and acceptance of technology involve pre and post – assessments that utilize the following instruments: Stages of Concern Questionnaire, University of Texas; Computer Anxiety Scale, Sears; Computer Thoughts Survey, Weil; and Teaching Styles Survey, Norton. Data retrieved from these instruments will help determine the quality, effectiveness and appropriateness of integration of technology into their teaching.

This presentation will discuss what the information and data indicate are the effective components of facilitating technology integration in to teacher education and those areas in need of further modification.

Staff Development: A Tale of Two Programs

Catherine C. Schifter, Ph.D.
Associate Professor
Temple University, College of Education
Philadelphia, PA, USA
Catherine.Schifter@temple.edu

Abstract: Over the last decade or more, large amounts of money have been invested in establishing school based computer labs, classrooms with Internet connections, and at least on Internet ready computer per classroom. Research indicates that staff development is the key to whether these investments are successful. This paper presents two staff development programs from on large urban school district with different outcomes. As school districts continue to spend scarce resources on technology innovations, learning how to predict sustainable change is important.

INTRODUCTION

In the last decade extensive amounts of money have been invested in establishing school based computer labs, classrooms with Internet connections and at least one Internet ready computer for every classroom. Conferences are dedicated to discussing the impact and importance of computers in education (e.g., SITE, Ed-Media). The proceedings from these conferences offer tips on how to integrate technology into teacher education programs, staff development tips, specific topics related to teaching math and science, and comparisons of technology implementations between countries. There are journals dedicated to technology in education, again with examples of implementation programs, uses of the Internet, and more. The key to effective impact of technology in classrooms, however, lies in whether the teacher knows how to use the computer, Internet, and/or software in pedagogically appropriate ways for her students.

Current technology training for teachers is insufficient. While the U.S. Department of Education recommends spending 30% of school technology money on training, the reality is that only 12-18% is used for training (Giordano, 2001). The fact that many teachers do not use technology in ways other than for games for reinforcement is not shocking. Most public school teachers were not taught by teachers who used technology, so they have no model from which to work. Rogers (1995) theory of "diffusion of innovation" explains that only when the innovation is seen as better than current practice, among other characteristics, will it be embraced. The ACOT studies (Fisher, Dwyer, and Yocam, 1996) demonstrated that teachers need time to reach the point where the technology is truly one more tool in the toolbox. And, while there are numerous studies that indicate positive outcomes from technology infused teaching and learning, technology is one more intrusion into classroom activities, often seen by teachers as something to take up time. This paper compares two teacher development projects designed to help teachers learn how to appropriately use technology to improve literacy, and attempts to predict which will more likely provide sustained change.

BACKGROUND

As part of a Technology Literacy Challenge Fund (TLCF) Grant received by a large urban school district (e.g., over 200,000 students district wide), several projects were developed to help teachers learn how to use technology to impact reading and writing abilities of children in grades PreK-8. One of those projects was designed to teach 4th through 8th grade teachers how to use technology as part of project centered learning (PCL). Another project created a mentoring process coupled with both face-to-face and online training to teach Kindergarten through 3rd grade teachers how to use technology in their classrooms more effectively. These two projects had the same overall goal using two different approaches.

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The school district contracted this author to assess of the implementation of the grant. My objective was to assess how each project was implemented and the impact on teachers in classrooms. This paper presents a comparison between two of the staff development approaches to help teachers use technology to improve literacy. A sample of teachers who participated in the two projects were interviewed and observed in their classrooms after completion of the training programs, or participated in focus group discussions of their experiences. This qualitative data was used to compare teacher response to the two programs and to provide guidance for future program development.

PROJECTS

The developers of the first project adapted an established teacher development course in PCL for infusion of technology into PCL. The course lasted 15 weeks, and teachers received a Mac computer for their classroom upon successful completion of the course. The course taught the basic principals of PCL and how to design a cross-curriculum project. In addition, the course taught the participants how to effectively use specific software, and how to use the Internet. The course was delivered through community technology centers to selected teachers selected. The trainers were oriented to the course two weeks prior to the first implementation to ensure to ensure comparability of delivery across trainers. The PCL project director did not participate in delivery of the course. Approximately 500 teachers started the course, and 450 completed it.

The second project involved identifying teachers who were successfully integrating technology into classroom activities (mentors), and teachers who wanted to learn how to integrate technology into their classrooms effectively (mentees). This project was initially developed through another grant, and the director both developed the program and taught most of the face-to-face classes.

The mentees initially attended 3 face-to-face classes where they learned how to use a laptop computer, to use specific software, and to use the Internet. They were introduced to an online discussion forum, where they would have five online modules for the program, assignments and a journaling area. These teachers were loaned a laptop computer throughout the program to do the online assignments either at home or at school. After the face-to-face sessions, the mentees were paired with a mentor, whose classroom they visited over two days. During this time, the mentors modeled infusion of technology. The mentee was to "soak up" as much information as possible and return to his classroom to implement technology into literacy activities. There was follow-up over the next three months by the mentor and a district technology person. One hundred and sixty eight teachers completed the mentoring program.

DISCUSSION

These two projects were very different, even though they had the same goal. The first had a project director who helped write the curriculum, helped train the trainers, and then went on to new projects. The second project had a director who was intimately involved with curriculum development and out in the field with the teachers in the classrooms. The first project depended on many sites and instructors to implement to course, while the second brought all the participants to a central location for training with a small consistent group of instructors that included the project director. The teachers in the first project only had access at the training centers to the new software they were learning and received a classroom computer upon successful course completion. The second project provided laptop computers for the teachers throughout the training and then replaced the laptop with a Mac computer for the classroom. Training received in the PCL course depended on the trainer, while formal training in the mentoring program was centralized and scripted. The only variant for the mentees was to which mentor they were assigned. The first project had no follow-up activities or support, while the mentoring program had 3 months follow-up technical support and ongoing support through the project website.

The full impact of these two projects cannot be assessed in a short time, no matter what teachers say upon interview. According to the ACOT studies, significant change in teaching with technology takes years to accomplish, not weeks or months. Obviously, this paper cannot report which project achieved definitive change. However, using the literature on diffusion of innovations and on implementation of innovative educational programs as a guide, there are elements in the two project descriptions that can be used to predict sustained change. Rogers (1995) suggests five sequential stages in the process of adopting an innovation: knowledge of the innovation, forming an attitude toward the innovation, decision to adopt or reject, implementation, and confirmation of decision. The ACOT (Dwyer, Ringstaff & Sandholtz, 1990) studies also suggest teachers go through five phases toward technology integration: entry, adoption, adaptation, appropriation and invention. Fullan & Pomfret (1977), in their review of research on curriculum and instruction implementation, posit five dimensions of implementation in practice - changes in materials, structure, role/behavior, knowledge and understanding, and value internalization.

One of the most comprehensive studies of educational innovation was the RAND Change Agent study of implementation of the ESEA Title III, Bilingual Education, Right-to-Read, and Vocational Education programs of the late 1960's through the mid-1970's. They reported that well-implemented reforms had a strong training component, practical workshops and locally available technical assistance. Effective follow-up support must address teacher's specific problems in implementing the strategy in their classrooms: "Classroom changes were most apparent where the projects provided teachers with some form of classroom support, which complemented the training and/or materials development phases of the project" (Berman & McLaughlin, 1975, p. 45).

Using this literature as a lens on the two projects, one could argue that the participants made it through the technology integration entry phase and were working through the adoption phase. They had received training in, what was for them, innovative ways to use technology to affect literacy. Both projects provide knowledge of the innovation, an opportunity to form an attitude and to adopt or reject, and to implement new skills in the classroom. Participants were provided materials, examples of different classroom structure and teacher/student roles, and opportunity to develop knowledge and understanding of infusing technology into teaching literacy. However, only one of the two projects provided the follow-up support back into the classroom. Previous assessment of success of educational programs for change indicates that one predictor of success is ongoing support after teacher training programs. The mentoring project described has ongoing support for the participants, initially through classroom visits, and then through the online discussion at the website. The PCL project offered training and technology with no follow-up. One can predict that as these teachers are re-interviewed in the new academic year that teachers who took the PCL training may continue to implement the principals of PCL using technology, but that the teachers who took part in the mentoring project will more likely continue to use both the technical skills and resources acquired.

CONCLUSIONS

School districts are obligated to provide teacher development programs of all kinds. Some training has greater impact than others. Overall, behavioral change is difficult to accomplish. In the case of the two technology-related projects described, support beyond the training program may be the key to sustained change. This paper presents only the first year of looking at the implementation of two programs intended to change teaching behavior, however, long term impact may be predicted. As school districts continue to spend scarce resources on technology innovations, learning how to predict sustainable change is important.

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Professional Development of Teacher Educators: The eChange Project Example

Sandra Schuck
Change and Education Research Group
Faculty of Education
University of Technology, Sydney
Australia
Sandy.schuck@uts.edu.au

Abstract: The paper describes a professional development project which has the aim of promoting and supporting pedagogically sound use of Information and Communication Technologies (ICT) in a faculty of education in a university. The professional development project, called the eChange Project, focuses on pedagogy first and technology second and supports the academic staff of the faculty in their development of appropriate strategies for use of ICT in their subjects. The paper focuses on the experiences and issues concerning the use of ICT which arose in the teacher education part of the faculty. It explores the layers of support that are required in the use of ICT in teacher education and analyses some of the issues concerning professional development projects with teacher educators. An evaluation of the success of some of the strategies used and a discussion of future directions for the project are presented.

Introduction

Recent literature on the use of Information and Communication Technologies (ICT) in education indicate that most education faculties are not using the technologies to their full potential and that academics in these faculties often exhibit a lack of confidence about ways of implementing such technologies in appropriate and authentic ways. Many teacher educators are uncomfortable with the use of ICT in their subjects, either because they do not see any value in using ICT with their students, or because they, themselves, lack skills in the area (Cuban 1998). Further, it appears that beginning teachers and student teachers often do not see themselves as computer literate and, because of their belief that computers will remove opportunities for highly valued face-to-face interactions, they are not motivated to use computers themselves in their teaching (Foley & Schuck 1998).

It therefore becomes apparent that there are two areas in which support for appropriate use of ICT is needed in teacher education institutions: firstly to encourage teacher educators to start using ICT in ways that both enhance their teaching and promote their students' development of the required skills for using ICT effectively and secondly, to show prospective teachers how to use ICT appropriately in their future teaching. A two-layered approach is therefore necessary in any professional development of teacher educators.

Further, if the transformational potential of using ICT is to be recognised then more must be done in professional development projects than merely teaching a few skills. New conceptualisations of ways of using ICT in teaching and learning need to be considered (Carroll 2000). New content can be covered in ways that could not be done previously. Therefore the "what" of learning can change as we have access to simulations, tools and techniques for understanding content differently (Cuban 1993, Pea 1998). However, Pea (1998) goes further in this discussion and adds that the technologies will not be the panaceas on their own. All such tools are mediated by human goals, beliefs and activities. Consequently, professional development in this area must consider the learning context and beliefs of the teacher educators and has to take these into account. The literature on professional development in general suggests that professional development must be sustained, ongoing and intensive and supported by collective problem solving around specific problems of practice (CERI 1998). It must be experiential, and able to provide opportunities for teachers to engage in teaching, reflection and discussion that contributes to the process of learning and teaching (CERI 1998). These understandings of professional development and the use of ICT in teacher education led to the creation of the eChange Project.

The eChange Project

The eChange project is an ongoing professional development project based in the Faculty of Education at the University of Technology, Sydney (UTS) located in the state of New South Wales (NSW) in Australia. The Faculty of Education at UTS has responsibility for two major areas: adult education and teacher education. The eChange Project is a professional development project, coordinated by the author, for faculty staff to develop and support their use of information and communication technologies in appropriate ways in their teaching. The project started in 1999 and is ongoing. This paper will focus on the particular challenges and context of the Project in the teacher education area.

At the start of the project academics in teacher education in the Faculty of Education, UTS, appeared to fall into two major groups: the first was a group of academics who had been early adopters of new technologies and who frequently experienced frustrations in their attempts to either incorporate these new technologies into their teaching or to transform their teaching through the new technologies. Administrative structures, policies and practicalities often posed barriers to the developments initiated by this group.

The second group were academics who in general, had little knowledge of how to incorporate new technologies into their teaching in effective ways and who lacked confidence to explore possibilities with ICT. Their major use of ICT was for their own email and internet usage. This group did not see value in the use of new technologies for their teaching or were quite unfamiliar with them. As the faculty was undergoing a large amount of change with respect to its staffing, resistance to new and seemingly untested uses of technology, and to the accompanying time demands was high.

A contextual factor which highlights the importance of professional development for teacher educators in the appropriate use of ICT is that the major employer of graduates of the teacher education programs, the NSW Department of Education and Training, requires certain competencies in ICT from graduates that they employ. Further it is assumed that these competencies will be embedded in the subjects in which they are appropriate. This requirement points to an urgent need for teacher educators to be able to use ICT appropriately in their teaching, and importantly, to teach their students how to incorporate ICT into their teaching.

The eChange project consequently offers two major areas of support:

- firstly, to assist early adopters of new technologies to have a forum in which to reflect on thoughtful use of the technologies and to remove barriers limiting their progress,
- secondly, to encourage, support and facilitate appropriate use of ICT by faculty members who are not doing so.

The first challenge for the project was to convince teacher educators from the second group that using ICT might enhance their teaching. There are four major professional development options that tend to be used for this sort of purpose. These are central support, faculty mentoring, technical support in the faculty and the use of external consultants. While our university does offer excellent centralised support, most people in the faculty were not availing themselves of it, possibly because they felt that as educators they could learn little from people outside the faculty, and possibly because the encouragement to use that support was not targeted specifically at the faculty. Technical support in the faculty, another option, was not used because many of the faculty staff were unfamiliar with the jargon often used by those familiar with new technologies and staff also needed to be convinced of the pedagogical value of the use of ICT before being interested in learning the skills. Having an external consultant who might be technically expert but would not have a good understanding of the context of the faculty was also rejected. In developing the idea for the project, the Dean of the faculty became convinced that the best way to get staff to embrace ideas of change in their teaching was to have two teacher educators in the role of coordinators of the eChange Project. The two coordinators were selected from the academic staff. We were teacher educators who were interested in exploring the new technologies and had used them in various ways in our subjects. We were not technical experts but rather academics with a keen interest in enhancing our practice.

Towards the end of 1999, we were appointed in the role of eChange Coordinators. We were given time release from part of our usual workload from January 2001. The project has been running since then and is ongoing. My colleague who had worked on the project with me from 1999 retired in July 2001. In 2002 two other colleagues will have roles in the project to support the work that I do. In our first year of the project we developed a number of strategies to get the project running. These continued in 2001 with a few additional activities and strategies. A discussion of these follows.

Strategies for the eChange Project

Working with the Early Adopters

Due to the different requirements of the two groups of academics described above, it was necessary to have a two-pronged strategy to launch the project. We needed a way of encouraging the early adopters as we saw them as a valuable resource for the faculty in leading the way in transforming teaching and learning. We therefore wanted to identify the problems they were having and also to investigate their ideas for transformational practice. Our way of achieving these two goals was to form a committee of early adopters. Membership of this committee was by invitation. We invited those academics who were engaged in interesting and innovative ideas for using ICT in their teaching, the faculty technical support person, and a member of the faculty management committee and we coordinated the running of the committee as part of the eChange Project. The mix of people on the committee was helpful in that it allowed the sharing of ideas. The technical support person could advise us of the potential of the available software for the new ideas that were proposed, the management committee person would take suggestions back to that committee for resourcing and would also suggest ways forward that fitted with the strategic initiatives of the faculty, and the remaining members of the committee would brainstorm ideas that they had for innovative implementation.

In that committee we resolved to have a faculty web development server for experimental and developmental purposes and this was set up for all faculty members to use as required, but with the main intention of supporting the developments of the early adopters. We also supported a plan for two members of the committee to develop a CD-ROM for teaching purposes and investigated ways of encouraging other staff to develop their thinking in the area. The committee has had a few changes of membership since its inception but remains an active and dynamic source of ideas for ICT usage development in the faculty.

It is our intention in the coming year to have members of the early adopter committee work with their close colleagues and act as mentors for their colleagues in small groups. This strategy should help us develop a critical mass of users of ICT who are interested and committed to enhancing their practice. The increase in innovative use of ICT will encourage those who are not participating to join in the developments.

Encouraging New Users

Our strategies emphasise collegiality, pedagogy, warmth and acceptance. We discuss the pedagogy first and then suggest ways of using ICT to implement those pedagogical strategies. The project focuses on how the technology would enhance teaching and learning rather than on what the technology could or could not do. Technological jargon was not used at all, and the coordinators and the academics shared a common language.

One of the first initiatives we implemented was to hold a forum in which teaching and learning ideas could be discussed as a way of preparing the ground for developing new approaches using ICT. We discussed new ideas for teaching and learning and illustrated with a few suggested models. We then had a group session in which people could talk about the major program in teacher education in the Faculty, the Bachelor of Education which prepares elementary teachers. One of the benefits of this session was that people were able to share their ideas and plans across disciplines, and get an idea of what others were doing in the program.

Following this forum, we offered individual support to staff members to use a Virtual Learning Environment (VLE) which is supported centrally in our university. We worked with staff members on ways of setting up the environment so that it would enhance their teaching and we were on hand if they needed support with their use of the VLE.

After a lengthy period of working in this way with different staff members, we had a two day preparation session, in which we suggested that staff members come with particular subjects in mind and work on leaving at the end of the two days with a product that they could use the following semester. Ideas on "blue skies" development were shared, subjects were planned with use of the VLE incorporated, and discussions on teaching practice were held.

A succesful strategy has been to team teach with others in various subjects and to incorporate use of ICT in rich ways into these subjects, thus supporting the other team members' development of knowledge in the area and providing them with contextual evidence of the value of such incorporation.

This year another initiative we have offered has been a reading group. In the reading group, those interested are sent relevant papers dealing with the issues arising in education concerning ICT. We meet and discuss these issues about a week after the participants have received the papers. These meetings are held monthly and a group of about six to eight academics and support staff attend them. These discussions allow

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staff members to reflect on and raise issues about the use of ICT in their teaching and to discuss these in an intellectual manner, supporting arguments from a research basis.

Successful Examples and Remaining Challenges

The major factor contributing to the success of the project has been that the coordinators have been academic staff and not technicists. Those who do not feel confident about their use of the new technologies have appreciated the fact that I am not a technical expert and am prone to making errors and learning on the job. This alleviates any reluctance to expose their ignorance which some staff might have felt in working with a technical expert. Also I have a good understanding of the context as I am a teacher educator and this allows appropriate suggestions and support to be offered. Staff who had little knowledge of the technologies but were very informed about good pedagogy appreciated the emphasis and direction that I gave the professional development.

A project that was piloted this year and hopefully will be developed further next year occurred with one of the academics who had not previously done any online work with his students. The academic was aware that his students needed to work with schools to get clearer ideas of how to develop a teaching program. Beginning teachers often would tell us that the area they struggled most with when starting their teaching careers was this one. However, because of the very contextual nature of programming in schools, it was difficult for staff to give the students the experiences they needed. So an online assignment for the students was developed which used a partnership with school teachers. Students were put into working groups headed by teachers and would discuss their programs online with the teachers and each other. In this way, they could obtain practical advice from their teachers to merge with the theory. The students were enthusiastic about this project in their evaluations but a limitation was the number of teachers who actively engaged in the project. When the project is repeated when the subject is next offered, the lecturer intends to give more support to teachers so that they find participation easier.

Another project with the teacher education students had the aim of challenging their beliefs about mathematics. Students were placed in pairs and given a statement to debate with another pair. Mathematics educators from around the world were invited to respond to these statements. Their responses were placed in the communication site and students would use these responses and recommended readings from the library and from websites to compose their position. The intervention was useful in challenging the beliefs about mathematics teaching and learning that the students had held (Schuck & Foley 1999).

A mentoring project in which beginning teachers and experienced teachers interact online is ongoing. Beginning teachers find that they get valuable support from the mentoring network and the experienced teachers learn about the experiences of beginning teachers that they might otherwise have not heard about.

Other projects done in teacher education included an email project where first year teacher education students interacted with teacher education students in New Zealand and shared experiences of learning in their respective teacher education programs; and using a question and answer forum in a discussion board to develop student teachers' understandings of mathematics and of science. So we have a number of areas in which teacher educators are using new technologies in authentic and appropriate ways to develop learning. However, there are still many staff who are either reluctant or have not yet had the opportunity to rethink their subjects in terms of what they might now be able to do with new technologies that they could not do formerly.

The challenges therefore that lie ahead are many. It is apparent that having forums, whether regular or irregular, is not sufficient for getting staff to develop new ideas and use ICT consistently. There is an increase in expectations of employers of teacher education graduates with regard to their ability to not only use ICT skillfully but also to use it effectively in their classes. Teacher educators can no longer afford to choose not to use ICT in their teaching nor can they limit their use to presentation uses. They need to be aware of how students can incorporate ICT into their teaching and into their future students' learning. So a challenge is to encourage all staff members to embrace the need for professional development in this area. An allied challenge to this one is one concerning time factors. Staff are already overburdened with the intensification of academics' work and it takes great commitment to be prepared to devote more time to subject development. This extra time is undoubtedly necessary as in any reconceptualisation of subjects, contrary to the rhetoric which suggests time is saved by working with ICT.

Another aspect of professional development that needs to be considered is student access to computers. Students are all given access to computers on campus and can work in one of the many computer labs where necessary. However, those who have computers at home and have internet access are advantaged by having ready access to such facilities. Implementing projects at schools during students' field experiences would enhance their learning as they would be using ICT in context. Unfortunately, often students are not given the opportunities to implement such projects due to practical constraints at the schools.

The major obstacle to be overcome is that of the beliefs of many of the teacher educators and student teachers. If they can be shown that use of ICT is enhancing their practice they will be far more committed to its use. Therefore projects such as the eChange Project need to work in context and suggest ways that practice can be enhanced. This is a major strategy of the eChange Project.

Conclusions

The eChange Project has had a number of successes in supporting authentic and appropriate use of ICT in teacher education. More staff are now online and have incorporated ICT into their teaching in useful and effective ways. Others are making inquiries and starting to think about how they can use new technologies in their teaching. However, sustained and targeted support is necessary to continue the process. One of the important aspects of my role in supporting staff is to develop open relationships with them in which they feel free to ask for help in any aspect of their work.

One of the great opportunities for the eChange Project is to act as a catalyst in promoting reflection and reconceptualisation of practices, and encourage the sharing of ideas from which all teacher educators would benefit. Thinking about new ways of teaching and learning for whatever purpose is always a useful exercise which prevents stagnation of ideas. Having forums to share ideas which are centred around practice with ICT encourages the sharing of other ideas simultaneously and provides the opportunity to debate teaching and learning issues about which little discussion has occurred. Consequently, the professional development opportunity allows for greater thinking about teaching than might occur otherwise.

Our future directions involve looking at developing a whole program project such as an electronic portfolio which will have aspects of each subject contributing to it. Students will then have a product to take with them when they seek jobs and different aspects of the portfolio could be developed in different subjects, thus encouraging staff to incorporate appropriate ICT into their areas.

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The Rocky Road to Faculty Development

Michelle Sims, Ursinus College, US
Kimberly Sando, Ursinus College, US
Donna Ziegenfuss, Ursinus College, US
Paula Laholt, Ursinus College, US
Robert Davidson, Ursinus College, US

A panel of three Instructional Technologists, a Media Services Librarian, and a member of the faculty will present the history, trials and tribulations, disasters and successes of faculty development at this small liberal arts college in suburban Pennsylvania. Topics covered in this panel discussion will be the history of faculty development, the development of an Instructional Technology team, the move from technical workshops to project-based faculty development, the collaboration between Media Services and Instructional Technology, and a brief presentation of a project developed during project-based faculty development.

The history of faculty development began with desk-top applications workshops designed for faculty and staff where the basics of the application were taught by computing services staff. The workshops were taught out of context with no relationship to their application to teaching; faculty and staff received the same training.

The development of an Instructional Technology team led to changes in the focus of faculty development. Faculty still looked at workshops as being "techie-oriented" and it has been an ongoing struggle to change their perceptions.

The addition of the Media Services Librarian (with faculty status) to the IT team led to the collaborations between the library and the Instructional Technologists. The Librarian's familiarity with the faculty provided insight into the attitudes that were affecting the success/failure of faculty development. We needed faculty allies!

After a year of providing workshops with few attendees we developed a new plan. With the help of "early adopters" of technology we presented a panel, "Exploring the Possibilities of Teaching with Technology". Four faculty members served on a panel and briefly described their successful incorporation of technology. They answered questions by the faculty concerning the time involved in learning the technology and the development of course materials, the benefits to the students of technology incorporation, the assistance available through the IT team. At the end of the panel we advertised our new approach to faculty development, project-based faculty development opportunities, and asked for proposed projects from individual faculty members.

Shortly after the end of the Spring semester we held our first Technology Exploration. Ten professors with specific ideas for technology integration into their courses attended our three-day hands-on Exploration. Multiple workshops were designed specifically to meet the needs of the individual faculty projects. Time was given for work on individual projects with one-on-one assistance from the instructional technologists as well. The Technology Exploration ended with each professor presenting his technology project.

One of these professors will give a brief presentation of the multimedia, web-based project he developed and is using with his classes. Included in his presentation will be his impressions of the new approach to faculty development.

Time will be given throughout the panel to questions from the audience.

Evidence for Campus Transformation Through Instructional Technology Faculty Development

Michael Rodgers, PhD
Associate Professor of Chemistry
Southeast Missouri State University
Cape Girardeau, MO 63701

David Starrett, PhD
Director, Center for Scholarship in Teaching and Learning
Southeast Missouri State University
Cape Girardeau, MO 63701

Southeast Missouri State University is a public regional comprehensive Master's granting institution enrolling 8000 students. Founded as a Teacher's College, the University still provides a quality teacher education program and graduates a large class of K-12 teachers every year. At the dawn of the Internet revolution in the mid-1990s, the University found itself at the trailing edge of instructional technology adoption. Faculty interest in computer-based instructional technology was limited, technology investment was poorly funded, and technology infrastructure was inaccessible to large segments of the campus. Recognition of our weakness in instructional technology coincided with a growing awareness of the need to enhance access to education in our service area, and increasing concerns that online instruction offered by universities outside of our service region were beginning to compete for the undergraduate students that have traditionally been Southeast's clientele.

The University responded to the IT implementation gap with a comprehensive and inclusive strategic planning process. A University-wide Information Technology Committee (ITC), representative of all constituencies in the institution, developed a coordinated campus-wide technology plan that included a strong faculty development program. Teaching, Learning and Technology roundtables for faculty identified academic goals and priorities for integrating information technology with learning. Technology Associates, consisting of a faculty member from each college and school of the University, were charged with developing and implementing a Technology Serving Learning (TSL) program (the TSL Institutes) to develop faculty expertise needed to integrate IT with learning. All of these actions were supported by the University's 1995 Strategic Plan, which recognized the need to significantly upgrade technology for student learning by devoting one of the Plan's six Priorities to the problem. Two of the Priority's six Goals stated that the Priority would be met by extending "access to information technologies to faculty …by providing training opportunities and support", and extending "distance learning opportunities via technology."

Strategic planning resulted in creation of a comprehensive support structure for faculty seeking to effectively integrate technology into instruction. Permanent funding was procured, and the Office of Instructional Technology (OIT) was established within the Center for Scholarship in Teaching and Learning (CSTL) to support faculty. Faculty instructional technology training was delivered informally through the CSTL/OIT, and formally through the TSL Institutes. Those involved in planning and implementation opted not to act defensively, seeking merely to develop expertise in a few Southeast faculty sufficient to give the University an Internet presence. Rather, the planners sought a campus-wide transformation of IT use through the TSL Institutes, believing that many faculty – even those with little previous computer experience – could benefit from mastery of basic IT skills. By achieving a "critical mass" of faculty interest and expertise, Southeast might become a leader in IT application and innovation: the Internet was a new frontier to all educators, and therefore, offered opportunities even to IT newcomers. Through use of the Internet to **improve** instruction, Southeast might well blaze trails that other institutions could follow in an emerging field that had few established leaders.

The TSL Institutes were launched in 1997, and since that time, 279 of the 380 full-time faculty on campus (73%) have attended at least one Institute session. The Institutes were organized through collaboration of the CSTL, the OIT, and the Technology Associates. Inclusion of the Technology Associates in the collaboration gave the Institutes a distinctly faculty-driven aspect. Adoption of a continuous-improvement approach allowed both problems and new opportunities to be quickly identified and addressed in ways that befitted rapidly evolving technology, growing student familiarity with computers, and changing faculty attitudes. As a result, the Institutes moved in 1999 from a short course format to single-day sessions. The change better leveraged previous faculty experience, and improved access by faculty who had time conflicts that made commitment to a five-eight day Institute impractical. To improve the balance between technology and pedagogy, the single-day sessions became part of a two-tier model, in which a mandatory pedagogy session was followed by choice of twelve or more applications sessions over several weeks. To serve a wide range of faculty, from early adopters to those harboring deep fears of computers, Institute offerings were reorganized and expanded into a five-track program, featuring multiple sessions on Basic Computer Skills, Instructional Design, Basic Web Design, Advanced Web Design, and Teaching on the Web. Further improvements included online sessions, such as "Teaching in the Online Environment", and Web page development with our Online Instructor Suite (OIS) course management software. Follow-up support in the informal, comfortable work environment of the CSTL continued beyond the Institute sessions, with hardware, software and human resources all available to faculty.

Many at Southeast Missouri State University have claimed that Southeast has moved from the trailing edge of IT adoption to the leading edge of development and implementation. Further, the change has amounted to a transformation of the campus culture. To give credence to these claims, we have sought evidence in a variety of forms. This presentation will focus on how 20 items of evidence were used to evaluate the state of instructional technology at Southeast, with suggestions for adapting the list for use at other institutions. The 20 items are:

1. Evolution of Institute
2. TSL Institute attendance numbers
3. Declining recruitment budget for the TSL Institutes
4. Evaluation instrument completed by Institute participants
5. Number of Institute participants who later became Institute Facilitators
6. Number of online courses offered
7. Enrollment in online courses
8. Number of faculty IT server accounts
9. Number of course sections supported by Websites

10. Support for locally-authored course management software (OIS)
11. Quality and sophistication of course Websites
12. Changes in strategic plans around the University
13. Increases in faculty attendance and presentations at IT-related conferences
14. Increased faculty participation in IT committees and discussions on campus
15. Increased IT-related purchases and infrastructure formation (labs, servers, staff)
16. Student and faculty surveys
17. IDEA results
18. Faculty visits, phone calls, and e-mails to CSTL
19. Interest in the place that IT-related work has in Promotion and Tenure decisions
20. Promulgation of standards for instructional Web pages on campus.

The evidence supports the claim that Southeast has indeed undergone an IT transformation. The ability to support such claims can have important implications for planning by teaching and learning centers, and funding of technology-related programs on many campuses.

Adjunct faculty: Prepared to integrate technology into their curriculum?

David Stokes, Westminster College, US
Betsy Price, Westminster College, US

The Campus Computing Project has conducted the largest continuing national study of the role of instructional technology in higher education since 1990. The Project's 2000 national survey reveals that 59.3 percent of college courses now utilize electronic mail and 42.7 percent use Web resources (Green 2000). These numbers are consistent with what we see on our campus and what we have learned from peer institutions. These observations indicate that faculty have made strides in the use of technology, but those strides have been primarily in the areas where technology supports traditional teaching methods. Educators must now capitalize on those features of technology that allow them to change what they are able to do in the classroom, not just how they do it.

This phenomenon in colleges appears to be similar to what is happening in the pre-college classes. Recently T.H.E. Journal (May 2001) presented a summary of their State of the States survey on technology funding and use in the public schools. While funding across the country for technology and technology innovations in the classroom continues to rise, particularly in the area of professional development, the growth in teacher proficiency remains a challenge. According to survey results from the 20 states reporting 60% of all elementary school teachers, 75% of all middle school teachers, and 80% of all high school teachers have demonstrated average proficiency in integrating computers into the curriculum (p.50). This may appear encouraging yet hese findings suggest that many educators have yet to become fluent with technology or to use technology fluently to the learning advantage of students.

The inability of numbers of teachers to engage technology critically for learning may not alone lie at the door of school districts, state funding, or teacher education programs. While it has been determined that the success of integrating technology into curriculum depends upon the computer skills of teachers (Gallo & Horton, 1994), many preservice teachers remain unprepared to teach with computers. While federal funds infused through PT3 grants are beginning to change the way higher education views the need for technology integration into curriculum, perhaps even inducing the paradigm shift in investment from hardware to brainware Farenga and Joyce (2001) call for, recent changes in this funding pattern may well set back technology for teaching initiatives.

Instructional technologies engage students in more active learning while accommodating diverse learning styles (Smith & Kolosick, 1996). Yet resource based learning, inquiry, and other powerful teaching strategies are largely dependent on faculty's ability to effectively utilize new technologies (Taylor & Laurillard, 1995; Brace & Roberts, 1996). The presence of technology is not sufficient to create change. Faculty need time and support to incorporate new technologies into teaching and learning. Assisting faculty in the meaningful integration of instructional technologies into curricula is one of the greatest challenges facing higher education today. Faculty at institutions of higher education may still struggle in advancing technology integration into the curriculum (Isaak & Ward, 2000). Though technology has made changes in faculty thinking about teaching, it has not changed how faculty teach.

In many instances computers are still being used in higher education for little more than communication and administration (Green, 2000). This may be particularly so for adjunct faculty who may not have the access to technology or means to learn how to integrate technology into their curriculum. This comes at a time where many colleges are increasing their dependence upon adjuncts to fill key teaching roles nationwide. The ability of this group of educators to teach to learning with technology has never been more necessary. Many adjunct faculty teach in content areas central to obtaining teaching licenses. If adjuncts do not have access to knowledge and training in how to incorporate technology into their curriculum it is difficult for them to model technology teaching practices for future teachers. The trickle down effect of this upon future teachers ability to "see" the need for such integration must cause problems for teacher education programs and the potential of technology proficiency of future teachers.

Westminster College in Salt Lake City has been successful in obtaining two Preparing Tomorrow's Teachers to use Technology grants. These grants have greatly impacted teacher education faculty who now regularly integrate technology into their curriculum. This said the grants have had little impact upon faculty who help prepare teachers in content areas not taught by School of Education faculty and even less impact upon adjunct faculty across campus. With the advent of a Teagle grant on campus in 2000 efforts have been made to provide adjunct faculty access to technology

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workshops with an objective for them to gain knowledge and experience in integrating technology into their teaching and curriculum. Specifically this paper reports upon the results of a survey of these adjunct faculty who teach in the School of Arts and Sciences, Nursing, Education and Business with suggestions as to how to improve their teaching with technology skills and knowledge.

Method

Surveys were sent to all 139 adjunct instructors on campus seeking their input upon their various uses of computer based technologies, 77 responded. Issues reported upon include:

- percentage of class time spent with different teaching methods
- percent of class time spent with different teaching methods by rank
- teaching methods used in the different schools on campus
- percentage of class time adjuncts use material supports (chalk, PowerPoint, overheads, pictures, stories, Internet etc.
- number of workshops adjunct faculty have taken
- use of home email
- use of campus email

Results are analyzed and compared to Green's (2000) assessment of the use of computing in colleges. From this data comparisons are drawn between the effectiveness of faculty training and adjunct training with technology applications. Suggestions of further means to improve adjunct training are provided.

Discussion

Adjunct faculty at Westminster College begin their tasks with a campus wide orientation that in part provides a "how to" for use of the campus computer network. Adjuncts are provided with a network computer account, an office often shared with other adjuncts, a brief working knowledge of their teaching environment, and sometimes a regular faculty mentor to help overcome the hurdles of "settling in". With access to the computer network comes extensive data storage capacity on a server, a full array of word processing, statistical, and graphic software, a website, and email. Adjuncts were also informed that they could contact the IT Department to meet them in their classroom to learn how to use the presentation equipment. Finally, for those who may not have computers or compatible software at home, adjuncts could checkout laptop computers from the library computer lab.

To assist adjunct faculty to better understand the possibilities of teaching with technology, a regular once a semester workshop was created and adjuncts encouraged to attend. For the past 2 years, as the college created a Faculty Technology Center (FTC), adjunct faculty were increasingly directed to the center for one-on-one instruction. More recently hired adjuncts are immediately brought to the FTC where qualified instructional technology staff provides individual assistance at a level of comfort compatible with the adjunct faculty members' skills. Additionally, beginning computer workshops are offered two or three evenings or weekends a semester. The content of the workshops focuses upon the perceived needs of those who attend. Technologies taught are in the main, PowerPoint, email applications, webpage creation, and a sprinkling of WebCT applications. Discussions on the general or specific role of technology for teaching and/or learning were conducted at a novice level. Adjunct faculty's pedagogical understandings of technologies for teaching and learning at their time of hiring, their technology knowledge and skills, were never recorded if in fact they were asked for. Thus the survey as a data source.

In contrast to the above, full time faculty in the School of Education not only have access to all that available to adjunct faculty, but have been 3 year participants in a Preparing Tomorrow's Teachers to use Technology (PT3) grant shaped to provide intense levels of professional development in the pedagogy and practice of teaching and learning with technology. Included in the broad goals of the grant are a goal to improve the quality of instruction in science math, language arts, reading, social science and creative arts methods courses through technology enriched curriculum on campus and in field placements.

At the beginning of the PT3 project faculty had a dawning understanding of the power computer based technologies provide for achieving instructional gains but perhaps not learning gains. Faculty came with a growing recognition that computer based technologies, particularly multimedia, bring to their teaching real-life examples that provide a context central to learning (Brown, Collins, & Duguid, 1989). Though it was understood by faculty that access was available to many forms of technology aids, videos, audio, statistical data and lesson plans, they felt considerably underexposed as to how best to use these technologies in their own instruction to benefit preservice teachers' cognitive and practical skill development. The notion of anchored instruction (The Cognition and Technology Group at Vanderbilt, 1990) that is the capability to demonstrate real world applicability of knowledge was less prevalent than hoped. Research findings that suggest computer-based learning environments reduce learning time significantly with higher achievement levels (Kulik & Kulik, 1991) were not known or ignored. Although all content method faculty at Westminster College are in philosophical agreement with Piaget (1969) that students learn better when they can invent knowledge through inquiry and experimentation rather than through acquiring facts presented by teachers, they did not understand the role computer based technology and particularly multimedia, web applications and online learning can have upon instruction and learning practices. In short faculty had not yet came to understand that "Technology-is not a collection of machines and devices, but a way of action" (Muffoletto, 1994).

Over the course of the last three years School of Education faculty (12) have each experienced extensive one-on-one training by competent instructional technology staff funded by the PT3 grant. These staff regularly visit faculty, while faculty teach, making careful suggestions of technologies capable of extending instruction and learning. Workshops are held for several hours each month to provide group training on new technologies of interest to faculty e.g. video editing. Additionally, several hours are effected each month for forum discussions on the general and specific efficacy of teaching and learning with technology. Faculty share their successes and failures, read articles exploring pertinent issues, and discuss the ramifications of technology upon the School of Education program and preservice student' learning. Issues developed in these forums become subject matter for School of Education faculty meetings often resulting in programmatic changes.

To date faculty have received training to a measure of competency in:

- PowerPoint
- Dreamweaver
- Smartboard
- Mimio
- Digital cameras
- Software applications
- WebCT
- Eboards
- Streaming video
- Various online research databases

Outcomes of this training and educational project include: ready support of faculty for the creation of an education teaching with technology lab/classroom; numerous examples of curriculum revision, program changes that provide a richer immersion into technology- rich learning environments for preservice students; and "more effective instruction" (Van Ert, 2001).

Competition for technology resources is now the issue of discussion by regular faculty.

Survey outcomes

Despite the discrepancy between training offered to regular faculty in the School of education and adjunct faculty the results from the adjunct faculty survey are encouraging. Seventy six percent of respondents report taking at least one technology workshop. These respondents tend to be newer adjuncts more likely to have taken a workshop and to engage with technology in the classroom. The newness of the adjunct reflects how we orientate and work with our new adjuncts. During their orientation they are introduced to the instructional support services and asked to report to the FTC for a one-on-one session with staff. This activity parallels the colleges' recent efforts to provide better workshops and support for adjuncts. In this the college feels some success. Unfortunately, the emphasis on new adjuncts has resulted in the college not successfully inducing veteran adjuncts to attend the FTC or to integrate technology, with the exception of email, into their curriculum.

Email use by adjuncts has risen dramatically with much use being generated from their homes. This may indicate a need of adjunct faculty to generate lessons and pedagogy at times convenient to them, times not necessarily convenient to access to on-campus facilities. In contrast regular faculty use more diverse means of communication including eboards, and most particularly threaded discussions on a routine basis.

	Fall 2000	**Fall 2001**	
	Campus email	Campus email	Home email
Use Email	51%	68%	89%
Seldom use or never use	48%	32%	11%

Further survey results suggest that email is the dominant form of out of the classroom communication between adjunct faculty and their students. This suggests an increasing awareness of the advantages computer based communication technologies have over more traditional means. This result was not expected. Regular faculty (11 of 12) as expected, use email almost exclusively for out of classroom communication.

How Adjuncts Connect with Students

	Email	Phone	Set office hours	Appointment	Casual meeting on campus
% of time	29%	27%	21%	12%	6%

Other survey results suggest that the provision of technology workshops was a popular choice for adjuncts. As the level of sophistication of the workshop increased so did the number of attendees. This suggests that adjunct faculty are very interested in learning basic computer skills leading to much deeper understandings as to why use technology in the classroom as well as to best time such use. They understand the need to be current in their field and this includes technological innovations.

As the FTC became more fully equipped and staffed and thus better able to serve adjuncts the survey revealed large numbers of them seeking one-on-one assistance in developing their curriculum. This has resulted in increasing numbers of adjuncts seeking multimedia classrooms in which to teach. Regular faculty report regular use of the FTC along with in-house support and training on issues of interest or concern.

Number of workshops adjuncts attended

Year	None	One to Two	Three to Four	Five to Six
2000	38%	41%	14%	7%
2001	9%	61%	15%	15%

A further surprise is the manner of use of technology in the classroom. More adjuncts report regular use than anticipated. This is tempered by indications that the technology use may be in the form of simply replacing another teaching medium than any measure of substantive change to Muffoletto's "way of action" (1994).

Use of computers in the classroom.

	Use computers in class		Specific Software	PowerPoint	Internet
Sometimes to everyday	54%	% of class-room time	28%	26%	21%
Hardly ever to never	46%				

Prior to the grant, the college ran large group, one-size-fits-all workshops. Each workshop featured specific software. All the attendees went step by step with the IT instructor. We wanted faculty to use discipline specific software and to use it into the classroom. To accomplish this we followed the suggestions of Green and other researchers who indicated that a new way of teaching was needed.

FTC attendance	WebCT	FTC	Workshops
2000	1	13	29
2001 (Fall only)	7	70	0 (not offered)

However our survey also indicated that lecture continues to be the dominant teaching activity.

Types of teaching styles adjuncts use.

Activity	Lecture	Small Group	Problem Base	Questions	Large Group	Special Projects	Hands-On	Interactive	Demos
% of time	35.2	14.6	14.6	12.1	17.1	11.8	29.4	17	11.7

This said it is interesting to note that when use of lecture method is assessed by school, education adjuncts appear more likely to use diverse teaching methodologies. This is both pleasing, perhaps not surprising, yet still difficult to explain. Only one adjunct faculty in the school of education regularly took part in the PT3 promoted project described previously, thus the overall effect of that technology program had little influence upon the practices of the majority of School of Education adjuncts. These adjuncts shared no benefit in training with technology over those in other schools across campus. Most importantly this finding is in line with regular faculty uses of lecture for teaching. The difference is that regular faculty are much more likely to use manipulatives and multimedia in concert with lecture.

Percent of Time Lecture is used by School

	Business	Nursing	Education	Arts and Sciences
Lecture	49%	35%	12.4%	35.2%

Overall adjuncts report a more varied use of technology in the classroom and a deeper use of email as a communication medium than expected. This said email was rarely used as a device to move along pedagogy. Adjuncts continue to use lecture as the primary source of instructional medium and to use technology as a replacement tool for now outmoded technologies rather than to fundamentally restructure their modes of teaching.

Conclusion

The suggestion that Green and other researchers had made that teachers need a different type of instruction than large computer classes, worked at Westminster. Although we are still a year away from the end of the Teagle grant and our results are not conclusive, we believe that we are making strides at bringing technology into the classroom as a pedagogical tool. This is being accomplished through our efforts to individualize computer instruction with an emphasis on discipline specific software and uses.

While our survey results are promising there is a need to reflect upon the outcomes and to build upon the successes of the adjunct training programs now in place. Adjuncts seem to be more technologically literate than expected but lack knowledge and skills that would allow them to reinvent their teaching using technology aimed at improving student learning gains instead of as an instructional medium. Overall adjunct teaching with technology as instructional aids is not much different to regular faculty use across campus. This said their teaching to learning gains, perhaps best exemplified by bringing the world to the classroom through computer based technologies is far behind that of faculty in the School of Education. To close this gap the following are under consideration:

- Extend the hours that adjunct faculty have access to support in the FTC
- Introduce adjuncts into the FTC prior to their teaching so that they have the opportunity and encouragement to use technology for teaching
- Treat the FTC as adjuncts' personal and professional development expecting that they will build skills and expertise the longer they are at Westminster
- Reconsider the role of workshops to focus more upon technology education than technology training. That is educate adjuncts on the means to explore technology as an instructional and learning tool rather than a communication medium or a replacement tool for older instructional technologies like chalk or overheads
- Provide short sharply focused workshops for small numbers of adjuncts to learn specific pedagogical applications of technology or develop technology skills in collaboration
- Provide access to adjuncts to classrooms that model exceptional teaching and learning with technology practices
- Help adjuncts to understand the need for careful time management as they further engage in integrating technology into their courses
- Provide key technical help, at short notice, in setting up and perhaps operating various technologies as adjuncts explore the medium
- Need to find the means to help veteran adjuncts to want to consider integrating technology into their courses given their history of long service for mediocre pay and spotty curricular support.
- Finally, though our survey provided much needed information on adjunct actions, there is a need for greater knowledge of specific technology and teaching skills adjunct faculty bring with them as they enter service, and how the college community could help them fulfill their crucial but often voiceless roles.

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Assessing the Integration of Technology Within a Context of Change: A Center-based Approach

Patricia A. Suess
College of Education
University of Missouri-St. Louis
s3i@ix.netcom.com

Carl Hoagland PhD
College of Education
University of Missouri-St. Louis
hoagland@umsl.edu

Joseph L. Polman
College of Education
University of Missouri-St. Louis
United States
polman@umsl.edu

Abstract: Recognizing technology as an essential tool for teaching and learning in the 21st Century, the University of Missouri-St. Louis established a technology and learning center within the College of Education to fulfill its vision for technology integration. While the center is a physical facility, it is also the springboard for a variety of faculty development activities. Among other change management programs, a study was undertaken to assess the integration of technology by faculty college-wide. The collection and analysis of faculty survey data and the corresponding results are presented.

Introduction

Beginning in 1996, a process of renewal and change began at the College of Education (COE) at the University of Missouri-St. Louis, under the leadership of a new dean. This "futures" planning process established four pillars of the college's shared vision: 1) more field-based student work, 2) technology as an essential learning tool, 3) life-long learning for all educators, and 4) community collaboration. Attaining the goals set forth in this visionary process required change, both at the individual and the institutional level. Recognizing technology as an essential tool for teaching and learning in the 21st Century, the COE's E. Desmond Lee Technology and Learning Center (TLC) was established to fulfill the "futures" process vision for technology.

While the TLC is a physical facility, it is also the springboard for a variety of faculty development activities. One of these change management programs is the PT3 project. The goal of PT3 is to have faculty model technology integration in their courses. This is accomplished through one-on-one and group meetings, providing opportunities for planning and reflection. By its nature, the PT3 program supported the implementation within the TLC of several data collection initiatives to assess its impact and guide future work. PT3 evaluation, including student portfolios, case studies and self-assessments is a data collection and analysis task set.

In addition to PT3, the TLC is collecting data regarding the overall numbers of users served by the facility and its staff and equipment. During the first year of operation, from May 2000 to September 2001, there were 47,000 visits recorded (each time an individual comes to the center, one visit is recorded). There were 28,613 visits by students, approximately 56% were undergraduate students and 44% graduate students, 1200 visits by guests, and 1098 visits by faculty. In addition, 27 individual faculty members have held classes in which technology was integrated into the learning process and 60 faculty members have received instruction at the TLC. These numbers demonstrate a promising degree of use of our facility and services but we are working to extend the research conducted by the TLC regarding the *benefits* derived from its service offerings.

The third area of data collection is aimed at assessing the integration of technology by faculty college-wide. Toward this end, a study was undertaken to determine faculty technology competencies. This study used a self-assessment competency-based survey to gather information regarding faculty's knowledge and use of a variety of computer technologies. With the recently approved National Standards in Education, came specifications for the inclusion of technology education in pre-service teacher preparation programs. Three sources were referenced in the development of the technology skills survey items, the International Society for Technology in Education (ISTE) Standards, National Education Standards, and the Missouri Show-Me Standards. The survey questions ranged from skill-based questions, such as opening, saving and deleting files, to application questions, such as developing online courseware. In general, the survey questions addressed the use of hardware and general software applications available within the TLC.

This survey assumes faculty members are able to fairly and adequately assess their own level of skill in the use of various computer technologies and tools. Skill tests were not conducted to verify the responses given. Faculty were not required to disclose their identity, however they were given that option so the researchers may potentially conduct follow-up interviews and further skills investigation with willing survey participants.

The scope of this project is two-fold: (1) to reduce the number of factors in the survey instrument used and (2) the investigation of the underlying data structures that permit the grouping of faculty based on personal and professional descriptors and self-determined computer technology skills. The intent is to develop characteristics that describe faculty who are well versed in the use of technology tools and their application in academic instruction as compared with those who are lagging behind. If these attributes are identified, the education technology faculty can develop a plan to involve more faculty membes in technology preparedness programs.

Method

The data set used in this study was collected at the University of Missouri- St. Louis and contains survey responses from 20% of the estimated College of Education faculty population, or 33 faculty participants. These faculty members were full-time or adjunct instructors. They were asked to participate in the online survey via an e-mail memo from the Dean of the College of Education to the entire college faculty population. The survey was available to faculty online through Internet access to Flashlightonline, an academic survey instrument available through the Center for Teaching, Learning and Technology at Washington State University – Pullman, Washington.

The survey results were anonymous, unless the respondent chose to complete an optional section including name and/or additional comments. Upon review of the data, it was noted that 18 of the 33 faculty members who responded completed the optional sections. All 33 participants responded to the 16 survey items that reflect demographic data (items 1-6) and provide a measure of technology use and tool-based skills (items 7-16). Each skill-based question was a simple check box on the survey form, with a check indicating an affirmation that the respondent possesses the skill and a blank box indicating a negative response. The first six questions determine the respondent's position, years in that position, academic area of emphasis, gender and age. Since the purpose of this study is to investigate relationships among faculty descriptors and familiarity with computer technology tools and resources, the demographic information was selected based on criteria for describing and discriminating between different faculty members. These 33 subjects' responses were used for the data analysis conducted.

The data report generated by Flashlightonline was downloadable to MS Excel as a spreadsheet. The analysis of this data was conducted using SPSS software (® SPSS, Inc.). The raw data was modified such that each technology skill sub-item on the survey (each check-box) was a nonmetric categorical variable with a value of "1" or "0", with "1" representing a checked box and "0" an empty box. The demographic data points are either nonmetric categorical (such as gender) or nonmetric ordinal variables (for example, respondent's age). A review of the data indicated four invalid technology questions. Every respondent answered these four items affirmatively. Thus, these data points were removed from the data set. The frequency plots for the technology questions are a good indicator of the "easy-to-do" (general and introductory) performance tasks and the "hard-to-do", or more advanced skills. The correlation matrix indicates some collinearity among the technology item variables. For factor analysis, this is desirable.

Although it is recommended the researcher use a sample size of at least 50 observations with the factor analysis technique, this study was conducted with the data collected. The factor analysis resulted in identification of 15 component factors for the complete data set. The 15 component factors are described as:

Description of Component Factors Derived from Factor Analysis		
Factor No.	Description	No. of Original Survey Questions
Factor 1	General computing skills	10
Factor 2	Spreadsheet, word processing, database intro skills	6
Factor 3	Instructional technology/online courses	8
Factor 4	Word processing features/tools	5
Factor 5	Classroom technology	6
Factor 6	Database, word processing, Web advanced skills	5
Factor 7	File access	2
Factor 8	TLC equipment use	2
Factor 9	Technology evaluation	2
Factor 10	TLC equipment loan	3
Factor 11	E-mail attachments	2
Factor 12	File management	3
Factor 13	E-mail reply	1
Factor 14	E-mail addresses	1
Factor 15	Advanced TLC	1

Table 1: A Description of Component Factors

According to the Total Variance Explained table generated, these 15 component factors account for 88.2% of the total variance.

After reducing the data set from 57 variables to the 15 component variables derived in the factor analysis, a cluster analysis was performed to identify distinguishing characteristics for grouping respondents. The demographic items were introduced in the cluster analysis. The Proximity Matrix for these 33 observations indicates all data points are distinct and are separated by at least 4 units in Euclidean distance. The smallest squared Euclidean distance value is 16.162 and it relates to the similarity of observations number 27 and 30.

The results of the cluster analysis on the data set indicated the significant differences in the demographic data overshadowed any differences in the technology skill levels of the participants. Thus, the demographic data was removed from the data set and a second cluster analysis was conducted using only the 15-factors for the 33 data points. A review of the Agglomeration Schedule for the cluster analysis indicated an increase in the difference in the percent change values at the transition from four to three clusters. Therefore, the four-, three-, and two-cluster solutions were investigated. Next, a one-way ANOVA was conducted on the 15 factors using the Ward's method variables resulting from the cluster analysis as factors (for two-, three- and four-cluster solutions).

For the three-cluster solution, the ANOVA results indicated the significance level of the F-test is < 0.05 for the latent variables identified as: Factor 1 (Significance = 0.014319), Factor 7 (Significance = 0.00000114), Factor 11 (Significance = 0.000000146), and Factor 13 (Significance = 0.014046). This indicates group differences on the skill areas of general computing skills, file access, e-mail attachments, and e-mail reply.

The final step was the K-cluster analysis. The results for the two-cluster, three-cluster and four-cluster trials were reviewed. Based on the analysis of the observation groupings and the ANOVA results for the three alternatives, the three-cluster solution was determined to be an appropriate grouping of observations. This cluster solution provides groupings with significant differences on four factors without isolating any single observation as its own group. The remaining task was the interpretation of the clusters.

To develop cluster profiles, an interpretation of the three clusters was attempted using the raw data responses. By comparing the observations using both their technology skill data and their demographic data it was possible to develop the following attribute information:

Cluster Membership							
Cluster	Observations in Cluster	Characteristics of Cluster					
Cluster 1	1, 3, 7, 9, 12, 14, 17, 18, 19, 10, 13, 14, 17, 18, 30, 31	56.3% male	37.5% <51 yrs old	19.0% Prof & Endowed Prof 56.3% Assoc & Asst Prof	62.5% <4 yrs in position	<50% yes for Factors 8, 9, 10 (14.6%) & 15 (6.3%)	Very high % yes for Factors 1 (94.4%), 7 (90.6%), 11 (100%) & 13 (93.8%)
Cluster 2	5, 11, 15, 21, 25, 32	83.3% female	50% <51 yrs old	0% Prof & Endowed Prof 66.7% Assoc & Asst Prof	83.3% <4 yrs in position	<50% yes for Factors 2, 3, 6, 8, 10 (16.7%) & 15 (0%)	Moderate to high % yes for Factors 1 (66.7%), 7 (100%), 11 (83.3%) & 13 (100%)
Cluster 3	2, 4, 6, 8, 10, 13, 16, 22, 26, 29, 33	54.5% male	45.5% <51 yrs old	27.3% Prof & Endowed Prof 45.5% Assoc & Asst Prof	54.5% <4 yrs in position	<50% yes for Factors 10 (36.4%) & 15 (45.5%)	High & very high % yes for Factors 1 (80%), 7 (90.9%), 11 (100%) & 13 (100%)

Table 2: Cluster Definition for Three-Cluster Solution

The research indicates there are significant differences among the faculty members with regard to computer technology skills and classroom application. The three groups that have been identified are distinct in their use of the TLC resources, experience with online courses and spreadsheet, database and e-mail skills. In addition, those with more advanced computer technology skills (clusters one and three) tend to be newer to their current university positions, predominantly male and in the fields of Educational Technology, Educational Psychology and Teacher Education (the areas occurring most frequently in clusters one and three). However, there is a split in this group that is related primarily to their reported general computing skills levels and their use of the TLC resources. The faculty members with lower average scores in the skill areas of spreadsheet, database, and advanced Web skills tend to be young, predominantly female and in fields such as Educational Administration (the area occurring most frequently in cluster two). This group reported lower skill levels than the other two in the factors described as general computing skills, classroom technology and dealing with e-mail attachments.

Discussion

In addition to information provided by this study regarding the current technology integration status, it provides a baseline for future studies. Thus, the goals of the faculty data collection are to assess both status and change in technology integration in COE courses.

The survey data collected was analyzed using two statistical methods, factor analysis and cluster analysis. The primary purpose of the factor analysis was to reduce the data set to a smaller number of parameters. The fifteen components identified by the factor analysis were used in the cluster analysis. The resulting groups of participants were differentiated by their level of technical skills, academic specialization, and the number of years in their current position at the university. Part of the analysis was conducted to enable changes to the survey instrument itself. Thus, the reduced survey will be used to conduct future investigations of technology integration in faculty courses. Further research will assist in the verification of current results and will begin to capture the change perspective among faculty participants with regard to technology integration.

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Higher Education and Technology Integration into the Learning Environment: Results of a Survey of Teacher Preparation Faculty

Jesus Tanguma
Research, Measurement, and Statistics
University of Houston-Clear Lake
United States of America
tanguma@cl.uh.edu

Sylvia S. Martin
Special Education
University of Houston-Clear Lake
United States of America
martinsy@cl.uh.edu

Caroline M. Crawford
Instructional Technology
University of Houston-Clear Lake
United States of America
crawford@cl.uh.edu

Abstract: Standards delineated by the Council for Exceptional Children (CEC) include competencies in technology that promote teacher development of a supportive technological learning environment for students with disabilities. Personnel preparation programs must demonstrate in courses and field experiences that technology use is incorporated in the learning environment. This study presents preliminary analysis results of a survey to determine faculty technology use in educator preparation courses. The data presented are part of a larger study of technology learning environments in a teacher preparation program. Results indicate that faculty do not model all types of technology use within the learning environment of educator preparation courses.

Introduction

The National Council for the Accreditation of Teacher Education (NCATE) adopted technology competencies as a required component for training all teachers. Standards delineated by the Council for Exceptional Children (CEC) include competencies in technology that promote teacher development of a supportive technological learning environment for students with disabilities. Personnel preparation programs must demonstrate in courses and field experiences that technology use is incorporated in the learning environment. Gillingham and Topper (1999) discussed four possible delivery approaches to preparing teachers for technology use in classrooms: single course, technology infusion, student performance, and case based. Ludlow (2001), in a review of the literature and discussion of technology and teacher education, notes that research indicates a need for better training. This need is based on research and reports that indicate (a) preservice program faculty do not model the use of technology, (b) faculty do not facilitate its implementation in activities and coursework, (c) future special educators are more likely to use technology competently if it has been embedded throughout their coursework and field experiences, (c) technology competencies are often "add ons" rather than integrated into coursework, (d) few faculty members have the expertise to develop complex technology mediated instruction, (e) faculty lack the skills for troubleshooting technical problems during instructional interactions, (f) research in the area of making informed programming decisions related to technology is lacking, and (g) systematic training procedures to assist faculty and students in using new technologies have yet to be developed.

Edyburn (2001) delineated 197 articles that have contributed to an emerging knowledge base on special education technology research and practice. Content analysis identified several themes but most relevant to this study were the areas of implementation issues, preservice teacher education, and technology integration. In a review and discussion of instructional technology and personnel preparation for early childhood special education, major issues were identified within the context of higher education. Illustrations for faculty to examine their own instructional strategies within technology use were presented. Self-examination areas included online materials, electronic reserve, electronic mail, listservs/reflectors, online forums, electronic presentations and face-to-face instruction (Hains, et al, 2000).

Method

Using a survey of education personnel preparation faculty, the investigators addressed the question: Do faculty model technology use in the courses they teach? Faculty were invited to complete the survey at the end of a program area meeting. A script describing the study was read by one of the investigators requesting that surveys be completed after the meeting and returned anonymously.

Participants

A total of 26 faculty members at an upper division university in the Southeast region of the United States constituted the sample for this survey. Response was 100 % of faculty attending program area meetings. Participants were all full time faculty members in an education personnel preparation program.

Measures

This study used the Technology Integration Survey for Faculty (High Plains Regional Technology in Education Consortium, 2001). For the purposes of this study, only the first 16 items were analyzed. These 16 items are designed to gather information on the degree of technology integration the faculty is incorporating into their teaching and are directly related to the question of whether faculty model the use of technology in their courses. Responses are evaluated on a 4-point Likert-type scale with the following labels: (1) strongly disagree, (2) somewhat disagree, (3) somewhat agree, and (4) strongly agree. The following is taken from the directions on the survey:

> **Directions**: This survey is designed to gather information on the degree of technology integration you are currently incorporating in your teaching. The statements address what you are actually *doing*, rather than what you *can* do.
>
> Use the following scale to gauge the degree to which each statement is true of you:
>
> **1 Strongly disagree** (You have never tried this, either because you are not comfortable with the technology or because you believe it is not appropriate in your teaching situation or because you don't have access to the necessary technology.)
>
> **2 Somewhat disagree** (You've tried this once or twice but it has not become a consistent part of your instruction.)
>
> **3 Somewhat agree** (You do this consistently to some degree but it is not an integral part of your instruction.)
>
> **4 Strongly agree** (This is a consistent, integral part of your instruction.)
> (High Plains Regional Technology in Education Consortium, 2001, paragraphs 1 & 2)

Results

The results of the study are similar to those identified in the literature: faculty (a) are incorporating software packages into the teaching of their subject areas; (b) are using assistive technology (e.g., scanner, digital cameras, video cameras, voice recognition) to develop and deliver instructional units in their teaching areas; (c) are using technology (e.g., video conferencing) to teach students; (d) are using the internet to gather resources (e.g., lesson plans) for teaching in their subject areas. However, faculty are not using projection devices with a computer to develop and deliver instructional materials in their teaching areas. The following table summarizes the results of the study.

Table 1: Samples of Faculty Responses by Technology Use

Technology Use	Response	Frequency	Percent
Use of spreadsheet applications	Strongly disagree	8	30.8
	Somewhat disagree	6	23.1
	Somewhat agree	5	19.2
	Strongly agree	7	26.9
Use of scanner, video/digital cameras	Strongly disagree	20	76.9
	Somewhat disagree	4	15.4
	Somewhat agree	1	3.8
	Strongly agree	1	3.8
Use of multimedia and/or Internet	Strongly disagree	12	46.2
	Somewhat disagree	9	34.6
	Somewhat agree	0	0
	Strongly agree	5	19.2

When the participants answered whether they use a variety of software packages to teach in their subject area, 38.5% of the participants stated that they do not use software packages. Similarly, 53.8% of the surveyed faculty stated that they do not use spreadsheet application when teaching. When asked about their use of a scanner to develop and deliver instruction, 76% of the participants answered as not doing so. Of those surveyed, 84.6% stated that they do not use digital cameras to enhance their teaching. Similarly, 92.3% of the participants indicated not using video cameras to develop and deliver their teaching. In relation to the use of assistive technology to promote learning for students with special needs, 88.5% of the participants indicated that they do not use such technology. Of those surveyed, 80% indicated that they do not use technology for distance education and 92.3% stated that they do not use video conferencing to teach in their subject areas. When asked about their use of projection devices, word processing, and use of multimedia, 53.8%, 88.5%, and 69.2% of the participants, respectively, agreed to incorporating them into their teaching. Similarly, 88.4% of the participants agreed to using the Internet in an informed manner and 69.3% agreed that they used lesson plans and other resources published on the web in their teaching.

Convenience sample, sample size, and the use of self-report data limit the findings of this study. However, results are consistent with research findings that preservice program faculty do not model the use of technology and that faculty therefore do not facilitate its implementation in activities and coursework. This lack of technology use is contrary to recommendations that future special educators are more likely to use technology competently if it has been embedded throughout their coursework and field experiences.

Discussion

Technology integration to provide a supportive classroom learning environment has been discussed as an evaluation tool of an educator's ability to address the individualized needs of students (Crawford & Martin, 2001) as well as a critical component in the success of learners with disabilities (Seevers, Crawford, & Martin, 2001). University faculty teaching personnel preparation courses should be modeling the integration of technology for their university students. Research has indicated that effective technology integration may be critical to producing educators who use technology competently to meet the needs of their students through a supportive classroom environment. Additionally, implications related NCATE recommendations and CEC standards for providing a supportive learning environment for students remain an area of concern.

This study used a survey questionnaire to determine whether faculty model the use of technology in educator preparation courses. It measured faculty use of technology not faculty knowledge of technology. It is possible that there is a discrepancy between knowledge and use of technology. Faculty may know more technology than they incorporate into their education personnel preparation courses. Results of this study indicate that some faculty (a) are not incorporating software packages into the teaching of their subject areas; (b) are not using assistive technology (e.g., scanner, digital cameras, video cameras, voice recognition) to develop and deliver their instructional units in their teaching areas; (c) are not using technology (e.g., video conferencing) to teach to their students; (d) are not using the internet to gather resources (e.g., lesson plans) for teaching in their subject areas; and that some faculty (e) are not using projection devices with a computer to develop and deliver instructional materials in their teaching areas. Additionally, the use of the survey questionnaire may have resulted in faculty self-assessing their use of technology in educator preparation course.

Conclusion

In light of faculty responses to the survey, further consideration pertaining to faculty professional development opportunities and curricular integration is imperative. After all, "Computerized electronic technology makes possible not only the wide and rapid distribution of information, but its manipulation, analysis, synthesis, and recombination as well. Through these operations, new knowledge is created that helps us understand ourselves and our world in new ways" (Gibbon, 1987, p. 2). Technology provides the opportunity to expand the realm of the curriculum, but only with faculty time and effort, as well as support of the institution, will appropriate and successful integration occur.

Perhaps consideration should be allocated toward the philosophical framework through which the faculty view their own pedagogical behaviors. A traditional mode of interaction within a classroom environment is one that is supportive. However, a supportive environment that celebrates the successes of the faculty may be described as one in which innovative approaches to teaching are perceived as inventive and appropriately rewarded. "A combination of essential conditions is required for teachers to create learning environments conducive to powerful uses of technology. The most effective learning environments meld traditional approaches and new approaches to facilitate learning of relevant content while addressing individual needs: (International Society for Technology in Education, 2001, paragraph 1).

As university faculty shift toward an integration of technology within their university courses, the modeling of technology use for university students will contribute to the production of education personnel who are competent technology users. This shift may provide the supportive learning environment necessary for education personnel to understand the importance of not only having pedagogical expertise but also of modeling its use through technology (Crawford & Martin, 2001).

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Adding "Flash" to Your Faculty Development Program

Michael Uttendorfer
Center for Teaching and Learning with Technology
New York Institute of Technology
United States
muttendo@nyit.edu

Abstract: A number of factors have been shown to influence the acceptance of new technologies in education. Research indicates that training and support are critical factors in the adoption of instructional technology by higher education faculty. This paper is a report on one solution that has shown potential in solving a problem of providing faculty development in instructional technology on multiple campuses with a small development staff at the Center for Teaching and Learning with Technology.

Introduction

With ever-increasing pressure from college administrators, faculty members are being encouraged to embrace technology as a way to increase the number of students served, improve the quality of their instruction, better prepare students for the workplace and reach students not previously served by traditional classroom instruction (Green, 2001). The initial review of the research examined factors reported in the literature as causes of college faculty reluctance to use technology as well as factors that help promote its increased use.

As indicated in Okpala & Okpala (1997) and Spotts & Bowman (1995), while the use of technology is rapidly increasing in the business world, the use of technology in academia is still not widely accepted. Additional evidence in Green (2001) shows that only 14.7% of colleges and universities in his study used course management tools for their online courses and only 30.7% used web pages for class materials. With the need to expand the use of technology increasing, it is important for colleges and universities to recognize the critical issues that impede growth in the use of technology by instructors and address them if their goals are to be met. Identifying incentives and motivational factors that will help expand the use of technology by college faculty will be beneficial to institutions of higher education (Chizar & Williams, 2001). Understanding the need for support systems will assist colleges and universities in planning for the infusion of technology in teaching. Providing adequate user support and assisting faculty with integration of technology in instruction were reported by Green (2001) as two of the most critical issues in on-campus computing for the next two to three years.

The literature review established a foundation for planning and implementing faculty development programs at the New York Institute of Technology's Center for Teaching and Learning with Technology (CTLT) in the use of technology as a tool for instruction. Understanding how faculty use technology, their concerns about technology and factors that help produce positive acceptance by faculty members are keys to successful instructional technology implementation and expansion projects.

The Role of Training

Faculty training is a critical component to successful integration of technology in higher education. The Center for Teaching and Learning with Technology at the New York Institute of Technology (NYIT) was formed with the expressed purpose of providing technology training to the college's faculty.

In recent surveys, Milliron and Leach (1997) and Green (2001) reported that the training structures for developing the technology skills of faculty members are still not in place and yet training is viewed as an essential ingredient in keeping their faculty current. Chizar & Williams (2001) also reported similar findings in their faculty survey.

For a staff development program to meet the needs of the faculty, it is critical that the trainers understand the specific types of technology being used by the faculty and which new technologies may also be useful for them. Gandolfo (1998) and Inman & Mayes (1999) suggest that training programs must be designed to allow for multiple training experiences. They found that as faculty become more familiar with technology, their need for additional training in other technologies is likely to increase.

Inman & Mayes (1999) also suggested that there should be a distinct separation of general computer literacy education and basic hardware training from advanced training in more sophisticated technologies. Dusick & Yildirim (2000) also found the need for separation of users and nonusers in training. Experienced users were focused on improving their existing skills through specific training. Nonusers preferred short personal training sessions or small group training sessions (Carey & Dorn 1998). Wilson (2001) also reported that faculty preferred one-on-one or small group training to traditional classroom training settings.

Dusick & Yildirim (2000) and Wilson (2001) found that computer competency and prior computer instruction were significant predictors of the use of computers for instructional purposes by faculty. It is evident from the study that training is an important positive factor in expanding faculty use of computer technology.

Candiotti & Clarke (1998) and Dusick & Yildirim (2000) also found that on-going technical support for faculty while they are learning new technology is critical. Both studies suggested that a modest investment in support staff yields far higher returns in increased faculty use.

Using Technology to Teach Technology

Ongoing training and support for faculty also plays a critical role in the expansion of technology use. Trainers must be aware of the types of technology that are available and in use in order to create training programs that will be useful to faculty (Inman & Mayes, 1999; Dusick & Yildirim, 2000).

Green (2001) reported that the single most important information technology support issue for institutions of higher education over the next three years will be assisting faculty to integrate technology into instruction.

Recently, NYIT adopted a new course management system for delivery of the college's online courses. It was selected because of its ease-of-use and intuitive interface. However, the organization of lesson materials in the new system required training for each faculty member using the online delivery system. Over 100 faculty members needed to be trained in a very short amount of time.

Many of the research articles cited the time factor as a deterrent to faculty adoption of technology. Training can only be effective if faculty take advantage of it. It became part of the training plan at CTLT to produce online versions of the training programs for the course management system, online web editors and general best practices for online teaching and learning.

Providing training that is available to faculty online has great potential for increasing faculty participation. Faculty members do not have to manage already tight schedules to attend sessions. They can take the training courses at any time of the day or night when time permits. The ability to work independently also has the potential to alleviate some of the reluctance to attend large group training sessions where their lack of certain technology skills may become more apparent to others.

Online faculty training appears to be a solution with a great deal of potential to provide much needed training while avoiding many of the disadvantages of traditional classroom style training sessions. Although group training sessions are still be offered by the Center, this additional delivery option has provided a way to reach many more faculty members in more different locations.

Tools that Facilitated Online Training

Rapid development of online training with a small faculty development staff required tools that were easy to learn, provided flexibility in formats and supported the types of training needed at the Center for Teaching and Learning with Technology. The writer investigated a number of tools designed for online content development and selected a set of web tools from Macromedia (http://www.macromedia.com). They proved to be quite powerful, worked well together and yet were very intuitive and relatively inexpensive.

The primary tool used was Macromedia Flash 5. The writer was able to create a few simple templates that facilitated the technical training required for a variety of faculty needs. The files created in Flash were remarkably small and required no special plug-in to be viewed on the web. Action scripts built into the software allowed the designer to easy add interactivity that allowed the learner to control the pace and sequence of the instruction. It was possible to import screen captures from programs that the faculty wanted to learn, such as Blackboard or Dreamweaver, and provide step-by-step instructions and guided animations using the actual displays from the program. Being able to see the screens and read or hear the instructions at the same time proved to be a useful strategy based on initial feedback from the faculty.

Another part of the Macromedia "Web Design Studio" package was another product called Fireworks 4. This graphic manipulation tool allowed the writer to compress the screen captures to reduce the download time without substantially reducing the quality of the images.

Macromedia's Dreamweaver 4 was used to develop and maintain the Center's web site where these tutorials were made available for use by faculty (http://iris.nyit.edu/~ctlt). Dreamweaver's built-in file transfer protocal (FTP) feature made file transfer and updating a relatively easy process.

Initial Results of Faculty Satisfaction

Although the results are quite preliminary at this writing, the initial data, gathered using an online survey instrument, indicate a high level of satisfaction with the use of online technology to assist faculty in learning technology. One of the major factors mentioned by numerous faculty members who used the programs was the convenience of being able to using the training programs anytime and anywhere. This convenience factor may encourage more faculty members to participate in technology-based educational enhancements to their traditional instruction when regularly scheduled training sessions offered by the Center for Teaching and Learning with Technology do not fit their busy teaching schedules.

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Multimedia cases and the professional development of teacher educators

Ellen Van den Berg, University of Twente / Faculty of Educational Science and Technology, NL

The integration of ICT in teacher education is one of the priorities of Dutch educational policy. Much money is already invested in computer hardware, and although less, in specific software for teacher education. However, the investments in professional development activities for teacher educators in order to integrate this software in their programs lay far behind.

This proposal is about an arrangement for professional development of teacher educators in elementary science. This arrangement aimed at familiarizing teacher educators with multimedia cases. Working with multimedia cases implies a double innovation. The first innovation is about the change in pedagogy of teacher education. Case-based learning in teacher education means a more profound place for classroom practice in the programs. The second innovation refers to the use of ICT for student learning purposes. Both intertwined innovations have implications for the knowledge base of teacher educators, and hence for their professional development. This proposal describes an explorative study on teacher educators learning about multimedia cases. In the next sections an outline is presented of the context of this study followed by brief a description of the methodology and a summary of the main findings.

The MUST-project

The study described in this proposal in part of the MUST project. The acronym MUST stands for Multimedia in Science and Technology. This project is a joint venture on behalf of three Teacher Education Colleges, the National Institute for Curriculum Development and the University of Twente in the Netherlands. The project aims at developing multimedia cases and investigating their impact. At the core of every MUST case is an interactive video-clip of elementary science classrooms. Hyperlinked to this video all kinds of information are added on a CD-ROM, such as comments on the video, facts about the school and the class etc.

Teacher education programs are frequently charged with being irrelevant, overly theoretical and out of touch with the realities of teaching 'on the front lines'. However, situating teacher learning in classroom practice may have as drawback that the kinds of teaching advocated in reform proposals are non-existent in real settings. Case–based learning is perceived as a means to overcome this theory-practice divide and cherish the innovative aspirations of curriculum change. When combined with computer technology, the educational potential of case-based learning may even be enhanced. Multimedia applications add the power of computer technology to approaches of case-based instruction, because these applications can stimulate more than one sense at a time and in doing so, may get and hold more attention (Jonassen & Reeves, 1993, p. 703; Cennamo, Abell, George & Chung, 1996)

"Case methods are expected to be more engaging, more demanding, more intellectually exciting and stimulating, more likely to bridge the chasms between principle and practice, and more likely to help neophytes to learn "to think like a teacher" (Shulman, 1992, p. 1).

Although the advantages of case-based learning is well-documented in literature, empirical studies on their use by teacher educators is scarce. This study tries to make a contribution to fill this gap.

Methodology

The research reported about in this paper was guided by the following two questions:

- Which images do teacher educators associate with the implementation of MUST cases by teacher educators?
- How do teacher educators evaluate their competencies of the different knowledge domains necessary to integrate MUST cases in their curriculum?

Fourteen teacher educators (3 women and 11 men) participated in this study. They all followed a short trajectory of professional development in order to get familiar with the MUST philosophy and products. This trajectory consisted of a one-day workshop, activities with MUST cases at their teacher education college and a finalizing workshop of 5 hours.
The following data have been collected:
After the first workshop the teacher educator wrote down their impressions of the MUST cases. Their responses were stimulated by expressions such as "What is on your mind when thinking about using MUST cases?
Subsequently, the responses are collected per expression and grouped in the following categories:
Implications MUST cases from a curriculum perspective;
MUST cases and future teachers;
MUST cases and teacher educators;

Technical implications of MUST cases.

After the last workshop the teacher educators were asked to evaluate aspects of their knowledge and skills on a 14-item list. They could rate themselves from 1 to10. (In Table 1 the results are summarized.)

Results and conclusion

Images

Most remarks were related to MUST cases and the curriculum at the teacher education college (37%). The teacher educators saw good opportunities to integrate the multimedia cases in the existing curriculum at their college. They did not perceive the cases as a springboard for curriculum reform. This is not surprising, because all participants had redesigned their curriculum profoundly in the recent past. The participants express as a major point of concern the lack of time within the curriculum. Multimedia cases capitalize on in-depth information processing. So, from a perspective of content coverage cases are rather in efficient. Teacher educators were afraid that other important topics would get less attention when much time was devoted to the topics in the cases.

About 25 % of the remarks were about the anticipated reactions of students on the cases. The teacher educators expected that working with the cases would a motivating experience for their students, especially because of the video-clips of elementary classrooms.

Remarks (20%) were on the technical implication of working with multimedia cases (installation on the computer network and so on.)

18% of the remarks were about the role of the teacher educator, especially how to guide student learning while working with a multimedia case.

Competencies

At the end of the second workshop the teacher educators filled out a self-evaluation form.

Table 1: Knowledge domains in relation to MUST cases

Installation/ navigation MUST	(4 items)	7,7
Insight in ICT knowledge students	(3 items)	6,1
Science in teacher education	(3items)	7,9
ICT in elementary science	(2 items)	6,1
Teaching with multimedia cases	(2 items)	5,1

N=14

Not unexpectedly, the teacher educators rated themselves highest on their "core business" (science in teacher education). Remarkable is the high rating of the technical competencies to work with multimedia cases, because after the first workshop the participants expressed concerns on this point. Informal conversations with the teacher educators indicated that the first in-college experiences with the cases did not cause any major technical problems.

The teacher educators do not have much insight in the ICT competencies of their students or in the role of ICT in elementary science. This implies that they cannot take a leading role in innovation in elementary science in which ICT plays a significant role. The participants do not feel very comfortable as far as teaching with multimedia cases is concerned. Teacher educators particularly perceive the use of multimedia in interdisciplinary courses as beyond their reach.

In conclusion:

The workshops and in-college activities with MUST cases have raised enthusiasm amongst the participants. But the implementation of multimedia cases in an innovative way requires more long-term support and collaboration. Especially the rational behind case-based learning needs more thorough attention, otherwise multimedia cases may be viewed as an interesting and motivating "extra" in a already heavy loaded curriculum.

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Back to Basics:
Non-Technical Tips for Improving Technology-Based Presentation Skills

Joseph Walsh
Department of Curriculum and Instruction
University of Montevallo
United States
walshj@montevallo.edu

Kristie Pretti-Frontczak
Department of Educational Foundations and Special Services
Kent State University
United States
kprettif@kent.edu

From a simple PowerPoint™ presentation to a complete online course, technology now allows educators unprecedented freedom to create, modify, and disseminate their own instruction; however, this same freedom also offers unprecedented opportunities to create and disseminate ineffective or poorly designed instruction. Ineffective technology-based instruction often stems from neglect of the basic principles of effective instruction. This paper describes four non-technical tips educators can use to enhance the quality and effectiveness of technology-enriched instruction. They include (a) identifying instructional objectives, (b) understanding the target audience, (c) organizing the content, and (d) preparing for instructional delivery.

Introduction

It is no longer surprising to see P-12 teachers and college or university faculty with the technical ability to create multimedia-rich PowerPoint™ presentations, develop and maintain their own course Web sites, or, with no technical assistance, setup and operate a wide variety of computer-based equipment. As educators, we are rapidly becoming more technologically savvy. Fortunately, many of us are learning to embrace this change and are enjoying the unprecedented freedom technology offers us in our ability to create, modify, and disseminate instruction, however, this same freedom also offers us ample opportunity to produce ineffective or poorly designed instruction. In allowing us to personalize and package the instructional messages we convey to our students, technology also gives us much latitude to miss the mark, and that is precisely the issue raised in this article. Perhaps we need to be reminded that, as we run to jump on the technology bandwagon, we must not forget to bring the basics of good instruction along with us.

Most of us have endured PowerPoint™ presentations with font sizes so small that we could not possibly read the information being presented or lectures by professional educators who stood with their backs to the audience as they read paragraph after paragraph from the information projected on the screen. In these and many other situations, technology, in all its capacity to enhance instruction, only served to impede the dissemination and reception of the intended message. It is with this in mind that we offer a few reminders on how, as professional educators, we can reduce the chances of getting blindly caught up in technology's enticement and instead, capitalize on its potential to support effective teaching.

Identifying Instructional Objectives

In simple terms, objectives are specific descriptions of what we want the learner to know or be able to do as a result of instruction. Whether we are using PowerPoint™ in the classroom or delivering our instruction online, it is critical that we make the effort to identify specific instructional objectives, even if it requires a considerable amount of time. Surprisingly, many of us spend more time selecting background colors and clip art, digitizing video clips, creating endless lists of hyperlinks to online resources, or toying with any number of technology's fun and often frivolous features than we do identifying and incorporating objectives into our technology-based instruction. While technology's bells and whistles or its ability to expedite our productivity should not be neglected, our first priority should be to identify and incorporate instructional objectives in the design and development of our instruction.

Determining and writing good objectives is not always, if ever, a quick and easy process. Taking the time to determine instructional objectives, refining them, and then developing content and evaluation methods around them can be a very detailed and time-consuming process. This stands in direct contrast to the expectations we may have of technology and its ability to assist us in rapidly creating a finished product. While convenience and expediency are enticing attributes, as educators, surely we are not willing to trade them for quality and effectiveness.

Understanding the Target Audience

In a traditional setting, when teachers walk into a classroom to teach a lesson or deliver a lecture, they are in direct, face-to-face contact with their audience and can react, make accommodations, and modify the information they are presenting and the way in which they present it based on audience reaction and response. Trained educators know this ability can greatly improve the effectiveness of instruction. Unfortunately, technology, if we allow it to, can easily separate us from the learner.

As many of us have already discovered, our efforts to understand and accommodate our audience often tend to lead us away from the rigid and inflexible presentations that can be so instructionally ineffective and instead, toward the development of presentations that simply support the information we wish to convey. For example, rather than creating a presentation that contains slide after slide of the exact content being presented, forcing the instructor to follow the pre-developed content precisely, we instead find ourselves more often creating presentations that merely contain supporting electronic artifacts such as charts, graphs, maps, photographs, video clips, or a few talking points. By simply augmenting a lecture or presentation with technology instead of letting technology dominate it, we help create an instructional environment that is much more responsive to our audience.

Organizing the Content

The appropriate organization of content is crucial when conveying information or providing instruction. The clear articulation of the content order reduces the chance of misinterpretation or confusion by the learner while assisting him or her in establishing important and necessary associations between the elements that make up the content and between prior knowledge and current information. Fortunately, content organization is often made simple by the content itself. For example, the order in which a step-by-step task such as creating a new slide in PowerPoint is presented is very sequential and straightforward. On the other hand, some content is more open ended and much more complicated to organize. Imagine having to organize the content for a presentation on how to deliver a persuasive oral speech. This type of content could be effectively organized in a wide variety of ways.

It is in the delivery of this open-ended type of material that it becomes crucial for educators to give careful attention to the appropriate organization of content. Unfortunately, as we now find ourselves with the technology-enhanced ability to create our own instruction, we must often assume the responsibility of organizing our instruction ourselves. To do so effectively, we must have a strong understanding of the content itself, of our target audience's existing skills and knowledge, and of the desired learning outcome we wish to achieve. Based on these, we can begin to organize our instruction or information in clear and appropriate ways.

Preparing for Instructional Delivery

This is perhaps the simplest but most overlooked aspect of delivering effective technology-based instruction. Simply put, make sure everything works before getting up in front of your audience. Audiences or students are no longer tolerant of our lack of preparation and consideration when we don't know how to operate equipment. In addition to being familiar with the operation of the equipment, we must also be familiar with our presentation and its content. Were not suggesting that hours of rehearsal and practice are required in order to deliver a polished and professional presentation, however, adequate steps must be taken to ensure that, as the presenter or teacher, we are familiar with what we are presenting and with the equipment used to present it. Anything less runs the risk of seriously jeopardizing the instructional effectiveness of our presentation. This is a big price to pay for failing to take a few extra minutes to make certain we are prepared.

New Instructional Technology and Faculty Development: Negotiating the Titanic Through the North Atlantic

Dr. Wanda Bunch, Chief Curriculum Officer, Pitt Community College, Greenville, North Carolina, wbunch@pcc.pitt.cc.nc.us

Dr. Phyllis J. Broughton, Dean of Academic Affairs and Student Services, Martin Community College, Williamston, North Carolina, pbroughton@martin.cc.nc.us

Introduction: What does the Titanic have to do with new instructional technology and faculty development? As we are well aware, the Titanic was an extremely large ship that had to negotiate dangerous icebergs in the North Atlantic. The Titanic was promoted as an unsinkable new ship, guaranteed to deliver its passengers safely and for them to have a most enjoyable trip while moving from one shore to another.

For faculty, technology is that new ship. Like the Titanic, it is not unsinkable. Icebergs can wreck any project. There just has to be good navigation through the icebergs that will inevitably appear in the North Atlantic or in projects that execute change. A point for the navigator to remember is that icebergs are moving objects and hard to chart so what seems like smooth sailing may have some surprises along the way.

Methodology: To execute our plan, three phases were instituted. *Phase 1*: Recruit interested faculty on PCC campus, provide training in the Blackboard software and offer time, technical guidance and funding for on-line and web enhanced course development during the summer. *Phase 2*: Seek grant funding to provide released time or technical support to allow faculty time to devote to learning new technology. Offer training to PCC faculty first but invite regional community colleges to participate in the training, as well. Provide guidance and support for faculty interested in going "beyond PowerPoint." *Phase 3:* Seek additional grants to develop an E-Mentoring program to have faculty assisting faculty.

These phases were based on faculty needs assessment and again, like the builders of the Titanic, available innovations and demand.

Original Project Objectives:

- Assist faculty in transition to more technology use
- Provide learning in a non-threatening environment
- 'Incent' faculty to try new technology
- Increase internet and web enhanced classes across the curricula, to feeder institutions, to other institutions and to the global market

Faculty Involvement: Some faculty are adventurers – ready to try anything new and different; some see the move to incorporate more technology in the classroom and in on-line courses as an imposition on their academic freedom, their personal time and their teaching competency; some feel that the adventurers can try it first, get the kinks out, then they "just might" get on board if someone helps them. The course of action is to find the incentive for each type of faculty member and use that to ensure their participation. Some types of incentives which can be used are recognition, released time, new equipment, opportunity to be first and "know more," travel and presentation options, leadership opportunities, and the ever popular, cash.

Funding Sources: Businesses build incentive programs into marketing and training plans. In most cases, educational institutions, especially ones funded by tax dollars, have little or no ability to start or market new programs without taking funds from some other internal source. As with Pitt Community College, grants and gifts are usually the major outside funding sources but there are other internal sources available, as well. For example (1) lapsed salary funds which must be spent on faculty salaries or be returned to the state can be used for extra contracts for faculty technology skill and course development, (2) Grants with a technology "twist", (3) partnerships with industry or universities (4) faculty initiative.

Navigating Faculty Using E-Mentoring for Creating Online Courses and Marketing Materials

Welcome to E-Mentoring: A major concept for navigating the Titanic was through team work, with everyone having a major part to play for the success of the trip. Navigation for faculty was through a new technique called "E-mentoring," also referred to as telementoring or online mentoring. The role of the e-mentor is one of an esteemed educator who has already been down the path of learning technology and gained experience and knowledge to share upon a worthy e-mentee (one who is learning). An E-mentor is compared to the captain of the ship, one who been trained and understands the dangers of currents and plots the course for a successful trip.

With the year 2000, the Internet and technology has improved the way of doing business with the working world. The traditional role of mentoring has expanded and evolved as well. Technology has allowed up to alter the traditional method of mentoring, allowing the workforce and education to tap the career advice of a mentor from virtually anywhere in the world.

Goal:

With the use of E-Mentoring, the goal of this project was to provide a means for creative and interactive learning that involved significant and continuous participation among faculty as a team to develop online courses or marketing materials.

Objectives:

1. To use new tools and technologies to extend educational access to faculty for communication and online development.
2. To implement technology to improve the quality of teaching in face-to-face classrooms, web-enhanced courses, and online courses.

3. To change the nature of the teaching-learning interaction to involve learners more direction, support, and guidance in creating effective learning environments through the use of technology.
4. To develop marketing materials for CDs and/or web applications.

What is E-Mentoring? E-mentoring is an interactive relationship between a mentor and a mentee through the use of the Internet, e-mail, information highway, discussion groups, chat rooms, etc. For our training, e-mentors are the pioneers who have already designed, developed, implemented, and evaluated online courses. The e-mentors possess a wealth of knowledge and experience in technology and course design. They have the knowledge of "what works" and "what doesn't work."

E-Mentoring is a Team Effort: Developing online courses is a team effort and everyone brings a certain about of expertise to the team. In this project, the following roles and responsibilities were as follows:

- **Faculty mentors:** The faculty member of instructor assumes the role of the instructional or content expert. He or She is responsible for planning, implementing, and evaluating instructional materials. The Faculty Mentor also assists in locating resources and course materials appropriate for course content. He or She assists in helping Faculty Mentees solve problems related to organizational structure and policies.
- **Technology mentors:** A Technology Mentor assumes the role of assisting with instructional and graphic design and the logistics of structural design. This person is responsible for assisting the instructor in selecting software and hardware appropriate for specific course results. This person assists in designing specialized graphics; visuals and print materials; web-based materials; and audio, video, and digital requests. The Technology Mentor is also responsible for equipment setup, network connections, testing, and troubleshooting course design applications. This is a critical role in that the Technology Mentor advises the instructor how to develop course content and learning strategies to blend with software and hardware capabilities. Technology Mentors may be on your campus or at a distance. FTP (File Transfer Protocol) can be used for Technology Mentors off your campus.
- **Faculty Mentees:** The Faculty Mentee assumes the role of the learner by researching and working closely with a Faculty Mentor and Technology Mentor in course development. Faculty Mentees tasks include
    - communicating frequently with Faculty and Technology Mentors
    - preparing and following a timeline
    - developing course content and learning strategies
    - obtaining copyright approvals
    - developing contingency plans
    - taking care of program logistics
    - preparing course resources ahead of time
    - providing feedback to learners

About the E-Mentoring Project.
This e-mentoring project is funded by the North Carolina Community College system's grant. The grant is available from September 2001 to May 2002. This project is also unique because the e-mentoring took place between two community colleges. Martin Community College is located in Williamston, North Carolina, and Pitt Community College is in Greenville, North Carolina. Pitt Community College provided the Technology Mentors for Martin Community College.

The mentoring project included synchronous and asynchronous communication and learning.

- Synchronous communication is then mentors/mentee are online at the same time. This includes brainstorming, role playing, and discussing course content in real time.
- Asynchronous interaction is communication that takes place outside of real time. Mentors and mentees participate at times that are convenient for them. This delayed interaction allows mentors/mentees time to reflect and pace themselves and to check resources and references before contributing to online discussion.

Summary:

A series of training and application were conducted throughout 2001-2002. Approximately 123 faculty from 13 other community colleges participated in the training. Technology funds provided training and travel opportunities for faculty during a period when there were severe budgetary constraints with the community colleges. Funding provided release time for faculty, technical personnel to assist in software and hardware needs, and specific training and resources for course design. A web page was maintained for convenience for participants for information and updates.

Upon completion of this project, faculty will showcase marketing CDs (Commercial Refrigeration and Welding) and online course development. Materials developed are available for other colleges to share and use as resources.

Evolution of Faculty Web Page and Video Skills: A P^3T^3 Case Study

Pamela A. White
Purdue University
1442 Liberal Arts and Education Building
West Lafayette, IN 47907-1442
whitepl@purdue.edu

Chaoyan Dong
Purdue University
1442 Liberal Arts and Education Building
West Lafayette, IN 47907-1442
dongc@purdue.edu

James D. Lehman
Purdue University
1442 Liberal Arts and Education Building
West Lafayette, IN 47907-1442
lehman@purdue.edu

Abstract A primary mission of staff working with the Purdue Program to Prepare Tomorrow's Teachers to Use Technology Project (P^3T^3) is to train faculty members in the School of Education to use technology and serve as mentors during the learning process. This study was initiated to investigate how select faculty members evolved as they integrated technology into their work, how they perceived technology integration, and how effective and efficient their strategies were to use technology in their teaching In addition, existing problems in faculty training, and inefficient processes in technology integration were investigated. The authors provide tentative solutions to these problems and suggestions for possible early intervention in an effort to prevent similar problems in the future.

Introduction

Among other goals, the Purdue Program to Prepare Tomorrow's Teachers to Use Technology (P^3T^3) is designed to prepare pre-service teachers to demonstrate fundamental technology competencies, and prepare teacher education faculty to teach pre-service teachers in technology-rich environments by modeling approaches that future teachers should use themselves. In order to achieve this goal, P^3T^3 incorporates a comprehensive faculty development and mentoring program, which is the focus of this paper. P^3T^3 combines workshops, training sessions, and one-on-one mentoring. Workshops, which are conducted at the beginning of each semester and during summer breaks, consist of a two-day "start-up" session followed by three or more days of focused skills development. In the first two days participating faculty members engage in problem-based learning activities involving technology integration. This is followed by previews of technology skills development workshops and consideration of models of technology integration in education. At the conclusion of the "start-up" sessions, faculty members develop and share personal technology integration plans. Based upon the technology integration plan, a graduate student – skilled in the appropriate software/hardware to meet the goals of the faculty member – is assigned to provide optimal mentoring throughout the integration of technology into teaching during the following academic year. Subsequent sessions include workshops on WebCT, PowerPoint, FrontPage, and Dreamweaver, and "how to" sessions focusing on the use of digital video, digital photography, HTML programming language, and Purdue's career account system (supporting centrally managed storage for files and web pages).

Through workshop and personal mentor training provided by the P^3T^3 graduate assistants, some faculty made great strides in the development of technology skills. Others attended the same workshops but encountered major struggles and challenges as they attempted to incorporate technology into their courses. A few faculty members chose to continue their curriculum in the same manner as it always was – without the addition of new technology. What are the reasons for this broad spectrum of use? Why did some faculty members perform exceptionally well? Why did some find the challenges so overwhelming? And why are there still faculty members who choose not to use technology?

Theoretical Framework

Considering the rapid pace of development in educational technologies, coupled with innovations in teaching and learning, utilizing technology is high on the lst of priorities of educational managers, administrators and operatives. Sandholtz et al. (1997) noted the use of technology is recognized as a valuable tool – making technology more common while developing it to enhance teaching and learning. However, Brand (1998) found that despite increased access to computers and related technology, educators are experiencing difficulty in combining technology into classroom teaching practice. Training and mentoring provide two major incentives in aiding faculty to successfully integrate technology in teaching (Dusick, 1998; Dusick & Yildirim, 2000).

Methodology

This research relied on case studies conducted by two of the authors. Both of us are proficient technology users and work as graduate assistants in the P^3T^3 program. We serve as mentors for the faculty members and have been involved with the project since it's inception in the summer of 2000.

Through an interview process, we videotaped or tape recorded responses from three faculty members and a teaching assistant. Two additional faculty members included in this paper were not interviewed, but information was recorded from interviews with the P^3T^3 assistant assigned as their mentor. Completed faculty projects were also used as a source of information for the subjects – websites and edited video projects provide evidence of faculty involvement with technology. Subjects were selected to include those who successfully learned and integrated technology and those who chose not to make changes. The faculty members have been teaching from 10 to 37 years in K-12 and higher education. One faculty member was proficient with technology, but the others were at various developmental stages of computer skills. For the purposes of this study, they were categorized into two groups: those who used web design software to develop websites, and those who attempted to incorporate video into their curriculum or course presentations. We conducted the interviews to explore faculty member attitudes toward technology integration, the strategies they used to learn the technology and integrate it into their teaching, and to determine the challenges they faced as they incorporated the new skills.

Website Integration

Three faculty members were interviewed about website integration. Two had no prior experience with website development but the third was familiar with website design, as she maintains her own website.

Successes

Dr. F. has been a professor in the School of Education for more than 10 years. After attending the faculty workshops, with the help of her P^3T^3 mentor she created her own web pages and a separate website related to her research interests. Professor F. stated, "There are several people I work with that use web pages… It's very convenient for me to get information. Web pages look like the information source. The assistance I get from P^3T^3…definitely impacted me to have my own web page. I don't have the technical skills to do it, but after I went to the Dreamweaver workshop, I know what I can do." Dr. A. had been an administrator in the K-12 school setting for more than 30 years. He has been a Professor in the School of Education for three years. Like Dr. F., he created his web pages with the help of his P^3T^3 mentor after attending the faculty workshops. Dr. A. stated, "I use the web a lot in my work area...this university is a highly-technology involved university. Both of these are motivations for me to create a website for myself." Dr. E. has more than 5 years of experience as a professor in the School of Education. Recognizing the value of the web as a communication tool for her students, her associates at other universities, and the outside world even before the P^3T^3 project began, she employed a graduate assistant to create her own website. After attending the P^3T^3 workshops, he was excited about converting her designs from FrontPage on a PC operating system to Dreamweaver on the Macintosh platform. With positive reinforcement from her P^3T^3 mentor and technical help when she needs it, she has plans underway to transfer the pages to the new format rather than recreating the pages in a new website.

Challenges

Some challenges were more easily solved than others. Dr. A. was faced with the introduction of web-editing software that was different from the one he had originally learned. He stated, "The changing of the software forced me to learn the new technology. However, it'll be a long process for me to learn and update the new software." Dr. F. stated, "Faculty's time is very tight." Dr. E. agreed and also stated that she is a Mac user; however some web design software, like FrontPage, is just for the PC. Her need for P^3T^3 assistance occurred when she found a need to update her current site. She approached a P^3T^3 assistant and together they experienced a great deal of difficulty making edits, even when working on the platform used to create the pages. Because the grad student who made the original site was no longer available for advice about specific programming, editing was neither efficient nor easy. After unsuccessful attempts to edit the pages in a manner the faculty member could understand and duplicate, the P^3T^3 mentor recognized the faculty member's confusion and frustration. The mentor chose to work on the site alone, read the HTML coding, identify the problems associated with the programming, and save new documents. When the mentor and Dr. E. met again, Dr. E. successfully updated the new documents. The mentor's decision to work on the project alone prevented Dr. E. from becoming frustrated to a point of choosing not to make future changes. If she had faced the problems alone, they may have been overwhelming. By finding the problems and creating documents that could be more easily edited, the mentor helped the faculty member gain experience and confidence. Currently she needs little more than occasional help for her updates.

Impact of P^3T^3

Professor F. stated, "Without the assistance of P^3T^3, I don't know if I would have created [a site] or not. I got hands-on experience, and specific handouts in the workshop; I get back and use it. After the workshop, I got individualized help from P^3T^3. P^3T^3 provided me encouragement, support, a sense of 'can-do' confidence." Professor A. stated, "The P^3T^3 assistant has been indispensable for me to put that [site] on. [She] helped me a lot. It would not be on so quickly, in such a quality without [her] help. I really appreciate [the] help." In contrast, Professor E. stated, "I went to a couple of FrontPage workshops, but they didn't get to the level and skills I needed. They just start teaching how to create a new page, how to insert graphics." P3T3 one-on-one mentoring provided the required help.

As P^3T^3 mentors work with faculty, we must strive to help them determine the correct software before their projects begin. When projects are already underway, we must recognize when faculty members become frustrated and find ways to minimize the frustration and provide alternatives to motivate the faculty to continue making personal technical advancements. We must also meet the needs of faculty who already have some expertise but desire to learn skills beyond those taught in beginning workshops.

Video Editing

Several faculty members showed interest in adding video to their coursework after viewing a demonstration using iMovie on a Macintosh to make a video clip from a digital camera. Four faculty members subsequently purchased digital video cameras with a stipend provided from the P^3T^3 project. Others decided to use one of 14 cameras already available in the department. A variety of results occurred from the purchase of these cameras and the incorporation of digital videos. One faculty member and one teaching assistant were interviewed for this case study, as well as two P^3T^3 assistants working as a faculty mentors.

Successes

Teaching Assistant Mrs. L taped an interview with a Master Teacher in a K-12 classroom and desired to edit the tape prior to introducing the teacher to her students. She was immediately provided with personnel resources and training to complete the work within her timeline. The result was a teaching assistant with a new skill, and a polished final product that succeeded in meeting her objectives. Dr. E. first became involved with video through a 3-year project she headed in the Educational Technology Department – a few years before the P^3T^3 project began. Although she had extensive experience with video, she took a more personal interest in adding it to her curriculum when she saw the ease of digital video editing as presented in the P^3T^3 workshops. As a direct result, she purchased a digital camera and began working with it herself without the aid of her mentor. Soon she was editing the videos and she currently has plans to incorporate video in her classroom in the future.

Challenges

Even though Mrs. L. is a new teaching assistant in the School of Education, she set her project into motion with a set of clearly defined goals. However, she didn't realize the amount of video-editing time required to meet her goals. With her new responsibilities and minimal free time she was overwhelmed with the task she needed to accomplish. Professor G, a 17-year faculty member at Purdue, wanted to use video to document his research, but he became disinterested when he found that he could not use his video camera to download still photos to his Macintosh due to platform issues. Professor C, a Visiting Professor in the School, attended a P^3T^3 faculty workshop session designed to build computer skills through the use of hands-on training but experienced difficulty during the sessions. She commented that she did not learn skills when she was guided through each "point and click." Even though she wasn't comfortable with her own use of the technology, she realized its importance to the students so she added a video assignment to her undergraduate course curriculum. While this project had great potential, neither she nor her course instructors had the skills to support the activity. When it became clear that P^3T^3 staff would be unable to provide support for more than 400 students since the P^3T^3 project concentrates on faculty development, Dr. C. changed the assignment and made it clear to P^3T^3 staff that her teachers were too busy teaching course content – that "they don't have the time to teach technology."

Impact Of P^3T^3

Each instructor had different reasons to use video – personal research, interviewing guests, curriculum enhancement, and challenging students. Professors G and C do not have plans to continue using video at this time. Some of their setback lies in their lack of research and quick decision-making. Dr. G purchased a camcorder before realizing it did not fit his needs, and Dr. C assigned a student project before verifying resources for support. Ms. L. was overwhelmed by the amount of work necessary to edit the tape, and didn't plan enough time to do it by herself, but she communicated her needs effectively and P^3T^3 was able to obtain help so she could meet her goals. Each of these instructors had limited experience with technology. On the other hand, "Dr. E." is technology proficient and realized she needed to take time with a camera and learn to use it prior to adding the component to her classroom, choosing a slower path without the need to discuss it with her P^3T^3 mentor.

It is easy to become motivated to learn a new skill when opportunities arise, and experienced P^3T^3 assistants make the technology appear simple. However, learning a new skill takes time; two of the faculty members lost motivation when they learned that their goals had a price that was too high (in time and/or the requirement to learn and teach a new skill). In the future, as P^3T^3 introduces new technology, we can learn from the two faculty members who were successful. We need to recognize signs that instructors are planning unattainable goals and try to more effectively communicate the time and resources necessary to integrate new technologies so that the instructors have a better chance of success in developing realistic goals in the future.

Outcomes

The study shares successes for some faculty, but more importantly it identifies problems for faculty that include frustration during "point and click" hands-on workshops, platform-dependent issues, lack of awareness of the scope of some technology-integration issues, and a need for better pre-planning. Workshop instructors and mentors must analyze their audience/mentees and strive to meet their needs rather than assume all learners need basic skills. For example, let the participants bring questions and specific needs or challenges to the workshops. Help them understand what they can achieve at the end of their training. When tasks appear to be as simple as a "point and click" P^3T^3 staff must be capable of explaining the learning curve necessary to become proficient with the software and hardware. Most of the workshops are conducted on PC computers, and skills may not translate easily to Macs. Although many software programs are seamless today, there are issues when older versions of software are used, and these issues should be addressed. Mentors have an obligation to give faculty confidence in themselves by helping them determine realistic tasks using reasonable time and effort while using the appropriate equipment to meet their goals. Faculty must to be able to practice and use their new skills in their own time on their own computers so they are motivated to continue to increase their skills and become independent users of the technology who no longer need assistance. With the new skills, they will develop their curriculum to include technology designed for teachers of the future, and those of us involved with the P^3T^3 project will have met our goals.

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FINE ARTS

SECTION EDITOR:
Bernard Robin, University of Houston

For those of you who have been involved in technology and teacher education for a number of years, you may remember the days of the text-only Internet. It was less than ten years ago that there was no World Wide Web (do we even call it that anymore?), there were few if any pictures to access electronically, and multimedia files being available online was but a dream of futuristic things to come. What a difference a decade and a couple of billion web pages make! Today's Internet users are bombarded with an almost endless stream of images, animations and ever more sophisticated multimedia resources. And the prediction is that we have only seen the beginning. According to the Consumer Electronics Association, the DVD is the fastest-growing consumer electronics product of all time. Digital cameras are being sold in record numbers and in the US., digital television sales are estimated to exceed 10 million within the next five years. Recent surveys indicate that almost one fourth of the US. population over the age of 12 has downloaded music from the Internet and the number is growing.

Since the first graphical web browser became widely available in 1993, the text-only Internet has become increasingly less useful and less interesting. Emerging technologies, rich with media of all types and description, are converging in numerous and unanticipated ways that capture our imaginations and engage all types of learners. The opportunities for educators interested in taking advantage of these technologies are likewise growing but many challenges will arise for teacher education programs that understand that they cannot ignore the technological revolution that is part of our world.

With this year's SITE conference, a new strand has been added to showcase the convergence of the art education, technology and teacher education. With this addition, we hope to begin a series of dialogues and encourage an exchange of ideas on issues related to the coming together of art and music education, museums, technology and teacher education. With this first attempt, we focus primarily on educational projects involving museums of art. Museums in general, and art museums, specifically, are already enthusiastic technology users and providers of educational content on the web. In 1995, only about 120 museums had a web site, but by 1997, that number had increased ten times to 1200. Today, just about every major museum in the world has some type of online presence but the work now has shifted to adding quality and not just quantity. Museums are participating in partnerships with other organizations and collaborations with schools and universities are helping shape the use of new technologies to support teachers, students and all learners. Projects that have already been developed from such partnerships include the creation of virtual exhibitions, the writing of lesson plans that use museum content and the implementation of programs that bring teachers and students to museums for workshops, seminars and special projects.

The number of articles in this section is understandably small this first year but already, they reflect the diversity of programs already underway. We feel certain that in time, the convergence of the arts, art education, technology and teacher education, in all of its possible variations, will expand to include even more components. We hope to bring together art and music educators, museum education staff, technology specialists and teacher educators who can help re-design existing programs and create innovative new ones. We invite all others interested in these ideas, including K-12 teachers, researchers, and other community partners, to join us and share our excitement as we announce this new section for SITE.

Expanding the Boundaries of the Music Education for the Elementary Teacher Classroom with Information Technology

Dr. Cheryl Jackson
Music Education
College of Education
Eastern Kentucky University
United States
Cheryl.Jackson@eku.edu

Abstract: This paper is a report on how information technology is used in a music methods course for elementary education majors. The National Council for Accreditation of Teacher Education (NCATE), the National Association of Schools of Music (NASM), and the Kentucky Department of Education: New Teacher Standards call for teacher educators to address issues of teaching with technology. Information technology is incorporated into the Music Education for the Elementary Classroom Teacher course, especially through the use of *Blackboard 5*. Each student enrolled in the course has access to the course syllabus, project guides and other important information. To be able to use *Blackboard*, each student must be familiar with the Internet, email, and simple word processing. Effective uses of technology are modeled as sources of information, aids to effective teaching and learning, and a starting point for knowledge and the advancement of pedagogical skills.

Introduction

The Music Education for the Elementary Classroom Teacher course is required of all elementary education majors at Eastern Kentucky University. The trepidation of some of the students in the music education course is evident. Some are fearful of the music class, in general. Some are fearful of using the web-enhanced component of the course. Many of the elementary generalist education majors in the music education course are non-traditional students. Therefore, some of them have not had a great deal of experience in using computers. The author can understand this fear. Several years ago when the author began teaching in the public school system, the audio system that was used to play recordings, or an electronic keyboard, or other electronically amplified musical instrument were considered as using technology in the music classroom. The definition and scope of technology in the music and general classrooms has been significantly augmented. The National Council for Accreditation of Teacher Education (NCATE), National Association of Schools of Music (NASM), and the Kentucky Department of Education in the New Teacher Standards direct teacher educators to address issues of teaching with technology. Due to the importance of music and technology in the curriculum, future teachers must have many opportunities to develop and strengthen their skills in both areas.

A review of literature yielded very few articles that specifically addressed the use of technology with music education methods courses. As stated in the summary of agreements made at the Housewright Symposium on the Future of Music Education, held in Tallahassee, Florida, September 23-26, 1999, "Societal and technological changes will have an enormous impact for the future of music education." It is imperative that all persons are enabled to "participate fully in the best music experiences possible (National Association for Music Education, 1999)." Kimberly C. Walls' article (2000) presents some ideas for addressing technology competency in music education courses. Typical music education courses must include a great deal of information in a very short period of time. Therefore, the content of the course can be extremely condensed. This fact is especially true of the Music Education for the Elementary Classroom Teacher. The fundamentals of music are presented during the first half of the semester, leaving the remainder of the semester for elementary classroom instrument music performance skills, music teaching techniques, and other culminating activities. Information technology should enhance the course objectives rather than merely adding to them. As suggested by Walls, technology may be easily integrated into a music education methods course through the use of email assignments and on-line course materials (19).

Perhaps one of the most attractive features of using the web-enhanced component of the music methods course is the ability to access assignments and course documents from one's own home or computer laboratory any time day or night. Many of the music education students in the current report would agree with one of the subjects in the Bauer study, "I like being able to access course materials at a time that suits my own schedule and preferences." Bauer's study also addressed the attitude of the students toward web-enhanced learning experiences. "The degree of accessibility to Internet resources, along with the individual characteristics of students who use these resources, may be related to student attitudes toward this instructional methodology (Bauer, 1999)." As the web-enhanced component becomes user-friendlier and as the students' skills are strengthened, the attitudes toward the web-enhanced assignments may become more positive. On the other hand, as stated in the Bauer and Daugherty 2001 study, "Students indicated that they would not like to take a course that was conducted entirely over the Internet" (32). The course content of the Music Education for the Elementary Classroom Teacher would not lend itself to being taught entirely on-line. The success of many of the activities and assignments relies upon on-site classroom instruction with face-to-face communication to achieve some of the course objectives.

Blackboard

At Eastern Kentucky University the use of *Blackboard* has increased since it was placed into service. Since the music methods course includes a great deal of hands-on activities, one may not realize the benefits of an on-line component upon first glance of the course. However, the incorporation of *Blackboard* has enhanced the course objectives and has proven to be a great classroom aid to the students and the instructor. "*Blackboard 5* is a comprehensive and flexible e-Learning software platform that delivers a course management system, and, with a Level Two or Level Three license, a customizable institution-wide portal and online communities." (Blackboard Inc. 2001).

The course syllabus, course calendar, and project guides are all posted on *Blackboard* to which each student enrolled in Music Education for the Elementary Classroom Teacher course has access. Each student may access the information from the comfort of his or her own home or from one of the computer laboratories on campus. To be able to use *Blackboard*, each student must be familiar with the Internet, email, and simple word processing. The following features in *Blackboard* are used for the music education course: (a) Announcements, (b) Syllabus, (c) Assignments, (d) Communication, (e) Discussion Boards, (f) Digital Drop Box, and (g) Online Gradebook.

The Announcements page is the opening page. When the instructor needs to communicate an announcement to all students enrolled in the course, then the message is posted on that page. As previously mentioned, the Syllabus section includes the course syllabus, course calendar, and project guides with scoring rubrics. The students are enabled to retrieve these important documents at any time during the semester. The on-line availability of the course documents serves as a timesaving and cost-effective method of distributing materials to students.

The Assignments page is used to post coursework that needs particular explanation. For example, one of the requirements of the course includes each student teaching a mini music lesson in a mock elementary setting to his or her peers. A comprehensive Peer Teaching Lab informational packet is posted to the Assignments section. The Communication section is handy for sending messages to individual students about exemplary projects or missing projects.

The Discussion Board provides a forum for students to pose questions to their peers or the instructor. The instructor may set up a forum based on a particular topic. Many of the students in the music education class have had no, or very little, musical training. The Discussion Board allows the students to ask questions about the fundamental elements of music, and then, it allows their peers who *have* had musical training to answer their questions, thereby providing them with teaching moments.

The Digital Drop Box allows students to send their written projects to the instructor, and it provides a place to store their projects. The students have the option of sending written projects to the instructor via the Digital Drop Box instead of via email attachments. Sending the material by means of the Drop Box is more practical than filling the email inbox with a large quantity of messages. Many of the students at Eastern Kentucky University commute long distances; therefore, the ability to deliver written reports via *Blackboard*'s Digital Drop Box proves to be very handy. The Online Gradebook allows the students to check their grades at any time. It enables the instructor to organize the Gradebook entries and weight the various entries.

The web-enhanced component allows the students to take ownership of the course documents and information that is posted to *Blackboard*. Use of this component is a most efficient way of communicating with the students. The flexibility of anonymity *or* working with peers online serves as a very attractive feature.

Inconveniences with *Blackboard*

Although the Blackboard software has many advantages, a few inconveniences exist in the system. For example, some students have problems using the Digital Drop Box. When a student uses word processing software other than Microsoft Word, then the file may not come through at all. Word Perfect files will work, but the formatting may be changed. Also, the student must remember to *add* the file, and then to *send* the file. Often a student will not complete the final step. They also receive no confirmation that the file has actually been sent.

Three to four sections of the music education course are offered One major drawback to the Online Gradebook is that it provides a single alphabetic listing of *all* the students. The students' names are not separated into individual sections. Each section may have from twenty-five to twenty-eight students. The creation of groups is tedious for sections of more than about ten students.

Entering large documents such as the course syllabus, for example, requires a very rudimentary knowledge of HTML. When first getting acquainted with *Blackboard*, importing documents can be somewhat problematic.

Eastern Kentucky University has updated the current version of *Blackboard 5* to *Blackboard 5.5*. Some of the new features include the following: (a) weighting grades in the Gradebook; (b) displaying Announcements; (c) Setting Release Dates; and (d) Setting the Entry Point for the course. "Weighting grades in the Gradebook" needs no further explanation and has been discussed earlier. Concerning the displaying of Announcements: in the older version, the instructor had to mark an announcement as "permanent" to have it show on the opening tab. Otherwise, the announcement would only be visible for one day. In the newer version, the Announcement is automatically displayed for one week. The "Setting Release Dates" feature allows the instructor to choose a period of time that the document will be available to the students. As previously mentioned, the Announcements panel was the opening page in *Blackboard 5*. In *Blackboard 5.5*, an instructor may select the area of the course to appear as the opening page.

Additional Strategies

In the Music Education for the Classroom Teacher course, the students design and construct a Music Materials Notebook. The project is a collection of music related materials that the generalist teacher may use in his or her classroom. Students are encouraged to search the Internet for songs, bulletin board ideas, lesson plan ideas, and many other items for use in the Notebook. One of the sections of the Notebook is a personal entry. The students are encouraged to use their creativity in including a comprehensive section that is of special interest to them. The following are among the choices (found on the Internet) that students have included: a list of web sites that relate to music instruction, music games, music worksheets (crossword puzzles, word search, fill-in-the-blank, etc.), or piggyback songs (new words to "old" tunes).

As previously mentioned, each student designs and implements a mini lesson that includes music in a mock elementary class setting. The Peer Teaching Lab allows each student to practice many of the acquired musical skills with his or her peers, as well as enables the student to practice teaching techniques discussed in class. Students are encouraged to retrieve ideas for lessons from various sources including the Internet. In addition, they are required to use technology in their mini lessons. Moreover, students have used compact disks that they have created to provide accompaniment or listening examples.

Special Education majors, who take the music education course, are encouraged to survey the National Association of Music Therapy Website for relevant information. This particular site is kept up to date and is very helpful not only for the Special Education majors, but also for the elementary education majors.

Conclusion

The students' skills are strengthened through technology-enhanced assignments. Moreover, the assignments will prove to be useful in the future teachers' classrooms. As a teacher of teachers, the instructor is expected to model effective uses of technology as sources of information, aids to effective teaching and learning, and a starting point for knowledge and the advancement of pedagogical skills. Therefore, the students will best be served by incorporating authentic and relevant technology-enhanced assignments.

Those teacher educators incorporating technology into music or other fine and performing arts methods courses should be sharing their insights and experiences. If we are to truly expand the boundaries of our methods classrooms, then strategies and technology-based activities must be reported and documented.

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The Convergence of Teacher Education, Art Museums and Instructional Technology: Goals, Insights, and Recommendations

National Gallery of Art/George Washington University Team:
Phyllis Hecht, Web Manager, National Gallery of Art p-hecht@nga.gov
Julie Springer, Coordinator, Teacher Programs, National Gallery of Art j-springer@nga.gov
Natalie Milman, Assistant Professor, George Washington University nmilman@gwis2.circ.gwu.edu

University of Houston/Museum of Fine Arts Houston Team:
Bernard R. Robin, University of Houston, Instructional Technology Program brobin@uh.edu
Beth B. Schneider, Education Director, Museum of Fine Arts, Houston bschneid@mfah.org
Sara Wilson McKay, University of Houston, Art Education Programswilsonmckay@uh.edu
Sara G. McNeil, University of Houston, Instructional Technology Program smcneil@uh.edu
Donna Odle Smith, University of Houston, Instructional Technology Program odlsmith@uh.edu

Abstract: The focus of this panel discussion is to examine how art museums are creating partnerships with schools, universities, and teachers to design and develop technology-based instructional resources that can be used by students, in-service teachers, pre-service teachers, and the general public. Education specialists from the National Gallery of Art and the Museum of Fine Arts, Houston, along with educators from the University of Houston and George Washington University, will describe the programs they are creating and discuss the benefits, challenges, and lessons learned from these collaborations. The panelist will explore the role of museum educators and their institutions as they embrace and utilize technology as part of their mission to work with teachers and schools. University faculty and students will also discuss the challenges involved in creating and taking graduate level courses that utilize museum content and resources.

The National Gallery of Art's Project: 2001: A Cyberspace Odyssey

Phyllis Hecht, Web Manager, National Gallery of Art
Julie Springer, Coordinator, Teacher Programs, National Gallery of Art
Natalie Milman, Assistant Professor, George Washington University

This education initiative at the National Gallery of Art was the first of two annual programs designed to explore online technologies as tools for studying and teaching art. Open to teachers nationwide, participants began to plan and develop online programs that will integrate K-12 curriculum content, constructivist learning theories, and the art collections of the Gallery. The technology initiative was the most recent incarnation of a professional development seminar, The National Teacher Institute, that has been offered every summer at the Gallery since 1989. The Institute was established with the belief that the best teachers are those who make time to renew their skills and rededicate themselves to lifelong learning.

The goals of the 2001 program were two-fold: to strengthen teachers' skills and comfort levels using online technologies and to help them develop Web resources that they or their students could use in the classroom or during independent research. A select number of the final projects will be edited and published on the National Gallery's Web site for use by the online community of K-12 educators.

A major challenge was how best to establish certain parameters for the content and design of the projects, while allowing for the inventiveness and creativity of individual teams. We also wanted to ensure that finished products met teachers' specific curriculum and instructional needs, while constituting useful resources for the wide variety of K-12 educators who would be accessing them through the National Gallery's Web site (http://www.nga.gov).

We also realized that many of the teachers selected to participate, although experienced in writing lessons or curricula, would not have sophisticated skills writing or designing for the visually-based, dynamic

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medium of the Web. The six-day program was thus framed to facilitate understanding of effective Web use, and good Web site design and writing. We began by introducing teachers to the collections of the National Gallery by showing them how to use the Gallery's Web site search engines in order to find the best objects to support their curriculum projects. Reading assignments and critiques of select Web sites done prior to their arrival in Washington helped prepare them for selecting the best activity structures and design features for their projects. Armed with these insights, teams were then asked to refine or refocus their original proposals for brief presentations at week's end.

Another challenge was how to support teachers once they left Washington and keep them motivated and working once they returned to teaching full-time. Each team was assigned two mentors with whom they could brainstorm and problem-solve through e-mail and phone communications. One mentor was qualified to advise on the content development of their project; the other on the technology and software issues faced in building their projects. A listserv was established to facilitate communication among the teams and Gallery staff members. A password-protected Web site was also established to allow easy reference to project guidelines and deadlines, links to educational resources and software tutorials, and to provide work spaces to build their individual projects.

Recommendations from the Museum of Fine Arts, Houston Education Department

Beth B. Schneider, Education Director, Museum of Fine Arts, Houston

Since 1997, the Museum of Fine Arts, Houston (MFAH) has collaborated with the Program in Instructional Technology in the College of Education at the University of Houston (UH) to design a series of Web site components. These include the Bayou Bend Web site for the Bayou Bend Collection and Gardens (http://www.bayoubend.uh.edu), the American decorative arts (1640-1880) wing of the MFAH; a temporary traveling exhibition Web site for *The Grandeur of Viceregal Mexico: Treasures from the Museo Franz Mayer* (http://www.fm.coe.uh.edu), a private art museum in Mexico City (March 2002 launch); an online catalogue and order form for materials from the MFAH Teacher Resource Center (online spring 2002); and a prototype Web site for kids. The Bayou Bend and *Grandeur of Viceregal Mexico* sites were each developed over several semesters by graduate students enrolled in Web design and multimedia classes. Each semester, a different group of students enrolled in the course. For the online catalogue, a staff member in Instructional Technology and a graduate student, took a printed catalogue and, using Cold Fusion, created an online catalogue from which teachers in Texas can order free loan materials from the museum. In another project, middle school students participated in a four-session enrichment experience called "Multimedia Masters." Each session lasted a full day, with part of the activities taking place at the MFAH and others taking place at the university. The Spring Independent School District had collaborated with UH on this activity in the past, and in the fall of 2001, focused the class on a kids' Web component for the MFAH. Through these various partnerships with UH graduate students, faculty, and staff, the MFAH education team has learned valuable lessons about collaborating on Web site development with universities.

For all of these projects, the people developing the Web sites had to learn about the technology and also about art, a new topic for almost all concerned. Graduate students, most of whom worked full time while attending school, had to acquire new technological skills and learn content from a very unfamiliar field of study: art and art history. The enthusiasm of the museum staff and UH faculty for these projects, meant that each project was overly ambitious – although all were completed as planned. The deadlines inherent in an exhibition Web site are much more demanding that those for content focusing on art in the museum's own collections. Finally, the MFAH had a rather small and inadequate Web site that, until late in 2001, did not have the same sophisticated level of design and content as did the MFAH's traditional publications. The museum does not at this time have a full-time Webmaster.

For other museum's planning collaborations with local universities in the development of Web site components, some of the lessons learned from the MFAH/University of Houston partnership are described below:

- **Focus on your permanent collection and on those works of art which have been published, have been the focus of research, for which you have images and curatorial expertise.** The great challenge of working with temporary exhibitions is that text and images are often not available far enough in advance for students to have enough time to develop the site.

- **Begin with projects that do not have definite time restrictions.** An exhibition Web site has to be ready to launch a month or so before an exhibition opens. A component of the museum Web site focusing on an aspect of the permanent collection often has greater flexibility and the museum can respond to the needs of students developing the site.

- **Be realistic in the scope of your initial projects.** The Bayou Bend Web site was developed from three existing brochures focusing on Bayou Bend's collection, founder, and gardens and architecture. Students had access to abundant research and images. *The Grandeur of Viceregal Mexico* project had little advance scholarship accessible in English; few texts on the specific objects; few images until well into the project.

- **Be prepared to spend a significant amount of time working with faculty and students.** MFAH project director and education director, Beth Schneider, attended the weekly 3-hour meeting of the Web design class; facilitated the student group working on the exhibition introduction; and was the conduit for all content information, images, and text approvals. The project also required frequent meetings with faculty and curators.

- **Be aware that not all projects are appropriate for students**. The online catalogue was first assigned to a graduate student who was just learning Cold Fusion and this provided less than hoped for results. The most efficient solution to this problem was for the museum to pay a UH staff member expert in Cold Fusion and a graduate student who was learning the program. Together, they were able to complete the project on time and with significantly greater expertise.

- **Student learning is the focus of the classes** . In a classroom setting, the museum is not a traditional client and university faculty and students are not traditional contractors. Learning to work with actual clients is a part of that process, but not the only important part. The museum staff members involved in the project need to balance the educational needs and goals of the students and faculty and the needs of the museum in creating a final project. This can be a very delicate and sensitive process.

Overall, the MFAH-UH collaboration has been a great success. Everyone involved in the project has learned a great deal. MFAH staff members look forward to future collaborations with the Program in Instructional Technology at the University of Houston and discussions have already begun to determine what projects will come next.

Recommendations from the University of Houston Instructional Technology Program

Bernard Robin, Associate Professor of Instructional Technology, University of Houston

Two graduate Instructional Technology courses at the University of Houston (UH) use content from the Museum of Fine Arts, Houston (MFAH) as the raw material for technology-based projects that student teams design and develop. The first course to be discussed is CUIN 7330: Project-Based Web Design and Development. This course focuses on the planning and creation of web-based educational resources that enhance works of art and decorative arts that are on display at the museum. Each student in the course is part of a team that includes other students, a university facilitator, and a staff member from the MFAH's education department. The teams are each assigned different project components that together make up a large-scale project that may last for several semesters or even several years. A more detailed discussion of the course and its workings may be found in *A Model for Creating an Art Museum-University Partnership to Develop Technology-Based Educational Resources* (Robin, McKay, Schneider, McNeil, & Smith, 2002.)

The course is now in its fifth year and the relationship with the MFAH, as the content provider, continues to evolve. Based on our experiences, the following recommendations are suggested for other educators who would like to create similar partnerships with art museum partners.

- **Make sure the students understand the expectations for their work.** Working with real clients with real deadlines gives students an understanding of what they will face when they finish school. In this course, we do not operate under the philosophy that "this is only a school project." If the work is good it will be considered for going on the web; if it's not good, it will not. Clear expectations about the quality and specifics of student work should be articulated by the client and the faculty members. In this collaborative setting, students learn to critique their own and other students' work in a non-personal, non-threatening manner. Through a series of such critiques, not only will the quality of the work improve, but the students' understanding of the design process will increase.

- **Make sure the museum staff understands that student learning is the most important component of the course.** This concept is often stated but is worth repeating. It is the job of the university educator(s) to make sure that student learning remains the most important component of the course. The opportunities afforded by working with an art museum are many, but the opportunities for learning are the reason students enroll in a course. A willingness on the part of the client and the faculty to be open to student ideas will increase the potential success of the partnership.

- **Make sure that university educators understand basic museum policies and procedures.** Even though student learning is the focus of the course, educators must not forget that the client's needs are almost as important. If the student work does not meet the client needs, or if the faculty do not work within the policies of the museum, the partnership will suffer and ultimately, may dissolve.

- **Use additional university and museum experts as project component facilitators.** We have learned that in large-scale projects, student teams benefit from a university or museum expert who is willing to work with the students. These individuals provide valuable guidance and expertise and help the teams determine which parts of their design and development meet the needs of the client.

- **Try to recruit students from other disciplines outside of the Instructional Technology Program.** We have also found that the course can be strengthened by having students from other programs besides IT enroll in the course. Student with backgrounds in other areas such as art, art history, and social studies can add depth and meaning to the projects that are created. Since there will almost certainly be other team members who possess technology skills, not every student in this technology course needs to be a technology expert.

- **Provide opportunities for in-depth research.** Students interested in using these projects as the basis for thesis or dissertation work find a great opportunity for research. The museum benefits from scholarly research that focuses on their exhibitions and students benefit from a wide array of possible research topics and a large population of potential participants.

- **Prepare for changing expectations of the clients.** Finally, be aware that as design and development of technology-based resources progresses, the client's expectations may change. Rather than treat this as a negative occurrence, we view this as a predictable and necessary consequence of such a partnership. Students learn first-hand that no matter how meticulously they plan their projects, modification of their work will be needed as their clients see their work and begin to adjust their expectations of what is possible.

For the Project-Based Web Design and Development course, a critical factor for success has been the ability of the university educators and the museum education staff to adapt to change. Over the last several years, we have continuously made changes to the course and to the projects that students create. In addition to the recommendations already mentioned, being flexible will almost certainly enhance a successful, long-term outcome in a museum-university educational partnership.

Other Critical Factors for Success

Sara McNeil, Associate Professor of Instructional Technology, University of Houston
Donna Odle Smith, University of Houston, Instructional Technology Program

The second course, Collaborative Design & Development of Multimedia, is a two-semester course sequence of planning and creating interactive multimedia resources. These students also work in teams with content facilitators, but the products from this class are destined to either function in stand-alone multimedia kiosks, or to deliver web-enabled multimedia content. The deliberately interactive nature of this type of product requires a unique approach to content design, organization and delivery.

Several themes that emerged from data gathered from both the students and the client that are representative of the current literature in the field of educational technology development are shown below.

- **Preparation and Shaping Expectations**
  Students need to completely comprehend the steps of the process before they begin the actual design phase. The process of designing and developing multimedia courseware is complex and often difficult to understand when it is built only on a theoretical and technical framework. If both the students and client understand that there are often periods of indecision and questioning and possibly redesign, then perhaps the process would proceed more smoothly. Students should also realize that every team is different and that flexibility is a critical factor for success.

- **Dedicated Client-faculty Member**
  The client must be willing to work with students in a variety of roles from content matter expert to the user of the materials and must become active participants in the process. The client must be accessible at times other than class periods and flexible in their thinking about the possibilities for design.

- **Time to Build the Large Community with Adequate Time for Reflection and Meetings**
  The teams and the learning community in which they function, needs to be established as quickly as possible. Other opportunities for developing team skills and communication should also be provided throughout the design and development process. Teams should have time during class to meet, but should also expect to communicate either face-to-face or in person between classes.

- **Good Problem and a Variety of Approaches**
  The instructional problem should create a balance between challenge and frustration for the teams. The process should support a variety of solutions and opportunities for creative and original discoveries.

The multimedia projects that resulted were the results of a small team of students working together part-time with limited interaction and limited resources. Even with those limitations, the four modules developed displayed a remarkable level of creativity, imagination, innovation, and mastery of both instructional design principles and application of technology for online learning. It is not hard to visualize the level of quality that might be achieved by those teams working under different circumstances where more time and resources were available.

The Convergence of Teacher Education, Art Museums and Instructional Technology: Goals, Insights, and Recommendations

Sara Wilson McKay, University of Houston, Art Education Program

The following section includes some thoughts about collaborative efforts among teacher education programs, specifically in art education, art museums, and instructional technology:

Collaboration: A Definition

In any collaborative effort, a laying bare of several key aspects must occur. Players in the collaboration must each honestly assess their strengths and be forthright about what benefits they hope to reap from the collaborative process. Also a genuine willingness to co-labor is imperative: true collaborative work (vs.

cooperative work) recognizes that each participating party comes to the table with goals and agendas, but there is an openness and an expectation in collaboration that these goals and agendas will change and be improved through the process. To emphasize co-laboring is to admit that any truly collaborative endeavor is indeed a difficult and delicate task requiring the utmost in trust from all parties.

Correlated Communication

The Art Education program at the University of Houston has collaborated with several area arts organizations of varying size and structure, before now becoming involved with the MFAH. Attempting to add Instructional Technology components to already conceptualized collaborations that students in the Art Education program have developed as their real-world projects has so far most often occurred as an afterthought—e.g. a video project was conceptualized to support the orientation information for teachers for the university's Mobile Art Quest (MAQ); at the time during the class, the realization of this idea was not a possibility, but this project has now been adopted by IT Program's video class as a potential project, yet it could have been a much richer project if it had been conceptualized in a collaborative way from the outset. However, now that frequent and open communication has become more of a stable feature between IT and Art Education, we expect that the very conceptualization of the projects with area arts organizations will change for the better.

Real-World Projects

In addition to open and on-going communication, the next key feature is the opportunity to work on real-world projects in pre-service teachers' classes. Future art educators, when working with their client, begin to see their efforts in a whole new light. They conceptualize education in a much larger way than what occurs in the K-12 classroom—the end-user is not a generic 10-year-old who is imagined during the creation of endless lesson plans. Rather, the end-user of their educational efforts is someone they can imagine who has specifically had certain experiences in a museum or on a web-site. Specifying the beneficiaries of their efforts concretizes the pre-service teacher's transition from student to teacher in that they become cognizant of the importance of their role as teacher. They see, anticipate, and plan for direct results of their educational efforts. Obviously, there is overlapping benefit in students broadening their thinking about education in a non-school environment that impacts their eventual performance in the K-12 classroom.

Linking Pre-service to In-service

In bringing together IT, art museums and teacher preparation programs, one of the goals is to prove the usefulness of both technology and museums (and other learning sites) in students' future teaching endeavors. If teachers experience instructional success with technology and view museums as important educational places in their pre-service work, they will take these beliefs and these skills into the schools where in turn they will have influence not only on their own students but also on their colleagues. It has been said that improving the quality of education happens one teacher at a time pointing to the impact quality teachers have on their students, but this does not acknowledge the large impact innovative teachers also have on their colleagues and on school climates. Forging the link frompre-service education to in-service education is one of the things a convergence of museums, technology and teacher preparation does best.

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GRADUATE & INSERVICE

SECTION EDITOR:
Caroline M. Crawford, University of Houston-Clear Lake

The appropriate and successful integration of technology into today's diverse learning environments remain a predominant theme of importance within the areas of graduate and inservice education. Research focused upon face-to-face, Internet-enhanced and Internet-based learning environments has expanded imperative theoretical, research-related and application-based discussions. The appropriate and successful integration of technology within the learning environment is the focus of the majority of outstanding articles within this section. The authors within this section offer the latest research and theoretical issues through which the future of face-to-face and distributed learning environments will emerge.

Professional development is a growing area of interest within the world of instructional technology. The integration of technology into the learning environments over the previous ten year period has left a significant gap between the amount of technology available and the support for teacher candidates and inservice educators towards appropriately and successfully integration technology into the learning environment. As such, a renewed interest in and focus upon professional development is occurring within the world of graduate and inservice education. Emphases upon managing change, action research, integrating technology into the teacher candidate and inservice educator's learning environments, as well as Internet-enhanced and Internet-based professional development opportunities are discussions emerging as predominant themes.

Learning environment instruction is a vital element within graduate and inservice education, with the essential aspects focusing upon learning environments, learner-centered and instructor-centered instruction, collaborative technology integration into learning environments, interactive activities, project based instruction, content-based instruction and case study-based instructional environments. Learning environments emphasizing the latest research and theoretical issues pertaining to face-to-face, Internet-enhanced and Internet-based instruction are in its infancy. As well, the integration of technologically focused enhancements for the learning environment is accentuated. Instruction pertaining to scaffolding of knowledge, multimedia resources, instructional design and development, and the integration of moral development theory maintain interest; further, a triadic collaboration that enhances instruction through technological integration is discussed. Interactive activities associated with Web-based conferencing, videoconferencing, francophone networks, and other related information communication technologies are discussed with opportunities to communicate points of interest. Finally project-based, content-based and case study-based teacher education and graduate level learning environments are highlighted.

Student-centered learning environments focus upon engaging students outside the classroom environment, multimedia and handheld technologies. Engaging students within real-world environments, outside of the four walls of a classroom environment, offers innovative aspects towards enhancing learning objectives. Multimedia learning environments enhance the student-centered opportunities towards further understanding, with emphases upon linear and nonlinear multimedia programs; further, cognitive learning theory and instructional design models are appropriately incorporated and presented as aspects of the design and development process. Lastly, handheld technologies have become elements of interest, as standards, assessment and accountability are presented as prevailing movements within the learning environment.

Teacher candidate instruction is a continual area of focus within instructional technology. As such, focusing upon developing master instructional technology educators within graduate and inservice learning environments. One project that emphasizes the development of master instructional technologists is Project MITTS (Developing Master Instructional Technology TeacherS) that focuses upon technology-rich field experiences as well as professional development opportunities that emphasize standards, best practices, mentoring and the utilization of technology. A second project is one that emphasizes the partnership between institutions of higher education, surrounding school districts, public libraries, hardware manufacturers, software designers and manufacturers, local community organizations and telecommunication companies. Each of the organizations associated with the partnership emphasize a systemic educational reform through professional development opportunities.

Certification, accreditation, evaluation and levels of competency are areas of continual concern. The importance of national accreditation and certification standards towards the appropriate and evolutionary evaluation of teacher preparatory units and instructional technology programs emphasize a continual formative progression towards appropriate and successful level of expertise expected so as to enhance the preparation of teacher candidates and further enhancing the standards of inservice educators. Instructional technology competencies of graduate-level teacher candidates, graduate students and inservice educators offer elements of expertise and reflect the encouragement and promotion of information technology through the development of portfolios as a reflection of information technology competency.

Graduate and inservice education theoretical discussions and research that impact the learning environment are imperative to the ever-expanding conceptual framework. Pertinent theoretical issues surrounding graduate level, teacher candidate educational opportunities and inservice teacher professional development must be carefully considered and are imperative as technologies become more available and viable within learning environments. The authors within this section have presented rigorous research, contemplative theoretical discussions and thoughtful reflections that exemplify the cutting edge of the world of instructional technology.

Caroline M. Crawford is an Assistant Professor of Instructional Technology at the University of Houston-Clear Lake. She can be reached at crawford@cl.uh.edu.

GIS in Teacher Education: Notes from the Field II

Marsha Alibrandi
Shannon White
Rita Hagevik
Barbaree Ash Duke

Over three years of an experimental course entitled GIS in Education, we have consistently engaged student participants as collaborative co-constructive partners in designing instruction. With a class website that facilitates communication between students and instructors, and by incorporating former students as instructors, a number of new components have been added. With a goal of sustained GIS integration, we have conducted follow-up studies of in-service Instructional technology teachers' use of GIS across the curriculum. GIS projects designed by the participants and the results of follow-up studies are presented.

In an experimental course offered to M.Ed. candidates in Instructional Technology, course design, the design of the course itself is coconstructed with student participants. Given the uniqueness of a GIS in Education course, there is opportunity to discuss with students the value, placement and design of such a course as part of their Instructional Technology experience.

Through web and email feedback, reflections, discussions and quizzes, students have provided useful insights into their learning and how a course of this kind can best meet teachers' needs. Aduet and Paris and Audet have both discussed the proplonged period between teacher introduction to GIS and its implementation. In various studies, we have investigated what factors contribute to what we have called GIS 'uptake.'

Working with prior students to understand what helped them most to learn toward implementing those suggestions in future iterations, we found that the addition of a virtual lab component, books that discuss GIS use in both communities and schools, and a community partnership component were all contributing factors to learning and using GIS in concert with existing curricula. In the state of North Carolina where high stakes testing has greatly impacted classroom teacher practice, the integration of technology must meet curricular goals.

Elementary, Middle and High school teachers all found applications across a wide range of curricula. Of a dozen graduate teacher education projects, there were three main subject areas: Social Studies, Language Arts, Business Education and Earth Science or Geology See Table 1.). Additional projects by other students were not related to K12 curriculum, but to other issues.

With a goal of both temporal and curricular 'uptake,' we promote a methodology of cllaboration At least two of the teachers integrated interdisciplinary curricula with GIS. The Techno-book project was based in the language Arts curriculum of student reading "journey books" that tell the stories of journeys. The Instructional Technology specialist designed a project in shich students would map the journey using a GIS (ArcVoyager), would relate historic, weather and economic information to provide context for the story, and would present these in a Power Point presentation.

Elementary	Middle School	High School
Town History (4th grade	Techno-Book project	Business Education: Site Location
Town History	Civil War History: Troop Movement	Barrier Beach Erosion Modeling
County-wide SPED Resources	Geographic Regions of North Carolina	Voter Redistricting in North Carolina
	Historic Slave Population Demographics	Historic Population Change in the South
		Business Education: Locating a new GAP store

With Instructional Technology specialists central and working across disciplines, we hope to see increased lateral 'uptake,' that is, uptake of GIS by teachers other than the initial GIS user. In subsequent meetings of Instructional Technology specialists, presentations on GIS are planned to develop interest and support of GIS integration.

Among international GIS educators, there was debate about the location of GIS in the curriculum; whether geography, the natural sciences or instructional technology were the most appropriate home bases for school GIS. It has been our assumption (with inadequate evidence to project) that uptake in Instructional Technology might result in more lateral uptake across disciplines. One issue involved in the lateral adoption of GIS is that when one person concentrates his or her energy on GIS without reaching out to collaborate across disciplines, that GIS could essentially be lost to an entire school population if that one teacher moves or retires. Our assumption is also that instructional technology specialists can more easily integrate any technology across disciplines, so that GIS would simply be one more of those technological skill sets that could be transferred from one discipline to another, thus enhancing transfer learning.

As the course continues and if teachers tend to avail themselves of in service GIS opportunities, we will investigate these possible expansions of school GIS application. By SITE 2002, we will have additional data to report regarding integration by schools who have participate din various GIS offerings.

Professional Development Kit (PDK): Multimedia Resources for Instructional Decision Making

by Kelly Hunter Limeul and Janet Smith
National Center on Adult Literacy
University of Pennsylvania/Graduate School of Education
3910 Chestnut Street
Philadelphia, PA 19104-3111

The Professional Development Kit (PDK) is a multimedia resource for adult educators that utilizes print, video, CD-ROM, and the depth, flexibility, and complexity of the web.

The CD-ROM contains over 10 hours of Quicktime™ video that is accessed from within the computer's CD-ROM drive as one navigates through the different organizational elements of the PDK web site. The videos are also available on conventional VHS tape for viewing in group or classroom settings. Within the 10 hours of footage are authentic classroom investigations centered around particular topics, as well as commentary from professionals working within the field of adult literacy. The centerpiece of the kit is the PDK Guide, which provides ideas and resources of how to use the accompanying CD-ROM and videotapes in the professional development of adult educators.

The submitted video "Margarita: Narrative" follows an ESL teacher as she attempts to engage students in reading, writing, speaking and listening through the use of a dialogue exercise. The taping took place over a two week period in an authentic high functioning ESL classroom in Bethlehem, PA. The final 15-minute piece was culled from over 15 hours of raw footage.

The Maze of Re-Certification and Accreditation

Frances K. Bailie, Ph.D.
Department of Computer Science
Iona College
United States
fbailie@iona.edu

Catherine M. Ricardo, Ph.D.
Department of Computer Science
Iona College
United States
cricardo@iona.edu

Abstract: Education in America is currently receiving prominent attention in the public forum. Efforts to strengthen the quality of education have included more rigorous student and teacher standards, creating the necessity for reforms and revisions in teacher preparation programs. This paper describes the process involved in applying for New York State Re-Certification and NCATE Accreditation of a Masters Program in Educational Technology. The focus is on the challenges that a small college faces in complying with the requirements of various organizations. Problems, solutions and a sample curriculum are provided.

Introduction

One of the goals of the Goals 2000 legislation passed in 1994 was to provide teachers with opportunities for lifelong enhancement of professional skills. As a nation, we have fallen short of this goal (Senate Committee on Labor and Human Resources 1998). The turn of the century has witnessed a renewed interest in the state of education in America, as evidenced by its prominence in the 2000 presidential election. Parents are concerned about the quality of education their children are receiving. Our nation's leaders are calling for accountability as they seek to close the gap between our system of education and that of other industrial nations around the world. Concern appears to be focused on the lack of competent teachers, laying the problem directly at the feet of teacher preparation programs. One response has been the establishment of stricter standards. But the solution begins with the consideration of the students' needs and growth. Once we establish what our students need to know and be able to do, we can develop programs to prepare teachers to meet student objectives. Teacher standards must flow from student standards. However, setting standards is only the first step; of far greater importance is developing assessments to meet the standards (Galluzzo 1999). Almost every state has released more rigorous learning standards for students. Since research has shown that teacher expertise is related to student achievement (Darling-Hammond 1997), we must now focus our attention on teachers and the programs that prepare them. States are rethinking their certification procedures as well as their policy of requiring accreditation of teacher preparation programs, thus putting organizations like the National Council for Accreditation of Teacher Education (NCATE) in the foreground of the educational reform dialogue.

Iona College's MS Program in Educational Technology

Iona College has offered a graduate program in computer technology in education since 1983, when the College's MS program in Education Computing became the first of its kind to be approved by the New York State Department of Education. The program was offered at both the main campus in New Rochelle and the branch campus in Rockland County. It was designed for teachers, administrators and other school personnel, whether they were computer novices or experienced computer users. The goals were to enable them to provide leadership in the field for schools and industry, to integrate educational computing into the school curriculum, to be teachers of computer literacy, to write educational software, and to conduct research and evaluation in the field. Because the program was placed within the Department of Computer Science rather than the Department of Education, there was a strong technical computing orientation that included programming. Students who completed the MS program were eligible for permanent certification in elementary education and the secondary subject areas, provided they met the other state requirements. The degree was considered by the state to be "functionally related" to all these certification areas.

As originally offered in 1983, the program had a common core of 9 credits, three areas of specialization (Elementary Education, Secondary Education, and Educational Software Design), each with 12 specialization core credits. The specializations required programming in an appropriate language: LOGO for elementary education, BASIC for secondary education, and a commercial language for software design. There were 9 credits in general electives, and 6 credits in a culminating experience (thesis or project). When the program was revised in 1991, the goals remained the same but the specializations were eliminated. The core was changed to 15 credits, with 15 credits in general electives and 6 credits in a culminating experience.

Because of changes in the undergraduate preparation of teacher candidates, the Department of Computer Science undertook a major revision of the program in 1998. As the College was educating the community about its mission statement, the department identified the mission of the program: To provide students with the knowledge, skills, and experiences to become successful practitioners and leaders in the field of Educational Technology. At that time we changed the name of the program to MS in Educational Technology. The student population was identified as teachers, administrators, corporate trainers, and others who wish to enhance their knowledge of emerging educational technologies. The program remained open to both computer novices and experienced computer users. Linked to the mission of the College and the department. the program goals were defined to enable graduates to: provide leadership in Educational Technology for schools and industry; participate in the integration of Educational Technology in the learning environment; conduct research and evaluation in the field of Educational Technology; develop a foundation for continuing education and growth in the field of Educational Technology.

The curriculum changes included adapting an existing course, Introduction to Software Packages for Education, as a transition course that would not count towards the degree. The core consisted of 12 credits, with 18 elective credits, and a 6 credit capstone in research methods and a research project. The department committee's proposal was approved by the department and the college committees and was sent to the State Education Department, where it was also approved and went into effect in September of 1999.

New York State Certification Requirements

In 1996, after New York State adopted new performance-based student learning standards, the Regents Task Force on Teaching was established to address the teaching crisis in the State. They found that too few teachers are prepared to incorporate the more rigorous student standards and assessments and that too few teachers are able to sustain a high level of standards throughout their career (Teaching to Higher Standards: New York's Commitment 1998). The findings of this task force led to immediate action by the State. In September 1999, the Deputy Commissioner for Higher Education in the State of New York sent a letter to institutions offering teacher education programs stating that the Board of Regents had adopted new standards for teacher preparation programs. Among the objectives of these new standards are to ensure that: teachers would receive rigorous preparation in the content areas they would teach; these new teacher standards would coincide with the performance-based student learning standards that had been adopted in 1996; teachers would have experiences with diverse student populations; education faculty would collaborate with faculty in the arts and sciences, local schools, parent and community groups.

Seeking New York State Certification

The State also issued revised methods of obtaining both Initial and Professional Certification for teachers. When Iona received notification of these changes, the first decision we faced was whether to revise our program to offer Initial or Professional Certification. Since Initial Certification had traditionally been the province of baccalaureate programs, it seemed appropriate to offer our students the opportunity to attain Professional Certification. The State described numerous ways to achieve Professional Certification but those we considered were: 1) A Masters degree plus 12 graduate credits in a candidate's undergraduate major and 2) A Masters degree that includes 12 graduate credits linking pedagogy and content in English Language Arts, Mathematics, Science and Technology, and Social Studies. We rejected the first option because the completion of at least 40 graduate credits appeared to place too great a burden on students. We decided on option two because we believed it would better meet the needs of our student body. While Iona already had courses that addressed the linking of pedagogy and content, none did so explicitly in each of the three areas. Therefore, this decision necessitated the development of three new courses to replace some of our current courses.

These courses were designed to enhance the teaching of these three content areas utilizing the most current and appropriate software. The new courses were entitled Integrating Technology into the English Language Arts Curriculum, the Mathematics, Science and Technology Curriculum, and the Social Studies Curriculum. The courses emphasized the creation and delivery of a variety of lessons to afford the students practical experiences using software most appropriate to the specific content areas (e.g., desktop publishing, spreadsheets, database management systems). Faculty members from the Departments of English, Mathematics, Biology, and History at Iona provided guidance and suggestions to ensure the required linkage of content and pedagogy. These courses accounted for 9 of the 12 credits needed. The final 3 credits were accommodated through an existing course where students engaged in an independent research project involving the integration of technology in the classroom.

Once the curriculum had been revised, the next step was to complete the New York State application for certification, which placed a strong emphasis on the preparation of faculty teaching in the program. The State was most interested in their degrees held, their areas of expertise, their specific courses assignments, their knowledge of the problems of high-need schools and diverse student populations, and their recruitment from underrepresented groups. As a small college, we rely heavily on adjunct faculty with considerable experience in K-12 education to complement the technology expertise of our full-time faculty. We were concerned that this situation might weaken our application.

NCATE Accreditation Requirements

To further ensure the quality of teacher preparation programs, New York State also set a deadline of the end of 2004 for institutions to achieve accreditation. NCATE was then, and is now, the only organization ready to grant accreditation. Recognized by the U.S. Department of Education, NCATE sets standards of quality by which teacher preparation programs are judged. In the forefront of the recent national call for educational renewal, NCATE has revised its standards and recently released NCATE 2000 Unit Standards with its focus on performance-based standards and assessments. Research studies indicate that students of NCATE-accredited institutions have demonstrated superior classroom performance when compared to their peers at non-accredited institutions (Brown 2001, Nweke 2001, Wise 2001). Iona College made known its intention to apply for NCATE accreditation to comply with the New York State directive.

Among the initial steps in the NCATE accreditation process is the creation of a curriculum portfolio submitted to one of the NCATE Constituent Members, professional organizations that establish discipline-specific standards approved by NCATE. The International Society for Technology in Education (ISTE) is one of the technology organizations that establishes guidelines by which educational technology programs are evaluated. Procedures for ISTE accreditation can be found at http://www.iste.org/standards/ncate/advanced.html.

Seeking NCATE Accreditation

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As mentioned earlier, the Masters Program in Educational Technology at Iona College differs from most programs of its kind in that it is offered through the Department of Computer Science rather than through the Department of Education. The Education faculty had the responsibility of completing the NCATE application; our first responsibility was the completion of the ISTE portfolio. The most significant part of the portfolio was the matrix of performance indicators and experiences to fulfill the guidelines along with a set of course syllabi with the mapped indicators.

A committee was formed to complete the matrix and syllabi. An ISTE consultant provided invaluable assistance in explaining the requirements. For each performance indicator in the matrix, we were required to indicate the specific objectives, topics and assignments in our courses that verified that students had met the indicator. To cross reference the matrix, we were required to map each indicator onto the objectives, topics, and assignments of our course syllabi. Since our program offers a masters degree, ISTE advised Iona to complete the matrix for Advanced Programs consisting of the Educational Computing and Technology Literacy Endorsement Matrix as well as two sections for Educational Computing and Technology Leadership.

It became obvious from the start that compliance with ISTE standards would entail drastic changes in our program. The first problem we encountered was how to meet the over one hundred indicators within our current courses. ISTE requires each graduate of the program to meet each of the performance indicators in the matrix, implying that all the indicators must be met in core courses that are taken by every student. As explained above, New York State requirements necessitated the development of three new courses in the core. On the other hand, there were certain courses that we strongly believed should be part of our program, such as the programming and research courses, and were reluctant to eliminate. In light of all these requirements, our committee had no choice but to expand the core from its existing 18 credits to 30 credits. This left only 6 credits of electives for our students. We were concerned about the lack of diversity in our students' course of study but there were no other viable alternatives.

Each committee member took responsibility for a group of core courses and revised the syllabi and assignments to meet the appropriate indicators for the course. We met periodically to ensure consistency and completeness. The initial feedback from our consultant on the first three sections of the matrix revealed other problems in our procedures. Many indicators had several parts and we had not been sufficiently attentive to each and every one of them but rather addressed the general intention of the indicator. We learned the importance of using the language of the indicators in our syllabi. Another problem that surfaced was our misconception that merely addressing an indicator in class was sufficient evidence that it was met. Our consultant made us aware that performance indicators could only be properly satisfied through specific assessments such as examinations, assignments, and projects. This realization forced us to revisit each of our syllabi to provide compliance with the indicators though performance-based assessments. We also encountered difficulty in completing all of the indicators to our satisfaction. Some of the indicators required equipment that we do not have and that we might have trouble acquiring. Other indicators could only be properly met in an extensive field experience that we are unable to provide at the current time. By the end of this iterative process, we added another new course to the program (bringing the total of new courses to four) and significantly revised four others. Iona College submitted its ISTE portfolio to NCATE in August 2001. A complete description of the revised program can be found at http://www.iona.edu/cs/gradreqs.htm

Implementing the Program

We have already achieved one of our goals: New York State has registered our newly revised Masters Program in Educational Technology. We were gratified that the State recognized the strength of our program and implicitly acknowledged that our use of adjuncts in the program did not detract from but rather enhanced the students' experiences. After approval by the state, the next challenge was to implement the new program. A three-year projected schedule had to be revised to reflect the changes. The scheduling was complicated by several factors, including the stipulation that all core courses had to be offered on both campuses within a reasonable cycle. Students already in the program, who had matriculated under the old curriculum, were given the option of completing their existing program plans or switching to the new requirements. Most opted to complete their old plans, making substitutions where necessary. A summary of the changes was prepared and distributed prior to registration for fall of 2001 for all new and non-matriculated students. New requirements could also be found in the college catalog and the department website. The more structured program required scheduling additional advisement hours to explain its effect on the students' programs. The adjunct faculty teaching in the program had to be brought up to date on the changes, and made aware of the revisions to their course outlines, which they were no longer permitted to modify. In general, they were pleased with the specificity of the outlines, and they adjusted their teaching accordingly. Collection of assessment materials became more crucial, and the department is still experimenting with methods of collecting and storing those assessments. Electronic portfolios are being developed for each offering of the courses.

Conclusion

We discovered that the new courses the State required us to offer were well received by our students. Our K-12 teachers are constantly looking for effective ways to integrate technology into their classrooms and they found these courses most beneficial to them and their colleagues.

At the time of writing, we are still awaiting a response from ISTE on our curriculum portfolio. Although the first round of the ISTE accreditation process was long and arduous, it yielded some positive outcomes. Perhaps for the first time, the committee examined each course in minute detail to reduce duplication of course material, and to eliminate areas that were outdated and replace them with more meaningful, relevant and current topics and assignments. This purposeful "house-cleaning" can have a cathartic effect. Our program has been invigorated with the latest theories in educational technology and, as such, is a more challenging but rewarding program. With its emphasis on performance-based assessments, we are convinced that our revised Masters Program in Educational Technology will better prepare our students to meet the challenges they will face in their own classrooms.

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How Graduate Teacher Education Students Addressed Timely Teaching and Learning Issues Through the Construction of a Website for Their Colleagues

Dr. Candy Beal, Department of Curriculum & Instruction, College of Education, NC State University, USA
<candy_beal@ncsu.edu>

Dr. Lisa Grable, Department of Curriculum & Instruction, College of Education, NC State University, USA
<grable@unity.ncsu.edu>

Abstract: This research paper examines a unique curricular design project that demonstrates the value of recursive learning. A curriculum integration project completed and reported on last year, Wetlands 2000, was thoroughly explained and used as an example of taking curriculum integration theory to practice in a larger project that examined the value of using a curriculum integration approach to teaching and learning. A website on curriculum integration was built in support of colleagues' who question the value of teaching solely for recall of discrete facts and who are frustrated by education's pressure to move in this direction.

As educators, we teach and learn about a spiraling curriculum. The first step is to introduce and explore a basic idea. After students are able to understand what we have taught, we then cycle back and expand on the original idea. This method helps develop new dimensions of thought and information. The time spent in discussion and development of the idea is Vygotsky's (Vygotsky, 78) intermental processing which shifts to intramental processing as students internalize the information and seek to make meaning for themselves.

Educators are constantly using the spiraling curriculum method of teaching. For experienced educators it may be so routine that they may not spend time reflecting on the process itself. This paper describes how a curriculum integration project implemented in a technology enabled environment and reported on last yearbecame a component of an even larger technology project for preservice and graduate teacher education. In other words, we spiraled back to the original learning and deconstructed that project to illustrate the process of curriculum integration, the subject of the new learning.

The Wetlands 2000 Project was a curriculum integration /service learning project that was reported on at last year's SITE Conference in Orlando, Florida. It involved one hundred 8th graders and their teachers and demonstrated the power and scope of learning that is possible in a technology enhanced learning environment. The project demonstrated classic curriculum integration. Students asked about, researched and reported on big issues of social/environmental injustice using technology applications as diverse as GIS, spread sheets, PowerPoint presentations and on-line research sites. The eighth graders did action research at the wetlands site and made a public/university-wide presentation of their project findings. It was a highly successful, exhilarating, exhausting process and, once it was completed, the class moved on to other learning opportunities. Who would have known that this project would play a major role in another, larger effort involving graduate students studying and building a website about curriculum integration?

The graduate students selected the topic, curriculum integration, to support their argument that children learn best when differentiated instruction is used to fully engage them in issues of personal and global interest. They sought to demonstrate that testing for knowledge of discrete facts alone does not indicate true reflective knowledge. Their frustration was borne of our country's mania for using standardized testing as the sole measure of learner achievement. Their audience was others like themselves who were struggling with the question of whether to teach the children or teach the test.

They based their website work on James Beane's (Beane, 97) study of curriculum integration and their own experiences using curriculum integration in the classroom. They deconstructed the theory and process of curriculum integration and then build a website to inform colleagues about curriculum integration's application to middle school education. Components on their website (<www.ncsu edu/chass/extension/ci>) included:

$ a thorough, user-friendly study of curriculum integration

$ an explanation of how curriculum integration, based on the needs of early adolescents, applies to teaching and learning in the middle school classroom

$ a one hundred year time line with drop down information that traces the development of curriculum integration in the context of the history of education and

$ a section on evaluation and assessment, highlighting both formal and informal methods to examine students' progress.

Graduate students determined that the most critical part of the website would be an example that demonstrated how curriculum integration could be used in an actual class project. Having heard about the Wetlands 2000 Project undertaken by their undergraduate preservice colleagues, they decided that highlighting that project would be a way to show the actual application of curriculum integration theory. In an effort to offer a unique approach to learning about Wetlands 2000, the students chose to fictionalize the actual story. They called it *Pam's Story*.

In *Pam's Story*, the reader meets a new teacher and follows her through the first semester of her first year of teaching. Readers are introduced to the members of her team, become familiar with the issues teachers face on a daily basis, and join her team as they develop and implement a curriculum integration project, Wetlands 2000. Photographs and sketches from the actual project appear throughout the chapters of the story. Graduate students included all of the teaching and learning approaches that were employed in the real project. They related theory to practice in all aspects of implementation of Wetlands 2000. Pam's story ends with the team celebrating its success by visiting a global issues museum. In the final chapter, the teachers and students find themselves addressing a new concern that will require building yet another curriculum integration unit. The graduate students cleverly provided a link to another website, SwimDog, that was developed by undergraduates as a curriculum integration resource. The teacher education class also included a forum in the site to enable all teachers to discuss issues regarding curriculum integration. It joins a resources and references section that can be used to learn more about curriculum integration.

This project demonstrates that learning in a technology enabled environment makes it possible to fully access information and activities previously undertaken and currently archived. Past projects can be recycled into other contexts. Time and energy that was devoted to previous learning activities becomes value added when it is used as the foundation on which to build new knowledge. Students see that learning is a dynamic, recursive process, the results of which can be more readily shared through technology.

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The Use of a Web-Based Professional Development Forum to Enhance In-service and Pre-service Teacher Education

Catherine Brown
Department of Curriculum and Instruction
Indiana University
United States
cathbrow@indiana.edu

Yusuf Koc
Department of Curriculum and Instruction
Indiana University
United States
ykoc@indiana.edu

Rebecca H. McGraw
Department of Curriculum and Instruction
Indiana University
United States
remcgraw@indiana.edu

Kathleen Lynch
Department of Curriculum and Instruction
Indiana University
United States
rklynch@indiana.edu

Abstract: This paper is a description of how pre-service and in-service secondary mathematics teachers use a web-based professional development tool to examine, reflect on, and discuss classroom practices. The teachers are engaged in a professional development project in which they work in teams with each other and with mathematicians and mathematics educators to collaboratively plan, implement, and reflect on mathematics lessons. The web-based environment supports their work by providing discussion areas and document building capability. The web site also contains video clips of lessons and lesson artifacts that can be used to stimulate discussion about teaching and learning. Ultimately, video of the lessons developed through the project and artifacts from these lessons will be included on the web site. Research related to this project will examine the interactions among the team members and the ways in which the web-based forum may be used to support teacher education.

Introduction

We present how technology has been used in two intersecting innovative teacher education activities. In particular, we describe how we have provided a rich context for pre-service and in-service mathematics teachers' professional development through the use of information technology in the form of a web-based professional development tool (the Inquiry Learning Forum (ILF)). The ILF website has been used in both a professional development project (the Collaboration for Enhancement of Mathematics Instruction (CEMI)) and in a secondary mathematics methods course at Indiana University.

The Inquiry Learning Forum (ILF)

The ILF, hosted at Indiana University, "is a web-based professional development tool designed to support a community of in-service and pre-service mathematics and science teachers creating, sharing, and improving inquiry-based pedagogical practices" (Barab, Makinster, Moore, Cunningham & the ILF Design Team, in press, p. 3). The virtual facilities for the community include classrooms that can be visited, various types of meeting rooms, a library, and "workrooms" that provide "an on-line space for groups to form working circles, or sub-communities, to facilitate collaboration on a particular project, product, or goal" (Barab, Scheckler & Makinster, 2001, p.7). Thus the ILF creates a comprehensive web-based professional development community through which the participants connect with each other and participate in interactive construction of professional knowledge (Barab, et. al., in press).

The CEMI Project

CEMI seeks to engage teams of middle and high school mathematics teachers, university mathematicians, university mathematics educators, and pre-service secondary mathematics teachers in an activity that is inspired by *Lesson Study*, a form of professional development that is widely used in Japan. In Japan, an entire school has a general theme for the *Lesson Study* and each lesson study group develops a lesson that relates to the theme. *Study lessons* are then taught in regular classrooms. An implemented lesson is observed by many teachers in the school and is followed by a public discussion of the lesson with the planning group. This cycle of meetings and lessons is repeated several times during a year.

CEMI Lesson Study Groups also work through cycles of planning, implementing, and reflecting on individual lessons. Responsibility for planning and reflecting on lessons is shared among participants. The classroom teachers are responsible for implementing the lessons while other group members observe and take notes. The CEMI project is not simply trying to engage U. S. secondary mathematics teachers in Japanese Lesson Studies, but rather to adapt this model of professional development for several purposes. These include providing professional development for all of the participants in the project and creating an extensive community of people with diverse perspectives with the common goal of providing secondary students with quality mathematics education. The evaluation/research component of the project seeks to understand these activities and their impact on the participants and the participants' classroom teaching.

The CEMI project conducts many of its activities through the ILF website. Lesson Study Groups regularly meet face to face, but the actual writing and co-construction of lesson plans occurs on ILF site through the use of a document builder tool. Discussion of the plans and reflection after teaching also occurs both face to face and on the ILF. Ultimately, video of the lessons developed through CEMI activity and artifacts related to these lessons (e.g., student work, teacher reflections) will be included on the ILF site. Through the ILF, the work of each Lesson Study Group is made available to others in the project and will eventually be visible to all ILF members. CEMI participants have recently decided to take a break from the development of new lessons and spend 2-3 months more intensively reflecting on the lessons that have been developed and taught over the past 18 months. In addition, participants will read and discuss books and articles related to the teaching and learning of mathematics. These reflections and discussions will take place in both face to face meetings and on the ILF.

The Methods of Teaching Secondary Mathematics Course

It is a goal of every teacher educator to stimulate meaningful discussion about issues related to teaching among their students and to help students become reflective about their own and other's teaching. The ILF is used by Indiana University's secondary mathematics education students for both these purposes. Students in the secondary mathematics methods course are participants in CEMI Lesson Study Groups, but they also use the ILF in other ways. Students are required to virtually visit mathematics classrooms on the ILF. This provides a common classroom experience for all students. Available for each lesson are written plans and video clips of implementation, student work and teachers' own reflections, connections to state and national standards, and references to related resources. Discussions of these visits occur on line and in class, enabling students to use real classrooms as a basis for developing concepts of teaching and learning mathematics. Students also use the ILF document building tools to create and revise their own lesson plans, making the process visible to both instructors and other students. The ILF library contains web-based teacher related resources and lesson ideas. Students are required to explore other web sites and add at least one additional site to the library resources, with a brief review and suggestions for use. Finally, students use the ILF to discuss books and articles they've read and other methods class experiences.

Research Components and Issues

Research related to the ILF, CEMI, and the secondary methods class has several foci including (a) the role of the ILF in helping mathematics teachers, mathematicians, teacher educators, and secondary methods students develop "communities of practice" (as defined by Wenger 1998); (b) the integration of Japanese Lesson Study methods into U.S. teacher professional development and the ways in which the ILF enhances this process; (c) the characteristics of face-to-face and on-line discussions and the ways in which the ILF can be used to support reflection on teaching and learning; and (d) the roles of teachers, education students, teacher educators, and mathematicians in Lesson Study Groups and on-line and face-to-face discussions. Wenger (1998) identifies four characteristics that define communities of practice: negotiating meaning; preserving and creating knowledge; spreading information; being a home for identities. Because we believe these are important characteristics, we are beginning to examine data to determine the extent to which the Lesson Study Groups and the methods class exhibit these characteristics.

Conclusion

The ILF provides a technological tool that provides opportunities for professional growth for pre-service and in-service secondary mathematics teachers as well as other mathematics educators. Our use of the ILF in the CEMI project and in the secondary mathematics methods class is only in its second year, so conclusions about its value must be tentative. However, we are convinced that the ILF is helping us introduce pre-service teachers to reflection on practice in ways that were previously unavailable and that are valuable. Similarly, the ILF provides a mechanism for engaging in-service teachers and other mathematics educators in collaboratively constructing and examining practice in new and powerful ways. Whatever terms are used to describe what is developing – discourse community, community of practice, collaborative, or something else – the bottom line is that through the use of the ILF we have people talking with each other and working together who have not previously done so.

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Acknowledgments

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Building an Educational Technology Masters Degree Program with ISTE/NCATE Standards as the Foundation

Cathy Cavanaugh, Ph.D. Curriculum and Instruction, University of North Florida, USA. ccavanau@unf.edu

Terry Cavanaugh, Ph.D. Curriculum and Instruction, University of North Florida, USA. tcavanau@unf.edu

Abstract The NSDC 2001 staff development standards and ISTE's 2000 standards for educational computing and technology programs served as the foundation for a new Educational Technology Master's degree program at the University of North Florida, designed to lead educators in the region toward the innovation stage of educational technology integration. Program development began with a thorough review of existing courses and their alignment with national standards. A team of professors created a matrix of course objectives and standards in order to identify gaps in the existing program. Existing courses were restructured, and new courses were designed to meet needs.

Preparing teachers to teach with technology

In the rapidly changing world of the information age, it is more critical than ever that all teachers be life-long learners, and that they collaborate to continuously improve their practice and their results with students. A priority of the US Department of Education is preparing prospective teachers to use technology as a tool for teaching and learning and to work effectively with diverse students (US DOE 2001). Lack of professional development for technology use is one of the most serious obstacles to fully integrating technology into the curriculum (Fatemi, 1999; Office of Technology Assessment, 1995; Panel on Educational Technology, 1997). "The transformation of classroom technology from hardware, software, and connections into tools for teaching and learning depends on knowledgeable and enthusiastic teachers who are motivated and prepared to put technology to work on behalf of their students," states the CEO Forum on Education and Technology (1999).

Jamie MacKenzie (1993) indicates stages of technology mastery for teachers, from survival through innovation. The needs at each stage are different. Studies have outlined four stages through which teachers may pass in learning and applying new technologies in their teaching: (1) Survival-- struggle, teacher-directed, (2) Mastery-- coping, confidence, (3) Impact-- tech-enhanced, learner-centric, (3) Innovation-- restructures learning.

Leading educators toward the Innovation stage requires effective professional development experiences. The National Staff Development Council revised the Standards for Staff Development in 2001 to better meet the needs of today's teachers and students. The NSDC standards guide professional development of teachers in all facets of education. As a guide to staff development in technology, the International Society of Technology in Education has provided standards for Professional Preparation in Educational Computing and Technology Literacy (NCATE 2000). The two sets of standards have many parallels, and served as the foundation for the development of a new Educational Technology Master's degree program at the University of North Florida, designed to lead educators in the region toward the innovation stage of educational technology integration.

Educational technology master's degree program development

Prior to the development of the new Educational Technology Master's degree program, UNF had four technology-centered "tracks" in its Master's catalog. The tracks were minors within elementary education and secondary education majors. Both the secondary and elementary education programs offered tracks in instructional technology and in computers in education. The four technology tracks were developed at different points over the last decade and for various purposes, but the result was program profusion and confusion. Beginning fresh on a new program would have several benefits: students would join one clear program, the program would be extensively updated, and the program would reflect current standards not in existence when the original programs began. The names and descriptions of the new courses better reflect current practice, and together they meet new standards implemented at the state and national levels.

The new program is outlined below:

College Core courses in Foundations of Education Research, and Education in America.

Curriculum and Instruction Core courses in School Curriculum and Models of Teaching.

Educational Technology Requirements: Computers in Education, Enhancing Instruction with Technology, Educational Technology Systems, Educational Design for Digital Media, Educational Multimedia OR Educational Web Design, Electives such as Telecommunications or Technology for Special Populations, Educational Technology Issues capstone course.

The process of developing the new program began with a thorough review of existing courses and their alignment with national standards. A team of instructional technology professors created a matrix of course objectives and standards in order to identify gaps in the existing program. To streamline the transition from the existing program to the new one, existing courses were restructured, and new courses were designed to meet needs. The most significant new course is the capstone Educational Technology Issues course, which includes a strong field-based project. The field project requires the Master's students to work with children in classrooms on innovative technology-based experiences, and to create and deliver professional development experiences to teachers. UNF's new program addresses each of the NSDC 2001 staff development standards and ISTE's 2000 standards for educational computing and technology programs.

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The Learning Schools Programme: an analysis of teachers' professional development and pupil gains in a lottery-funded ICT training programme for in-service teachers

Dr John L Chatterton j.chatterton@shu.ac.uk
Head of IT
Sheffield Hallam University
School of Education
Collegiate Crescent Campus
Sheffield S10 2BP
England

Introduction

In the UK, the New Opportunities Fund of the National Lottery has provided funding of £230 million ($330 million) to train teachers, not in the basic skills of computer use, but in the much more complex areas of the use of ICT in teaching and learning, planning and assessment and in the continuing professional development of teachers. The expectation is that all teachers will at least meet the ICT competences laid down for the training of new teachers in all subject areas and over all phases of education. Lottery funding provides not more than half the cost of the projects it supports, so schools are expected to contribute teacher-time for the training as their 50% of the funding. At the same time, the government is spending some £500 million ($700 million) on provision of hardware for schools and every school is gaining a broadband connection to the internet, with a nationally supported school-web structure — every school has a web address and every teacher and pupil is to have a personal email address.

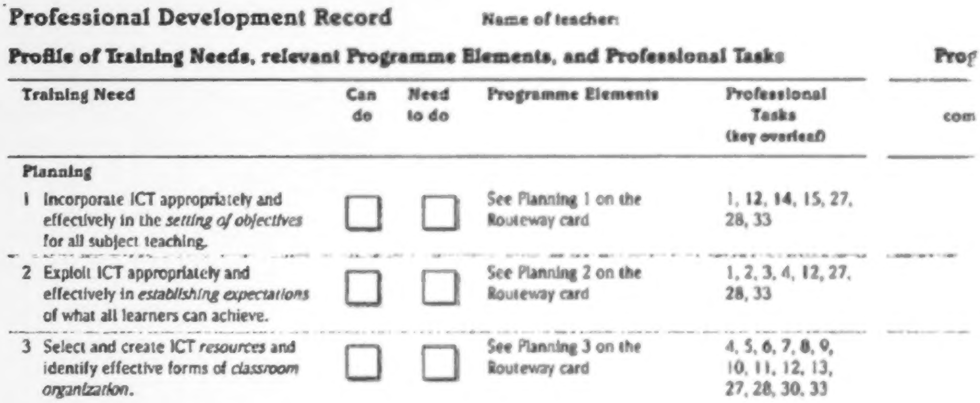
Standards for the training were set out by the government and would-be providers of the training were asked to submit their programmes for approval. The approval process resulted in a mixture of provision: some subject-based, some taking a whole school approach; some providers worked within a defined region, others worked nationally.

The Learning School Programme, with which this paper is concerned, is a national provider which takes a whole school approach, while providing specialised materials for the various subjects and phases. The Learning Schools Programme was formed from the co-operative efforts of the Open University, the largest provider of open and distance learning courses, and RM plc, a major supplier of ICT systems and software in the education sector in the UK. The author is currently co-ordinating the delivery of the programme to more than 2500 teachers across a large area of England.

As we pass the half-way point of the programme, which is due to finish in 2003, evidence is beginning to accumulate about teachers reactions to the programme, changes in their professional and classroom activities and their perceptions of the consequent impact on pupil motivation and attainment.

Teachers and ICT

The Learning Schools Programme begins with a needs analysis undertaken by the individual teachers and covering the four basic areas of planning, teaching, assessment and reporting and personal professional development. Teachers are guided through an examination of 44 professional tasks covering the four areas and, using the professional development record, they devise an individualised programme according to their needs.



Professional Development Record **Name of teacher:**

Profile of Training Needs, relevant Programme Elements, and Professional Tasks **Prog**

Training Need	Can do	Need to do	Programme Elements	Professional Tasks (key overleaf)	com
Planning					
1 Incorporate ICT appropriately and effectively in the *setting of objectives* for all subject teaching.	☐	☐	See Planning 1 on the Routeway card	1, 12, 14, 15, 27, 28, 33	
2 Exploit ICT appropriately and effectively in *establishing expectations* of what all learners can achieve.	☐	☐	See Planning 2 on the Routeway card	1, 2, 3, 4, 12, 27, 28, 33	
3 Select and create ICT *resources* and identify effective forms of *classroom organization*.	☐	☐	See Planning 3 on the Routeway card	4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 27, 28, 30, 33	

figure 1: part of the Professional Development Record used in the needs analysis

The teachers are supported during their training by a mixture of face to face tuition, books, multimedia CD, videos, online support and computer moderated conferences: further details will be provided in the paper.

During the training period, the teachers build up a portfolio documenting the work they have done and the changes which have occurred in their planning, teaching etc. A senior member of staff in each school takes responsibility for organising the school-based part of the training and s/he is responsible, with the support of the Learning Schools Programme's School Adviser, for assessing the portfolios and monitoring the progress of the staff. At the end of the programme, each teacher is expected to plan and teach a series of lessons involving the use of ICT and to evaluate its effectiveness in terms of the subject-based objectives / lesson outcomes. On completion, the teacher completes an evaluation of the programme and a personal development plan for furthering their use of ICT.

The data provided by the programme mechanisms has been supplemented by interviews with the teachers to provide a rounded picture of the progress made and the changes occurring in the classroom. These demonstrate a wide range of outcomes and show how these outcomes are dependant, inter alia, on the underlying attitudes of the teachers and on the rapid changes in hardware provision which have been concurrent with the training programme.

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Conclusions

The data so far have been very positive, with the great majority of teachers reporting that the programme has helped them to raise their awareness of the possibilities of the use of ICT in subject teaching and has given them the confidence and encouragement necessary for them to begin to use ICT in the classroom. Virtually all the teachers on the programme were making significantly increased use of ICT for professional purposes by the end of the programme.

Where progress was slower, it was generally linked to staff having limited access to ICT facilities within the school — caused in no small part by the rapid increase in demand for the ICT facilities the school had. This was particularly true of the early entrants to the training, where the investment programme had not taken full effect.

Short Bibliography

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RM plc	www.rm.com

Integrating technology into teaching: exploring a teacher learning community for teacher professional development

Haojing Cheng, Doctoral candidate, Michigan State University
Mary Ann Robinson, Technology Outreach Coordinator, Mecosta-Osceola Intermediate School District

Abstract:

The push for integrating technology into k-12 curriculum from social and political forces has exerted tremendous pressure on schools and education support institutions to provide adequate professional development opportunities for teachers beyond just fundamental technical training. According to OTA (1995), less than half of American schools provide teachers with training on basic computer skills, let alone the training on instructional uses of computers. It is not a surprise to see not many teachers actually use technology regularly in their teaching (OTA, 1995; McKinsey, 1996). Such conflicts between the call of the reforms and the reality of the teachers' work require teacher learning opportunities that directly address the emergent problems that teachers confront in their practices.

The importance of learning communities for professional development is much discussed in literature (Schwab, 1976, Lave and Wenger, 1991; Hallwa and Lindy, 1999, Putnam and Boko, 2000). In the past 10 years, the calls for a commitment to alternative means of inservice teacher professional development have increased exponentially. This is considered as the key to any and all educational reform (Wilson & Berne, 1999).

This paper intends to examine the role of a teacher learning community in relation to teacher learning for technology integration and professional development. By focusing on the content and conditions of teacher learning through this teacher support group, this study will deepen our understanding of the role of teacher learning community for professional development of inservice teachers.

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Scaffolding Graduate Student Learning Through the Use of Gen www.Y Students

Alice Christie, Arizona State University West, US

This paper explores the benefits to all stakeholders when student mentors are used within a graduate course in educational technology. Stakeholders include the university professor, thirty-four practicing K-12 teachers working toward an M.Ed. in Educational Technology, and three eighth grade students proficient in using some of the software used in the graduate course.

The purpose of the course is to develop graduate students' skills and sophistication with a variety of multimedia tools appropriate for K-12 teachers. In addition, these students produce an electronic portfolio that provides evidence of their expertise in educational technology. Students use *Inspiration*, *PowerPoint*, *HyperStudio*, *iMovie*, and a variety of graphics editing programs.

This study incorporates Dennis Harper's *Generation www.Y* model of training K-12 students to assist teachers with technology use and curricular integration. The *Gen www.Y* students developed technology skills, collaboration skills, and presentation, teaching, and leadership skills during training sessions throughout the school year. Their training included an in-depth exploration of *iMovie* as well as numerous opportunities to collaborate with peers and present their ideas and work to large audiences. During the summer, these Gen www.Y students assisted graduate students as they learned to use *iMovie*.

This paper discusses benefits to the university professor, the graduate students, and the Gen www.Y students. Data sources included observations, open-ended surveys, and focus groups. The paper also delineates the details of the partnership between the university and the K-12 school district where the Gen www.Y students attended school.

A WEB-BASED GUIDANCE SYSTEM WAS IMPLEMENTED FOR THE LIVING TECHNOLOGY TEACHER

Chu, Yao-Ming. National Kaohsiung Normal University Of Taiwan.
Department of Industrial Technology Education
t1179@nknucc.nknu.edu.tw

Yang, Hung-Jen. National Kaohsiung Normal University Of Taiwan.
Department of Industrial Technology Education
hjyang@nknucc.nknu.edu.tw

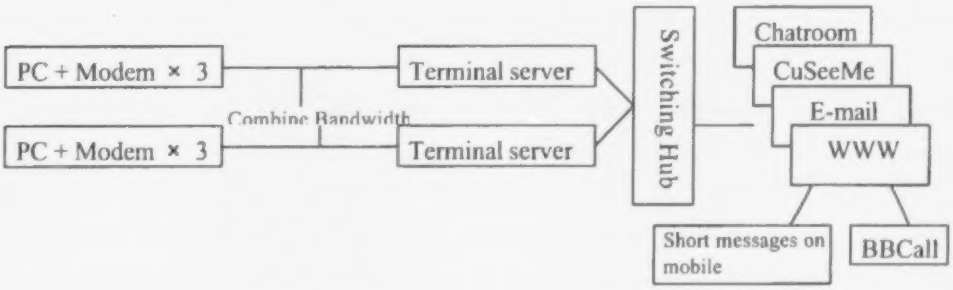
Chao, Shih Van. National Kaohsiung Normal University Of Taiwan.
Department of Industrial Technology Education
jim@controller.nknu.edu.tw

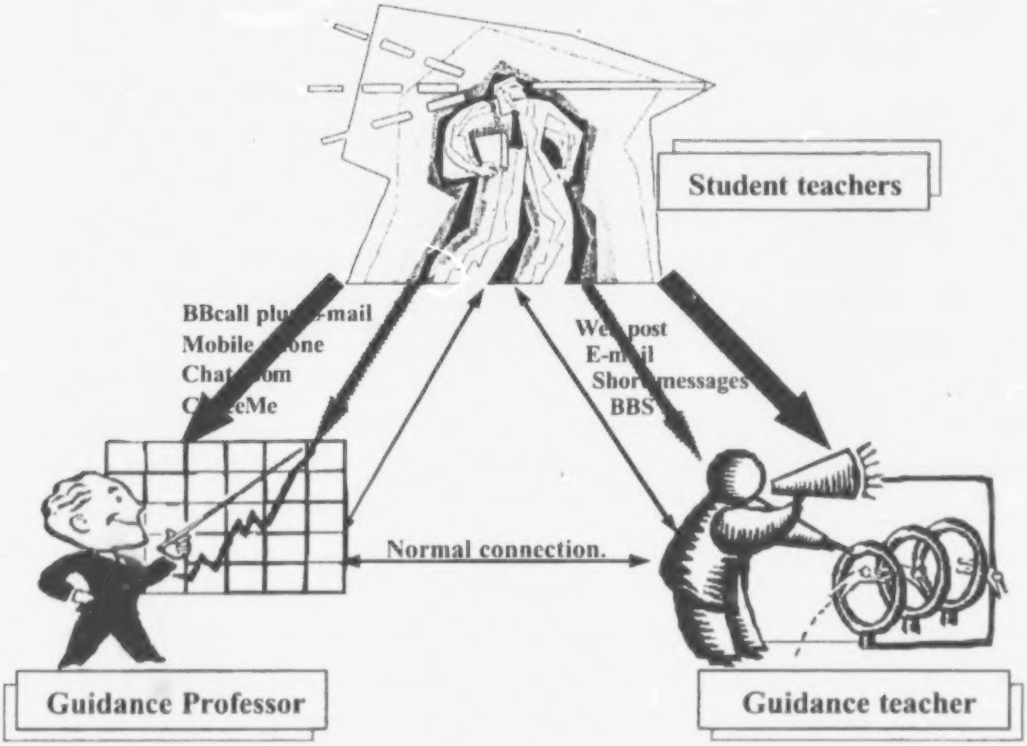
Abstract: The purpose of this study was to identify a junior high school technology student teachers' remote teaching guidance model through Internet. A Web-based guidance system was implemented for the beginning Living Technology teacher.

This system included seven communication paths, which were WWW, E-mail, BBS, Chat Room, Videoconference plus E-mail and Mobile phone/BBCall and mobile short messaging to support the guidance for beginning teachers. This system was mainly used to establish communication among student teachers, guidance teachers, and guidance professors.

Network connection Method Of Remote Teaching Guidance

A survey instrument was design to collect data from all three groups for evaluating the system. Statistical analysis result was discussed. The network resources used in the system were also presented





← Real-time guidance needed start.
Include BBcall plus E-mail, Mobile phone, Chat room, Videoconference.
↔ Normal connection.
← Non real-time guidance needed start.
Include Web post, E-mail, BBS, Short messages on mobile phone.

The researcher found that WWW and Email were most used by professor and beginning teachers and they worked very well. They were seems not used to communicate with each other by real time communication tools such as CuSeeMe or Chat even though there was no network problems. Beginning teachers were ask question directly to their colleague—senior teacher instead of professor. Therefore, focus on senior teacher's guidance skill was important to guide a beginning teacher.

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Beyond the Classroom:
Using technology as a tool to engage and empower students outside of the classroom

David Michael Cobb, Jr.
The Oakridge School
Arlington, Texas
mcobb@mrcobbs.net

Abstract: As American schools increasingly invest in technology for schools and classrooms, recent research has demonstrated that increases in infrastructure are not equating to increases in technological integration in the learning process. Much more than infrastructure development must occur for computers to be integrated into the curriculum and used in sophisticated ways to engage students. Teachers must be given the training and confidence must be developed to encourage infusion of computer technology into their teaching. Additionally, some teachers who are using technology may not use it to its fullest advantage and with the most efficient means. This guide will focus on methods to engage students and increase contact hours virtually through the integration of technological tools. Four methods of technological integration will be discussed for expanding curriculums beyond the classroom: web page publishing, computer mediated communication, online lessons and activities, and portable curriculum resources.

Introduction

History of Computers in United States' Schools

In 1967, Sir Eric Ashby referred to a "revolution in education" that would occur as a result of evolving technologies in the area of electronic media (Ashby, 1967). Ashby and his contemporaries could not have imagined the realities of the revolution that have occurred since the 1960s. Since that time there has been much enthusiasm, anticipation and conjecture with regard to the role and impact of new technologies and what effects they would have on education in our schools.

In the mid 1970s a few select High school students were using computers as part of their studies. The few students that were exposed to computers in schools were probably involved with elementary computer programming exercises in a language like Fortran, or supplied raw data to be used within a simulation program run on the machine. Generally there was no direct access to a computer in their school. Students from across the country would send special cards marked with code to be entered into a distant computer. Everybody hoped that the results arrived back at school in time for the next lesson but it could be more than a week before students got to see how their efforts fared. It was bad luck for a student sending in work for a Fortran exercise if the only error made was, for example, to forget a backslash or semicolon in a line of code. The role of the teacher in these circumstances remained unaffected. These exercises only served as supplementary lessons to a busy mathematics curriculum. The technology did not help achieve the existing mathematics curriculum it simply added to the curriculum (Campbell-Kelly, 1996).

Yet by the end of the 1970's, microcomputers began to increasingly appear on the consumer market. Machines like the Apple II, Tandy TRS-80 and Commodore were successfully marketed to household consumers. Early on few made it into schools and even fewer into classrooms. The beginning of the 1980's also saw a few primary school teachers taking an interest in microcomputers and their use in classrooms. In most cases, early teachers using technology were enthusiasts or computer hobbyist. However, computing as such was still seen by the majority of educators to be the exclusive domain of computer scientists, mathematicians or businesses. For one reason, microcomputers were extraordinarily expensive and out of the fiscal reach of most schools (Campbell-Kelly, 1996).

By the beginning of the new decade, computers were acknowledged as effective and efficient tools in business. Schools began to be asked questions about possible educational applications of computers in schools. Yet, the cost and availability of computers made the questioning merely philosophical. In 1981, IBM introduced their version of the personal computer (PC) for use in home and schools. The Apple Computer Corporation responded to the growing competition with an offer to assist schools with breaking into the technological age. Many schools gladly leaped into the new realm with the offer of a 64K RAM Apple II+ computer, with a 128K capacity floppy disk drive and color monitor for free or at a very low price. This helped set the scene for educational computing to take off in both primary and secondary schools. All of a sudden, just about every school community began to see computers for their students as a goal. In 1983, the release of the less expensive and more powerful Apple IIe and Commodore 64 models increased the already piqued interest of politicians, administrators, parents, and teachers on possible educational benefits (http://www.digitalcentury.com/encyclo/update/comp_hrd.html). As the computer market exploded in the 1980s, schools increasingly moved computers into schools and classrooms. The number of personal computers in use in homes and schools more than doubled from 2 million in 1981 to 5.5 million in 1982 (Office of Technology Assessment, Teachers and Technology: Making the Connection [OTA, 1995], 1995).

As the technology infrastructures were being constructed in schools across the country, a new vehicle for technology integration was being developed. The Internet traces its history back to a U.S. Department of Defense research project called ARPANET started in 1969. However, the resources of this computer network were not opened to non-military users until the 1970s, and big universities were the only early takers of the newly termed Internet. Yet in 1989 Tim Berners-Lee, a physicist working at CERN, the European Particle Physics Laboratory, was developing a collection of "hyperlinked" pages of information distributed over the Internet. The information would be distributed via a network protocol called HTTP (hyper-text-transfer-protocol) in what Berners-Lee termed the World-Wide-Web (Web). With the new advances with computer hardware, software, and now the Web, schools and districts began to allocate more of annual budgets to increased numbers of computers as tools for student retention and as a quantifiable demonstration of advancement. The Web has made the benefits of the computer and the Internet so much more readily seen. In the 1992-1993 school year, the National Center for Education Statistics estimated that public and private elementary and secondary schools spent over $280 billion on technology infrastructures (Digest of Education, table 33). Through the early 1990s schools endeavored to develop technology plans and programs. In 1992 the number of computers in schools had surpassed 3.5 million and more growth was occurring (OTA, 1995). In 1994, the Clinton Administration set a goal of connecting every classroom and library in the country to the Internet. As this goal was announced only 35 percent of schools and 3 percent of classrooms were connected to the Internet. By 1999, 95 percent of all schools, and 63 percent of all classrooms had been connected to the Internet, with one instructional computer with Internet connection for every six students (Orszag, 2001).

Since the turn of the century, educators have begun to explore with more constructivist technological integration programs. Constructivist theory argues children actively construct their knowledge. Rather than simply absorbing ideas spoken at them by teachers, or somehow internalizing them through endless, repeated rote practice, constructivism proposes that children actually invent and develop ideas through active learning (Forman, 1988.) Thousands of schools have invested in laptop computer labs and classroom laptop sets. Over 500 high schools across the nation have gone to full laptop learning environments. In a full laptop environment, each student has his/her own laptop for school and home. These innovative schools are on the cutting edge and complete research has not been done on the eventual effectiveness of this type of endeavor. However, early results show great promise in engaging, empowering and transferring ownership of learning to the students. Several studies suggest educational benefits related to laptop use. Specific benefits noted include increased student motivation, a shift toward more student-centered classroom environments, and improved school attendance (Stevenson, 1998). In the 1998 Stevenson study of a laptop pilot program in Beaufort, South Carolina students with laptops demonstrated a "sustained level of academic achievement" as opposed t o students not using laptops who tended to decline during the same period. The study also states that academic benefits were most significant in at-risk student populations (Rockman, 1998).

Research into the educational use of laptops has only begun; laptops have not been in place long enough to generate complete studies of their impact on student achievement.

Integration of Technology In Schools

Since Ashby's prophetic prediction of a "revolution in education" we have seen incredible advances in computer technology and technology availability for schools. Unfortunately, during the great infrastructure build up of the 1990s the needs of teachers with regard to professional development went almost entirely ignored. Increasing numbers of computers found their way into many schools with little planning for integration to improve existing curriculums. Unsure of what they could do with these computers, or lacking confidence to use them or time to learn how, many teachers simply ignored them or left it to the "computer teachers" to use the equipment. So although through the years of tremendous increases in computer hardware and software availability in schools, few teachers have kept up with using the technology to enhance an engaging learning environment (Hunt & Bohlin, 1995). Yet, research clearly demonstrates the potential worth of computers as a part of student learning and national, state, and local educational standards have named computer implementation as a primary goal (National Center for Education Statistics [NCES 1995], 1995). Recent research has given strong evidence that technology brings incredible educational benefits. John Cradler, Technology Director for the Chief State School Officers of California conducted a study entitled "Summary of Current Research and Evaluation Findings on Technology in Education" for the Far West Laboratory, an education think-tank. The study's findings clearly indicate that technology has important benefits to curriculums, students, and teachers. The following is a list of outcomes for students and teachers with effective technological integration in curriculums.

For Students:

- Increases performance when interactivity is prominent.
- Increased opportunities for interactivity with instructional programs.
- Is more effective with multiple technologies (video, computer, telecommunications, etc.).
- Improves attitude and confidence-especially for "at risk" students.
- Provides instructional opportunities otherwise not available.
- Can increase opportunities for student-constructed learning.
- Increases student collaboration on projects.
- Increase mastery of vocational and work force skills.
- Help prepare students for work when emphasized as a problem solving tool.
- Significantly improves problem solving skills of learning handicap students.
- Improves writing skills and attitudes about writing for urban LEP students.

- Improves writing skills as a result of using telecommunications.

For Teachers:

- Less directive and more student-centered teaching.
- Increased emphasis on individualized instruction.
- More time engaged by teachers advising students.
- Increased interest in teaching.
- Interest in experimenting with emerging technology.
- Teacher preferences for multiple technology utilization.
- Increases administrator and teacher productivity.
- Increased planning and collaboration with colleagues.
- Rethinking and revision of curriculum and instructional strategies.
- Greater participation in school and district restructuring efforts.
- Business partnerships with schools to support technology.
- Increased education involvement with community agencies.
- Increases in teacher and administrator communication with parents.

One of the top reasons teachers give for low level of technology inclusion is lack of training (Bosch & Cardinale, 1993). A large amount of reports and studies have revealed that both beginning and veteran teachers feel inadequately prepared to integrate technology into their curriculum. In a 1995 survey, the Office of Technology Assessment found less than 10 percent of new teachers felt prepared to implement technology in an effective manner (Abdal-Haqq, 1995). Yet the nation is embracing technology at an incredible pace. A January 2000 report from the White House stated that more than half of all American households now use the Internet, with "more than 700 new households being connected every hour." In a 1995 study over eight in 10 families were planning a PC purchase in the next year and cited "children's educational use" as the reason for the purchase. With all the recent research pointing to the benefits and proliferation of computers in education and American homes the need for effective technological integration has never been greater (Schacter, 1999).

While advances in the technology have made computing much more accessible and user friendly, many teachers still lack a clear starting place to begin integration. It has been estimated that secondary school students spend only 25 percent of their computer time doing productive learning with technical assistance (Becker, 1993). And many teachers who have begun integration lack direction on how to continue to build critical thinking and student based learning through the use of technology. But what they are missing out on is an opportunity to experience first-hand the benefits of a cooperative learning environment where teacher and student can expand learning objectives. Teachers need to be able to fall back on a readily accessible support mechanism for those times when confidence and direction are challenged and threaten to frustrate their efforts and waste valuable time (Johnson, 1997).

Despite the difficulties to study the ever changing field of technology and its effects on education, the majority of recent research gives evidence that computers offer great educational benefits (Orszag, 2001). A recent study conducted by the Miken Institute concluded that effective computer integration into curriculums greatly improves student performance. However, the study also cautions that for effective integration to occur, computers must be used to engage students and encourage critical thinking. Implementing tools that shift focus to student-centered learning have been found to have the greatest possible effect. Many available technologies allow teachers to engage students with the curriculum while empowering them with choices in the learning (Schacter, 1999).

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Developing Effective Teaching Skills Through the use of Instructional Technologies

Nikki L. Conklin,Ph.D.,Team Leader, Training and Development and Associate Professor
Conklin.1@osu.edu

R. Warren Flood. Graduate Administrative Associate
Flood.13@osu.edu

Linda M. Kutilek, Leader, New Personnel Development and Associate Professor
Kutilek.1@osu.edu

Jo M. Jones, Ed.D., Leader, Learning and Leadership and Associate Professor
Jones.20@osu.edu

Walter Warkus, Television Producer, Communications and Technology
Warkus.1@osu.edu

Ohio State University Extension, The Ohio State University, Columbus, Ohio USA

Abstract: OSU Extension, as the outreach arm of The Ohio State University, has traditionally addressed the need to enhance teaching skills among its program personnel via face to face in-service training. With approximately 900 educators located in 93 field offices, the OSU main campus and at numerous research centers, providing training to meet individual needs at a teachable moment is challenging. Through the development of an experientially based multi-media program *Enhancing Teaching and Learning Dynamics* , the authors intend to individualize instruction. This paper session will share the development of the program and highlight how instructional technology was used in conjunction with localized coaching and feedback activities to develop a skill enhancement program.

Introduction

To remain viable in today's high touch informational society, formal and non-formal teaching in higher education must incorporate computer-based instruction. Educators must keep up with the technological revolution that has restructured how people access knowledge

Teaching effectiveness and instructional strategies take on new dimensions when teaching via distance education methods. Those who are comfortable teaching in face-to-face environments are facing challenges requiring new approaches to teaching and learning. Teaching strategies highly effective in group settings may not enhance learning when the learner is sitting in front of a computer in the comfort of his/her home or office.

The Extension Employee Development Network at The Ohio State University provides training for employees on effective teaching as well as assisting with teaching components for undergraduate/graduate classes on teaching strategies, adult learning, and incorporating critical thinking into learning environments. The OSU Extension faculty who are major recipients of the Employee Development Network's teaching are hired for their subject matter expertise. These employees may not have education degrees or experience in teaching, yet their major role is that of educator/teacher. Therefore, it is imperative that these 900 plus employees receive effective teaching training so they in turn can teach learners throughout Ohio.

The Employee Development Network has traditionally taught effective teaching courses/modules in face-to-face group settings. Four members of the Network decided the time had come to revamp this teaching experience in alignment with high tech teaching strategies. A multi-faceted approach was used in the development of this individualized "effective teaching experience". The "experience" includes a computer-based training/teaching module (web-based or a CD), on-line learning partners, concept integration through teaching and facilitated learning, coaching and observation, and advanced training and in-service offerings. The experientially-based multimedia resource CD includes video references, text information, hyper-linked text, video/text/audio examples of implementation methods, pretest/posttest evaluation instruments, comparison log template, and application exercises.

The quality of teaching and learning cannot be compromised when using computer-based training. Teaching and learning principles and theories are just as critical in high tech dissemination of information as it is in high touch learning environments.

Constructivist Learning Theory and Instructional Design

The authors have focused on "constructivist learning theory" as a theory appropriate for guiding instructional design projects that are computer-based. According to Bencze (1999) constructivism emphasizes the mental building learners seem to do when they learn. The theory relates to the gestalt way of thinking that the whole is more that the sum of its parts. In the field of management this idea is referred to as synergism. Learning, from the bringing together of various input from different parts of our lives, suggest the need for active versus passive learning.

The authors of this paper were also the designers of the aforementioned multi-media experience on effective teaching. Their operational definition of constructivism was:

> ...a philosophy of learning that subscribes to providing learners with active learning processes that provide experiences, collaborative activities, shared discourse and reflection that encourages the learner to assemble, build and/or construct their own and a shared knowledge base. Thus, providing the learner an opportunity to take the knowledge gained through these active learning processes and extend it beyond what was presented. (Bencze,1999)

Following are critical instructional design principles that support a constructivist learning theory. These support the writings of Rosenburg (2000).

*educational goals must motivate and compel the learner;
*program activities/exercises must focus on learning by doing;
*learners need to perceive that the educational environment is one in which it is safe to fail;
*coaching and feedback strategies are a critical component;
*examples of modeling by experts are provided as part of the experience;
*authentic case studies and scenarios are furnished for a realistic perspective;
*the product affords opportunities to apply/reuse information after learning occurs;
*interacting with the program sets the stage for the learner to bridge "real life" experiences with the learning.

Experiential learning theory is compatible with active learning and constructivism. Kolb's (1984) four components of experiential learning include:

1. Concrete experiences including sensing and feeling
2. Reflective observation also referred to as watching
3. Abstract conceptualization involving thinking
4. Active experimentation or stated also as doing.

Whether teaching credit courses, providing in-service training for extension faculty and staff who teach community-based non-formal courses, or conducting effective teaching workshops for college professors or graduate teaching assistants, faculty must be on the cutting edge of technology. With every passing year, many learners arrive with more and more high tech literacy. The younger generations in the workforce are described as "cyber literate" and "techno savvy" (Salopek, 2000). Training programs and learning experiences must catch the attention of those who grew up with the glitz and glamour of videos, MTV, computer games, and learning from high tech/interactive toys.

The higher education students/learners of the future who will have entirely grown up in the digital age will have a tremendous edge on information technology. Alch (2000) said in reference to the net generation "they're comfortable with changes brought about by new technologies and e-commerce...they're conversant with a communications revolution transforming...education...and every other institution" (p.32). Are teachers of higher education ready to teach this new generation?

Dunerstadt (1999,p.12) would say that if we are not ready, we had better get ready. In Katz's book *Dancing with the Devil*, Dunerstadt says:

> The classroom itself may soon be replaced by more appropriate and efficient learning experiences. Indeed, such a paradigm shift may be forced on faculty by the students themselves. Today's students are members of the "digital generation". They have spent their early lives surrounded by robust, visual, electronic media...unlike those of us who were raised in an era of passive broadcast such as radio and television. They approach learning as a "plug-and-play" experience...inclined to plunge in and learn through participation and experimentation. Although this type of learning is far different from the sequential, pyramidal approach of traditional college or university curriculum, it may be far more effective for this generation, particularly when provided through a media-rich environment.

Enhancing Teaching and Learning Dynamics Program Overview

The authors of this paper have applied constructivist theory and experiential learning models to design a multi-faceted, individualized "effective teaching experience" called *Enhancing Teaching and Learning Dynamics: Individual Support for Extension Educators.* Starting with the concept of a single computer-based training CD, we have now expanded the package into a full-scale training module consisting of a set of interactive multimedia CD's and four other fundamental components. These components include coaching activities facilitated by experienced Extension educators, an on-line learning partners web-site, concept integration through teaching and facilitated learning within the responsibilities of an Extension educator, and advanced in-service offerings. Each CD within the resource set contains an introduction and a menu of its contents so that an individual may create his/her own path of exploration as a self-determined learner. The CD also includes video/text/audio presentation of content, printable text-based materials, hyper-linked text of key terms and concepts, examples of implementation techniques, tips on concept integration, evaluation instruments, a journal for self-reflection, interactive application exercises, checklist and form templates, reference lists, and a link to an on-line resource site. Figure 1 illustrates the relationship of each program component to Kolb's (1984) experiential learning theory and Rosenburg's (2000) instructional design principles. (Figure 1 attached)

Best Practices for Effective Educational Design

One of the side benefits from the creation of the computer based program on effective teaching is knowledge gained relating to the "how to's" of designing educational experiences that are computer or web-based. The authors offer the following advice to other educators who are ready to accept the challenge of designing a computer-enhanced learning experience:

> Make it a team effort that brings together expertise in the subject matter being taught, expertise in educational design and expertise in computer-based programming. If any of the three areas of expertise is missing, the quality of the end product will be compromised.
>
> Learn from others' experiences by accessing other educational computer programs. Try out the activities and make a list of the techniques/strategies you like and dislike. Have colleagues interact with the program and make a list. Compare the lists of likes/dislikes and then decide which would be appropriate for your project.
>
> Engage the assistance of a "sounding board" comprised of people who are representative of the end users. Have them continuously interact with the evolving program and give feedback as a type of formative evaluation.

Include a variety of learning activities that meet the various needs of your learners. Ask yourself if the training is tailored to different learning styles, or are you trying to make one size fit all (Goldberg, cited by Salopek, 2000).

Stonecipher (2000) poses the question and answers it—" will the introduction of new technology present any threat to traditionalists? Of course it will…we need to make sure that we are on the winning side of new technologies" (p.3).

A Challenge to Educators

Many in higher education are indeed traditionalists. Some educators will feel threatened but many will rise to the challenge of integrating new technology strategies with their current teaching methods. For those who do not rise to the challenge, they may retire from the "ivory tower" never having 1) provided feedback to a student via e-mail; 2) given a grade to a graduate student they have never met; or 3) engaged in a debate through a chat room with students from nine states and four countries. The time is right for experimenting with learners. Higher education must rise to the occasion.

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Collaboration between University and Schools in the Appropriate Use of ICTs in Teaching and Learning.

Iolanda Bueno de Camargo Cortelazzo
Doctor in Education, Teacher in the Pedagogy Course and in the Graduation Program in Education and
Researcher on ICTs use in Education at Universidade Tuiuti do Paraná , Brazil
iolanda.cortelazzo@utp.br icortel@attglobal.net

Abstract: This research investigates what teachers think of and how they use ICTs in their teaching practice in Higher Education and proposes collaborative projects to make teachers more prepared and updated to optimize their students learning through the appropriate and effective use of ICTs. But this research does not focus only the operational aspects of ICTs. On the contrary, it starts from the point that the knowledge of the history of technology and the appropriation of the use of ICTs can permit teachers to understand the impact ICTs have on their actions, on their own development, on students learning styles and process. Since ICTs are intensively present in the society in which teacher and students live, both in Higher Education have to discuss how ICTs affects society and think of ways to control and regulate them in favor of a sustainable life for the human kind.

Introduction

In Meetings, Conferences and in teacher empowering courses, you become aware that there are a number of graduated professionals from Human Science and Teacher Colleges working in a different area not related to the courses they had attended. Many continue in the same function they had occupied before taken their Higher Education Courses. Others are unemployed. One of the reasons they present is that they do not correspond to the labor market need either because they do not have experience or because they do not master the *I*nformation *C*ommunication *T*echnologies, *ICTs*.

Recently, private educational institutions and the human-resource departments in the companies, in any level, have been more demanding in choosing new employees for training functions as well as for teaching, administration and coordination. They demand competence and proficiency in the use of ICTs either as distance or face-to-face instruction,

On the other hand, there are many non-academic courses that teach just operational instructions in the use of computational applications and systems as if all ICTs were just operationally relevant

There are no care with the orientation of how, when and why to use the ICTs in Education and in the professional development at school, at the University or in-service. There is no study of the history of technology and as it outcomes from specific political and economical issues. There is no reflection on the use of ICTs as collaborative technologies that promote collective intelligence, creativity and teamwork. They do not prepare teachers to the use of ICTs in Distance Education, favoring the relationship among peers and the interaction among students beyond the school walls. They do not even preview negative consequences which could come from the inadequate use so they could prevent or minimize them.

On the other side, state and city public schools receive principals, coordinators and teachers selected in public contests which do not preview the competence verification neither in the use of ICTs nor in the collaborative work. Therefore, most of the school professionals do not have competence and proficiency in the use of ICTs and they do not know how to introduce them or implement their use in their schools. Most of these professionals use them as tools individually, without realizing their potentiality as collaborative tools enhancing creative and efficacious team work, besides optimizing their individual work, their research and their personal development.

Based on the project "Quality in public teaching and teacher formation", at USP, São Paulo and on my own experience in teacher development courses, besides the production of knew knowledge in the field, this research can bring relevant contribution for the Pedagogy curriculum to improve teacher development, to satisfy the needs in this professional field as well as to fulfil a social function in the community.

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Theoretical Fame

The teacher responsibility in the construction of a communication society can not be limited to the acceptance of the technological determinism that technology will master more and more the society, restricting its liberty, making it automated and controlled. Teachers must see the ICTs as mind extensions which can enhance the human creative, sensorial and cognitive capacity.

Large computerized databases permit information storage, classification, selection and retrieval in ways which were impossible to be manipulated by human being's memory.

The simulators amplify the imaginative capacity while the virtual reality amplifies the perception, enabling the virtual manipulation of dangerous experiments.

Telematics, integration of telecommunication and informatics, decreases space and time barriers and permits the development of a creative collective intelligence (Lévy, 1996). It creates conditions to access virtual libraries and the realization of projects with partners of institutions in other regions of your country and/or abroad. It also enables teachers and students from public schools to share projects. Finally, telematics optimizes the existing technological infrastructure if teachers are well prepared to its appropriate use.

Artificial Intelligence permits people to work with enormous databases and elaborate projects taking decisions much more rapidly and accurately.

We, teachers, are responsible when we make up our minds to act, or not, to develop in our students a criticism in using ICTs, putting them to the service of the society through a collaborative collective action to produce new social scenarios and new humanizing knowledge.

Instead of seen them just as tools which substitute or make human beings slaves, we can "make them tools and instruments which give freedom to people and social groups" (Martin, 1997:14). Autonomy and competence to search and retrieve information in communication networking will permit teachers and students to experience the permanent exercise of communication and information.

This experience, done through the manipulation of the ICTs, must be integrated to the curriculum not as a simple operational action, it must be embodied as a resource, as study object and as educational agents.

Lévy (1998), Martin (1999), Postman (1996) point out the danger of people to be drown in an information ocean if they are not prepared to look for information with selection and value criteria. As Postman syas (2000:170), schools have to be worried with those psychological, social and political effects technology impose. Thus, it is urgent for us, teachers of teachers, to prepare a "technology education" and to organize our courses with time and space for reflection so we can develop, in our teacher-students, concepts, attitudes and skills to analyze both the use of ICTs and if the collected information ethic they work with is true, relevant and.

It is essential for students and teachers to realize that people can be emitters, authors and agents and the ICTs are media for them to learn, work, have fun, create, communicate and collaborate interactively.

When teachers become effective and reflecting ICT users, they will realize they can help to improve student learning efficiency. It is not enough to introduce activities mediated by different technologies, it is fundamental that teachers experience technology in their own development as a mediator of information search, selection and retrieval and in the communication with their peers, their students and the community where they live in. Using ICTs as other means to do research and to communicate, the teachers wil certainly be able to work with them, awake their students interest and guide them in the mastering and controlling process of ICTs for their own growth.

Research

This research is an experimental action research in the sense that it tries to produce new knowledge from the investigation of a present situation and proposes an educative action from the results of this investigation getting along with it and assessing its process and outcomes.

At first, the investigation diagnoses if the 1998-to-2001 graduated teachers from UTP Teacher College have enough knowledge of the ICT educational and teaching potential as well as it collected data to characterize the social contexts and the teaching contexts where they have been working. They answered a questionnaire and attended a lecture "ICT Mediation in Education" to sensitize those who were still resistant to ICTs and to bring updating information to those already familiar with them.

This research investigates also the functions which the 1998-to-2001 graduated teachers from UTP Teacher College have been carrying out using ICTs, their competence in using them as collaborative tools, or other educational uses people make of them.

Teachers graduated in the years 1998, 1999 and 2000 did not have any preparation to use ICT in education during their under-graduation course. "ICTs in Education" as a discipline in the Pedagogy curriculum was introduced at UTP Teacher College in 1999 (those classes graduate in 2001). So it is possible to compare their competence, to know if they had any kind of instruction in using TIC in their professional life and how it works in their teaching practice.

Collected data will permit to plan and execute a 60-hour empowering course aiming to the reflecting teacher formation, adopting the collaborative educational action approach with individual projects interlaced with community and school collective projects. The teacher-students in this course will write a brief history of technology and work with ICTs as different forms of representation and communication and as mediators of a renewed and transforming education for a society with more equity and solidarity.

Since most in-service teachers cannot come back to University to study, a Distance Education program can provide them an environment to learn, discuss and reflect on the collaborative use of ICTs in education.

The research also brings necessary information to improve the curriculum of Pedagogy at Teacher College so that under-graduate students can experience ICTs, collaborative team work along their course as well as transfer what they will have learned to their teaching practice.

Partners

In parallel, ICT companies have been contacted to start a partnership with the University to promote a support to teacher continuing education in the use of ICTs. It is a trend to bring the enterprise to develop partnerships with schools to fulfill their social function. The research contributes with new knowledge on the use of ICTs that can be shared in the companies. It is a multiple-way partnership. The research gets funds, the enterprises get knowledge, schools get qualified teachers, teachers become competent and proficient and their students, in consequence, have better teaching.

Conclusion

Finally, this research has as basis that the focus must be on the students learning, never on the ICTs, but the teachers go on being the key for teaching and learning. Then, for the success to happen in education, dedicated and true teachers must be empowered by both studying and updating their knowledge as well as their use of ITCs. As they transefr their knowledge to their practice, a constant discussion and evaluation have to be held. As a parallel outcome, a new experience in working with face-to –face and distant courses will be created and evaluated as it goes on.

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Web-based Multimedia for Educators Course

Caroline M. Crawford
University of Houston-Clear Lake
United States of America
crawford@cl.uh.edu

Abstract: The instructional design that is imperative towards the design and development of a Web-based course environment is of primary consideration when a graduate-level course is the focus of attention. Further, a multimedia course that incorporates the theoretical as well as hands-on elements that must be consistently focused upon and updated is of further concern. What is the most productive way to constantly maintain the most recent knowledge within the multimedia genre, as well as offer a wide scope of multimedia environments through which to offer the learner a full scope and sequence of curricular events? The analysis, design, development, implementation and evaluation of two significantly distinct Web-based learning environments will offer a clear progression through the initial instructional design phase, clear feedback offered by the learners which drove the second instructional design phase, and the results of the second implementation and evaluative efforts pertaining to the course.

Introduction

Within the revisionist's redesign of the course, the curricular scope and sequence shifted, the access to the knowledge and interactive elements shifted, the flow of the course significantly changed and the learner's feedback on the newest course structure is intriguing. Educators must have the opportunity to delve into the graphic design basics, pertaining to textual layout as well as the importance of using type styles within distinctly different environments, have a clear understanding of instructional design basics, focus upon flowcharting and storyboarding a multimedia product, remain sensitive to human/computer interface issues, and remain closely tied to the formative and summative evaluation stages of the development stage. Further, a shift in the Web-based mentality impacted the outcomes of the learner's level of understanding through out the course; this Web-based versus Web-enhanced structural shift offered opportunities to the learners that eased self-regulation issues as well as community-building concerns.

History of the Multimedia for Educators Course

The graduate-level Multimedia for Educators course had historically been taught by adjuncts within the specialization area; therefore, there was no significant standard in place for the course's instructional design. When the author became a member of the Instructional Technology team and took the responsibility to standardize and maintain the course, a significant shift towards meeting the International Society for Technology in Education (ISTE) standards (International Society for Technology in Education, 2000; International Society for Technology in Education, 2001) was continuously integrated, implemented and updated.

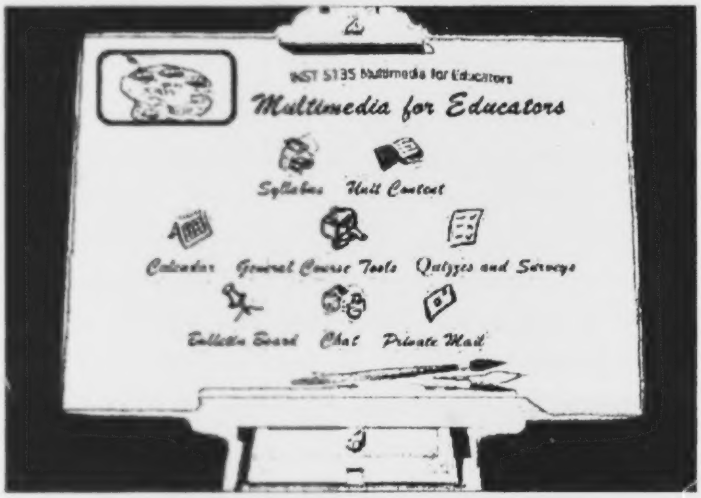
As the standardization process for this course was under way, the university developed a plan of action towards the support of the World Wide Web-basing of coursework. The instructional technology specialization area was one of the areas focused upon as an initial area of focus; therefore, the Multimedia for Educators course was one of the initial courses chosen to Web-based. As such, the course structure was as follows:

- Course Introduction
- Unit One: Introduction to Multimedia
- Unit Two: Developing Multimedia – The Basics
- Unit Three – Designing with Images

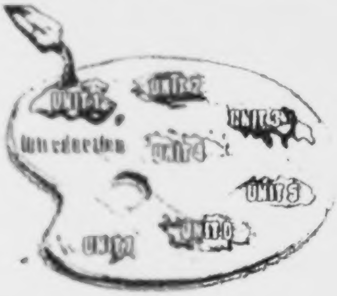
- Unit Four: Designing with Type
- Unit Five: Linear/Asynchronous Media
- Unit Six:: Nonlinear/Synchronous Media
- Unit Seven: The Future of Multimedia

Each of the course units maintained their own separate unit objectives, which directly identified with the course objectives that were previously identified through the Texas Essential Knowledge and Skills (TEKS) (TEA, 2001) and ISTE standards (International Society for Technology in Education, 2000; International Society for Technology in Education, 2001).

The course interface created a metaphoric representation so as to aid the learner towards the conceptual framework development and understanding. A metaphor surrounding the creative artist metaphor was decided upon, as multimedia is an artistic form of expression that integrates instructional design, imagery, designing with type, video, audio and numerous other interactive entities. Following is the initial interface for the course:



The artistic metaphor was simulated from the home page of the Web site. As the course was developed using a packaged course development software, the iconic representations were integrated from the course development software. Further, the course metaphor was further integrated through out the course structure as image maps simulated in the unit overview section of the course:



The course layout was one wherein all the textual and graphic information was scripted using HyperText Markup Language (HTML) so as to fit within the confines of the packaged course development software, as well as take advantage of the interactive activity capabilities available. Each of the seven Units of Instruction, as well as the Introduction and Syllabus sections, consisted of seven to fifteen pages of

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instruction that the learners needed to access. Within the pages, there were numerous hypertext links to either interactive activities or outside-of-course hypertext links to Web sites of importance.

Concerns With Original Instructional Design and Layout

The feedback from the learners was mainly positive, as the Web-based course was given to numerous hours of thought and planning before any specific design or development was undertaken. Following are the aspects that the learners noted as being positive within the course structure:

- Course metaphor
- Units of Instruction were color-coded
- Navigation
- Unit of Instruction overviews
- Unit objectives
- Unit Summaries
- Table of Contents at end of Unit of Instruction
- Clearly delineated assignments
- Clearly delineated assessment rubrics for each assignment

However, there were a few areas within the original course that the learners noted as being either difficult or negative aspects:

- Amount of information that the learners needed to review
  (As an aside, the learners printed out every Unit of Instruction page for ease of review)
- Some hypertext links to outside Web sites were "dead" links

As these negative aspects were serious considerations for the course instructional designer, the course was revised the following semester.

Revisions to the Course

Revisions to the Multimedia for Educators Web-based course were undertaken over a semester's time period. Several significant shifts in the instructional design and interactive layout were to occur and a significant period of time was necessary in order to accomplish this. Following are the changes that the course embarked upon:

- Shift the Units of Instruction
- Revise the Online Quizzes
- Change each of the Unit of Instruction's Layout
- Integrate the instruction within each Unit of Instruction into a downloadable Portable File Document (PDF)
- Integrate audio downloads
- Integrate video downloads
- Integrate PowerPoint presentation overviews for each Unit of Instruction

Following are short explanations of the above revisions to the Web-based course, so as to further emphasize the necessary elements under consideration.

Units of Instruction Shift

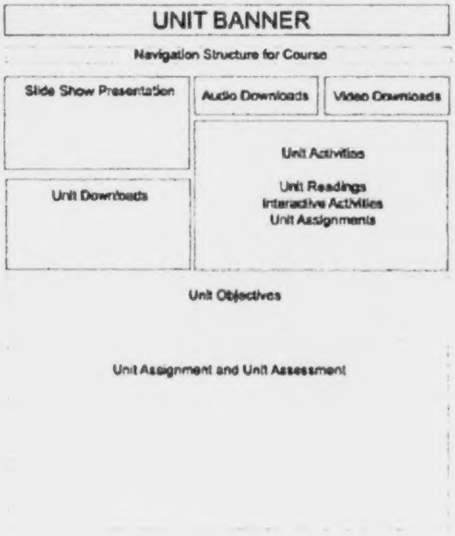
The instructor desired to integrate a more advanced multimedia software package into the course which, therefore, mandated a shift in the instructional design of the course. Following is the revised course structure:

- Course Introduction
- Unit 1: Introduction to Multimedia – The Basics
- Unit 2: Designing With Images and Type
- Unit 3: Multimedia into the Learning Environment: The Instructional Design Process
- Unit 4: Linear/Asynchronous Media
- Unit 5: Nonlinear/Synchronous Media
- Unit 6: High-End Multimedia Environments
- Unit 7: The Future of Multimedia

Some of the previous course elements were integrated into one Unit of Instruction and additional Units of Instruction were added, such as Unit 6: High-End Multimedia Environments. Further, the knowledge-level online quizzes for each Unit of Instruction were revised to reflect the shift in subject matter.

Unit of Instruction's Layout Shift

The layout for each Unit of Instruction was meant to allocate more space to the areas of greatest importance within each Unit, as the majority of the instructional information would be included within the Portable File Documents (PDFs) for each of the Units. Following is a simplistic layout example for a generic Unit.


UNIT BANNER
Navigation Structure for Course
Slide Show Presentation
Audio Downloads
Video Downloads
Unit Activities
Unit Readings
Interactive Activities
Unit Assignments
Unit Downloads
Unit Objectives
Unit Assignment and Unit Assessment

Each of the Units of Instruction included each of the elements included in the layout delineated above. Therefore, the significant difference between each of the Units of Instruction would be the color allocated to each Unit of Instruction, as well as the Unit Downloads and Unit Activities made available. Further, the Unit objectives and Unit assignment and assessment rubric would be available for the overview of each Unit of Instruction. As well, each of the Unit of Instruction slide show presentations, audio and video downloads would be appropriate to the Unit in question.

Portable File Document (PDF) Instruction Access for each Unit of Instruction

Each Unit of Instruction consisted of its own portable file document (PDF) that organized the unit knowledge into an appropriate instructional design format to emphasize the materials to be integrated into the learner's knowledge base as well as to designate the interactive activities that would offer the opportunity towards higher order thinking skills. The PDF format was chosen due to its portability factor and the ability to designate a page layout for each presentation of the content. The content contained within

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the PDF document offered an ease of instructional shift for the faculty member due to the lack of HTML scripting that was previously necessary. Quickly changing the document, saving it as a PDF, and uploading the file to the server was all that was necessary to revise the course content.

Integrate PowerPoint Presentation Unit Overviews, Audio and Video

Each Unit of Instruction offered a PowerPoint presentation as a Unit overview, as well as audio and video files of the instructor stating the main objectives of the Unit. The audio and video files were meant to test the perceived learner-instructor relationship that occurs within a face-to-face course yet may not occur to as great an extent in a Web-based course learning environment.

Learner Feedback

The new layout of the course was tested the next semester, with student feedback noting significant elements of interest:

- The High-End Multimedia Environment integrated into the course, although significant support information was available to the learner, was overwhelmingly disliked due to the steep learning curve over a short allocation of time. The learners noted a desire that a high-end multimedia environment with a less steep learning curve be considered as a replacement.
- The students stated their approval towards the PDF documents for each Unit of Instruction. They noted that it was easier to print out the information, if desired, as well as the portability factor was desirable when they moved from computer to computer through out their daily activities. They disliked accessing the course Web-based site constantly for other courses and enjoyed the ability to manipulate their learning environment through the portability of the PDF documents for each Unit of Instruction.
- The students noted a lukewarm attitude towards the slide shows available for each Unit of Instruction, although they all noted that they reviewed each one available for each Unit. The audio and video files were not available at the time of review, so the learner feedback was unavailable for the audio and video file level of success.
- The students stated that they strongly supported the "cleanliness" of the Units of Instruction. The layout was easy to access and review, as well as printing out the information available aided them in their motivation and time allocation.

Conclusion

The instructional design that is imperative towards the design and development of a Web-based course environment is of primary consideration when a graduate-level course is the focus of attention. The interactive elements of a Web-based course is also of significance through out the instructional design process with the focus being allocated towards the learning environment, the ease of information and activity access, and the clear layout of each Unit of Instruction.

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Online and Onsite Action Research: A State Wide Professional Development Model

Nedra A. Crow, National University, San Diego, CA, USA, ncrow@nu.edu
Michelle Bachman, Salt Lake City School District, SLC, UT, USA, michelle.bachman@slc.k12.ut.us
Betty Spencer, Davis County School District, Bountiful, UT, USA Bspencer@curric.dist.davis.k12.ut.us
Ann Adams, Davis County School District, Bountiful, UT, USA caadams@curri.dist.davis.k12.ut.us

Abstract: This paper is a description of a collaborative state-wide action research professional development program. The program centers around an action research course that employs a variety of distance education delivery strategies, including a newly developed and innovative online course. The purposes of this paper are to: 1) outline the local action research program and its instructional and collaborative principles, 2) illuminate the state-wide collaborative efforts and organization, 3) describe the distance education delivery strategies, 4) outline the online course, and 5) discuss preliminary findings.

Action research or teacher research is a form of reflective practice based on the principles associated with systematic inquiry of one's own educational practice. Historically, action research was embedded in social action and critical perspectives required to illuminate issues of curriculum and the social structure of schooling. Throughout the decade of the 1990s, action research, and its various forms of participatory inquiry began to emerge in graduate programs and higher education focused professional development endeavors. However, in recent years, action research has become an increasingly popular form of K12 professional development (Licklider,1997; Lytle and McGuire,1993). Its popularity can be noted in K12 staff development guides, school reform efforts, and workshops (Halsall,1998; Harris, 1998).

The popularization of action research has created challenges for educators who believe that this model of professional development is, by its very nature, different from the more traditional forms of training, workshops, and inservice education. As action research has expanded into the arena of district promoted staff development (Kochendorfer, 1997; Lytle, 1996), there is a tendency to reduce its conceptual, instructional, and contextually-driven frameworks into more discreet packages of "how to" or "tidy tips" approaches demanded by overworked and highly-pressured classroom teachers. Furthermore, there is the tendency to promote locally driven, collaborative and successful programs to a larger audiences. The challenge here is to keep to the pedagogical and collaborative tenets vibrant as more distance education strategies are employed in the ever expanding dissemination process.

It is within this changing world of professional development and action research, that a local and collaborative action research program evolved into a large dissemination project. The question before the developers of a local action research program called ULEARN (Utah-Local Eduators Action Research Network) was, how do you deliver a state-wide professional development program and maintain the instructional quality and collaborative nature that framed a successful local program? The purpose of this paper is to: 1) outline the local action research program and its instructional and collaborative principles, 2) illuminate the state-wide collaborative efforts and organization, 3) describe the distance education delivery strategies, 4) outline the online course and 5) discuss preliminary findings.

The Local Effort and Guiding Principles

Building upon years of instructional and evaluative knowledge about the role and design of a successful graduate action research program (Crow, Stokes, Kauchak, Hobbs, and Bullough,1996), a professional development effort was initiated in 1994 by four teacher educators from the University of Utah, Davis, Granite, and Salt Lake City School Districts. The teacher educators represented one full-time faculty member and three University/District Liaisons (half-time at the University of Utah and half-time in their respective district's Staff Development Offices). The goal of this collaborative venture was to design and implement a high quality professional development course for K12 educators using an action research model (Crow, Adams, Bachman, Peterson, Vickery, and Bernhardt, 1998). The subsequent course and

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U-LEARN (Utah Local Educators Action Research Network) program was developed and infused with six guiding principles that grew out of the work by Judith Warren-Little (1993). U-LEARN principles are:

1. Professional development should be educator-centered and context-specific.
2. Professional development is sustained within a community of learners focused on studying and discussing teaching and schooling practices.
3. Professional development should allow educators the opportunity to generate meaningful and passionate questions and pursue those questions within an atmosphere of support and knowledge of the action research process.
4. Action research should encourage a variety of "ways of knowing" that are useful to each educator
5. Learning the action research process requires sustained instruction by competent teachers, application of knowledge and skills by interested educators, and a community of learners involving participants and instructors.
6. Action research is both exciting and painful. There are no right, common or easy answers. The process is "messy" and intriguing. The teacher empowerment is breath-taking.

The first course was taught in 1995 to 30 K12 teachers and administrators in the three participating school districts. Taught onsite in various schools, the participants and instructor met for 90 minutes every week during a seven month period. Taught every year, participation in the six-credit semester course grew rapidly to 80 educators in 1998. By 1998, a consortium of seven rural school districts in central Utah called CUES (Central Utah Education Service area) approached the U-LEARN instructors with a proposal to provide the same course to their educators. The CUES course employed the state's two-way audio and video conferencing system (EDNET) to create weekly teaching sessions broadcast to five rural districts locations. Additionally, the course implemented four onsite teaching sessions in two locations. In September of 1998, the CUES distance education program was delivered to eight selected educators who then became onsite facilitators for future CUES action research courses. By May, 2000, the CUES course had successfully taught an additional 35 educators in these rural school districts.

State-Wide Collaborative Efforts and Organization

By late 1999, the four University of Utah teacher educators/course instructors were approached by representatives from the Utah State Office of Education and, a large K12/higher education consortium called the Brigham Young University Partnership. In a series of meetings, a state-wide action research professional development program was developed called the Action Research Initiative.

In order to create a locally and contextually driven program directed by collaborative efforts and centered in communities of learners, the Initiative organized the state of Utah into seven regional areas (see www.ed.utah.edu/ulearn). Each of the seven areas were represented by a local regional director (K12 administrator), one of the four University of Utah (UU) instructors, and a cadre of urban and rural assistant instructors called Lead Instructors. The coordination needed for recruiting participants was lead by the regional director and supported by the UU instructor. Financial resources were supported from Goals2000 Grants, directed by the UU instructor, and housed in the region's school district.

Presently, five and of seven regions are active participants in the Initiative efforts. The five regions include eighty percent of the urban Wasatch area (two regions: BYU Partnership and Utah Education Consortium consisting of the University of Utah and five local school districts) and three rural consortiums (including 20 rural school districts).

Distance Education Delivery Strategies

From the beginning of the U-LEARN program in 1994, the four University of Utah (UU) faculty members framed their efforts and course instruction with the guiding principles of action research and coupled them with the following instructional quality indicators: sound theoretically framed content, high instructional touch, classroom relevance, teacher empowerment, and appropriate academic rigor. The challenge of the Initiative program was to keep these guiding principles and instructional indicators front and center while employing more distance education and technologically-based approaches. To do so, the foci of the distance education delivery strategies were high tech and high touch. In order to achieve these goals, several key distance education strategies became integral Initiative program elements.

The first element was the instructors. Each region was directed by an University of Utah instructor. Each instructor worked with 3-6 Lead Instructors. The Lead Instructors were selected from K12 educators who had either completed a Masters degree with an emphasis on action research or completed years of U-LEARN course participation. Furthermore, Lead Instructors were selected because of their ability to work with adult learners, demonstrated proficiency in the action research process, and work in their own K12 classrooms. The UU and Lead Instructors worked with regional participants during the onsite teaching sessions and acted as "online course coaches" to those same participants.

The second distance education element was the onsite teaching sessions. The sessions were taught in each regional area. Because of the large geological area, two teaching sites were designated within each region. While the four onsite sessions covered content represented in the online course, the sessions also provided an opportunity for instructors to meet with participants. Personal contact was important for several reasons. Firstly, most participants were new to the online course environment, therefore, anxiety and confusion were high, particularly during the initial months of the class. Secondly, the action research process was a new venture for educators, requiring them to systematically study their own teaching and classroom practices. As a result, the action research process can be considered, a "messy" venture involving ambiguity, questioning, and methodological refinement. These unsettling perspectives often require high touch strategies. Therefore, the onsite teaching sessions became a salient aspect.

The third element was the online course. The online course was developed as a self-sufficient, stand-alone course. However, for the Initiative efforts, the course became a significant enhancement to the four onsite teaching sessions.

The Online Course

Prior to the 1999 call by educators for a state-wide action research program, the University of Utah instructors believed that an online course component was needed to encourage their distance education efforts for the ULEARN program. The online course built upon the curriculum, instructional strategies, and evaluative feedback gained from years of onsite course implementation. The four UU instructors secured funding to design the course with a corresponding website from a 1998 Goals2000 Grant. With grant funds in hands and a curriculum ready for online enhancement, a UU agency dedicated to technology driven applications, called Media Solutions was hired to migrate the course to Learning Space. It should be noted that Learning Space was selected for this project because it was already available to the course designers at no further cost. Additionally, the grant paid for Web Server maintenance through the College of Education and technical support staff.

The online course was designed to teach and apply the action research process to educators' professional lives by linking the online instructional experiences to their classroom activities. The course was activity-based and field focused. The course employed asynchronous instruction along with directed field assignments and projects, links to the relevant resources, threaded discussions, reflective assignments, journal entries, regional threaded discussion groups, "study-buddy" pairings, links to database reference systems, chat room, and collaborative learning space interactions.

The online course curriculum organization is nested. There are 11 Units. Within each Unit are Modules. Finally, within each Module are Activities. Each Unit and Module is composed of an Overview Statement that introduces the participant to the upcoming content, goals, expectations, and instructional activities.

Media Solution personnel created an online version as well as a hard-copy Participant Guide that served as a "how to" module able to teach beginning and advanced Internet users about: accessing the

Internet, navigating the website, accessing asynchronous activities, and participating in electronic conversations.

Preliminary Findings

September 2001 signaled the start of the pilot year for testing the program organization and the distance education strategies, including the newly developed online course. Presently, there are almost 60 participants located in urban and rural Utah. The course is lead by four University of Utah adjunct faculty members and 17 Lead Instructors working in potentially 30 school districts. The start dates for the course varied by region. One region (CUES) began in September 2001. Three other regions started October/November 2001 (Central Wasatch, NUES, and SEDC). Finally, the BYU Partnership started January 2002. All course participants will complete their action research projects in time for the 1 May 2002 ULEARN Conference. At the conference, participants will share their action research projects with other course participants and invited guests.

Based on observations, informal interviews, field notes, and document analysis our preliminary findings focus on four major themes: 1) the online course development, 2) overall course development and implementation, 3) Lead Instructors, and 4) collaborative process.

Online Course Development: Developing an online course that stayed true to our original, course pedagogical and content principles were a challenge. Most online course software packages are not designed to be activity-based, content applied, and field focused. Most online courses are designed around reading the content, participating in threaded discussions, using the chat rooms, and completing written assignments. Our action research course was and is based on immediately applying learned principles to the field settings of the K12 classroom or school. Furthermore, action research and the inquiry process requires sustained application, reflection, revision, and re-application through instructional directed activities and coaching. Much of the "learning" of the action research process occurred because participants and instructors worked together and through ambiguity and frustration. Designing an online course environment to facilitate and lead participants in a field-driven and applied learning seemed daunting at times, yet always a necessity. The Media Solutions personnel were extraordinarily bright and creative as they adapted a rigid software into an activity-based learning environment.

Overall Course Development: Using the online course as an enhancement to the onsite teaching sessions has helped to create and maintain the sense of community, lessen participant anxiety, and ensure instructor comfort. The onsite teaching sessions became invaluable in introducing the participants to the technology, the action research process, and instructional personnel. While the online environment assisted in developing personal contact through a somewhat anonymous medium, the face to face interactions added a much needed warmth and connection our K12 educators were accustomed to through their more traditional professional development classes.

Lead Instructors: Facing the prospect of teaching and traveling to the entire state of Utah meant that the four, already full-time employed instructors would need to be working two full-time jobs. This was not acceptable nor possible. Therefore, the conceptual formation of the Lead Instructors and actual selection of them made the Action Research Initiative possible. Furthermore, the Lead Instructors formed an additional, and important layer to the community of learners created by the four instructors. As a group, all the instructors struggled with and learned the Learning Space software. Moreover, the Lead Instructors became a valuable feedback resource as the course was designed and migrated to the online medium. The Lead Instructors' feedback guided the development and content needed for the Participant Guide.

Collaboration: Collaboration was messy and difficult, at best. Every aspect of the ULEARN program, Action Research Initiative, and online course was the result of collaborative efforts. The original U-LEARN program and onsite course were developed by personnel forming a university-school district partnership. The program was created to serve the needs of K12 educators, district staff development, and higher education. The state-wide Action Research Initiative was developed through partnership endeavors on the local, regional, and state levels. The Initiative required state leadership and resources while the program implementation was driven by local concerns. Finally, the online course was developed from several perspectives, including; the four university faculty designers, Media Solutions online and web expertise, and feedback from Lead Instructors as well as participants.

While the collaborative piece sounds neat and tidy, it was not so. Collaborative efforts required detailed planning and fluid philosophies to accommodate shifting stakeholder needs. The best of intentions were often met with changed agendas. Concerning the online course, close and continued interactions, evaluative feedback sessions, and shared development time was required between the primary course designer and software migrator. As a result, the online course development timeline moved from an initial estimated three months to over 20 months.

While the online and onsite course began a few months ago, work on the state-wide Action Research Initiative has been ongoing for over two and half years. Much has been learned, refined, changed, enhanced, and eliminated. The endeavors throughout the process has focused on creating and sustaining meaningful collaboration, empowering educators through the action research process, enhancing distance education strategies, and providing academically appropriate professional development. Embedded throughout the journey was the challenge to consistently stay true to the program and instructional principles.

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Integrating Inquiry Based Learning into Project Based Methodology Using a Constructivist Approach

Terry H. Daniels
Department of Education
St. John's University
Wm. E. Grady High School
New York City Board of Education
United States
crtstringer@pobox.com

Abstract: The problem faced in many K-12 classrooms is that teachers have access to computers but don't know how to infuse technology into their instruction. The goal of this paper is to set forth a plan to imbue in these teachers how to use computers in their classrooms and to use instructional technology to augment their teaching. The solution applied to the problem was treated through the implementation of project-based constructivist methodology. Each step in the process was reinforced through the use of hands on projects, which in turn were reinforced in the ensuing steps of the process.

Introduction

The National Education Association (NEA) (2001) has stated that technology is changing how faculty teach and how students learn. Administrators and faculty need to understand the role of technology in the classroom and how it complements the educational experience. Shaw (1999) cites a survey in which 13 percent of 1500 new and veteran teachers stated that they were well prepared to use technology in their teaching. Thirteen percent of veteran teachers versus eight percent of new teachers stated that they were not prepared at all to use technology in the classroom. The International Society for Technology in Education (ISTE) (2000) stressed that it is essential for teachers to create a learning environment through the powerful uses of technology. Technology should not be taught in isolation, but combined with traditional methodology to create new approaches to teaching curriculum while addressing individual needs. The National Council for Accreditation of Teacher Education (NCATE) (2001) contends that in the preparation of today's teachers, technology must become an integral part of the teaching and learning process in every setting.

Discussion

It is apparent that teachers in today's classrooms need support and training to learn how to use technology from the preservice to inservice levels. Shaw (1999) believes that the impact of teacher usage of a computer in every classroom will not become apparent until the class of 2004 graduates from college. Moore and Engeldinger (2001) discuss the need for preservice teachers to have a vision for the integration of technology into their classroom curriculum. This vision must precede the formation of the skills required to become competent users of instructional technology. Huffman (2001) considers what constitutes a successful technology-based learning environment. He stresses the importance of training the teachers who deliver instruction. A search of the literature revealed how to use technology in education, but no overall schema for training teachers to transfer this knowledge into the classroom. Teachers need a model to show them how to integrate technology into their curriculum, not how to use technology as suggested by Frances-Pelton, Farragher & Riecken (2000).

Implementation

A course of study evolved at two large northeastern institutes of higher education between September 2000 and June 2001. Twenty-five postgraduate inservice K12 teachers in an Instructional Technology Master's program and 45 postgraduate inservice/preservice teachers/students in a stand-alone computer course in a reading and writing program were exposed to a structured instructional technology course of study. Both courses of study used the same methodology and learning skills. Once learned, the basic skills of saving graphics, finding curriculum based Web sites and e-mailing attachments, were integrated into a project-based unit using inquiry-based learning (IBL).

The first step in the process is the development of the Scenario. This is similar a lesson plans motivation. The Essential Question and Foundation Questions called the Tas*k*, follows. This section is used to engage students in either decision-making or the development of a plan of action. The plan of action uses the previously learned skills to enhance the project with graphics and list resources and to create activities. The Product designates how the material gathered from the Task will be disseminated. The construction of an Assessmen*t* tool is the final unit. After the IBL unit has been completed, it is ready to be presented to students as a project-based thematic unit.

Conclusions

It is important in any course of study where instructional technology is used to have students become engaged in meaningful hands on projects from the onset of classes. Milbrath & Kinzie (2000) contend that teacher self-efficacy and attitudes must become positive toward the use of computers and technology in order for students to model them. Albion and Gibson (2000) observed that if teachers are to become successful at adapting technology into their curriculum, they require an understanding beyond that of being confident in using computers in their daily lives. Herrington and Standin (2000) discuss the use of real-life situations when designing a program. The use of PBL is authentic learning and adds meaning to coursework through the use of situations found in the daily lives of students. By connecting technology with active involvement in learning, Kommers and Mizzoguchi (2000) believe that teachers create a knowledge base that is described as a key issue by constructivists.

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Are We There Yet? A Composite Picture of the State of Computer Use and Teacher Training

Marietta Daulton
The Graduate School
Malone College
United States
mdaulton@malone.edu

Carol Welling Boltz
Newcomerstown Middle School
Newcomerstown, Ohio
United States

Patricia Nelms
Elena Tkac
West Elementary School
Youngstown, Ohio
United States

Christine Ehasz
Saint Paul K-8
Akron, Ohio
United States

Abstract: This report is a composite of findings related to the use of the computer in selected schools in Northeastern Ohio. Separate data bases are combined to present an answer to question of "are we there yet" in relation to the use of computers in educational environments. These areas include teacher use, student use, and perceptions of use.

Introduction

The introduction of the personal computer in 1975 launched a great prediction that the computer would revolutionize the way we teach and learn. The adoption of computer technology into American schools spread so rapidly that Ward and Zullo (1982) had declared that the movement was already an established order. While the predictions of the early 1980's were that by the year 2000 schools would be totally immersed in computer technology, the adoption of this technology may not have advanced at the predicted rate. By 1986 data relative to the rate of adoption and use of computer technology in schools was available (Daulton, 1987). For more than two decades there has been stated need for teachers to be able to use computer technology in their classrooms. The implications of not having and using computers to teach our children include that children who are not learning via the computer will be disadvantaged. Colleges and universities have struggled with the best teaching practices for preparing teachers to work with technology in the schools. Parents have questions the value of ways computers are used for teaching and learning. Schools, public and parochial, have experienced differences in acquiring the hardware and software for their teachers and students. Differences in teacher skills and attitudes toward using computers have impacted what has happened in the teaching and learning experiences. Four teachers who desired to learn more about the adoption and use of the computer in their schools have also attempted to answer the question of "are we there yet" in relation to the use of computers. While the answer to the question could easily be "not yet," a picture of where we are with computer technology and education can be presented. This picture may help to guide administrators, teachers, parents, and teacher educators in helping make computer technology an appropriate and effective educational resource.

The Study

This report is a composite of four studies and independent observations designed to answer the above question of where we are in use of the computer technology in certain schools. Schools of all levels have made great strides in acquiring the computer hardware and software needed for education. Experiences for teachers to learn to use the computer for effective teaching have been provided in many forms and levels. Most students in many schools have the opportunity to use computers for learning experiences. The presence of computers in homes has also impacted the student's use of computers for learning experiences. While the use of the computer as a tool in effective teaching is readily accepted, the goals remains that all students and teachers have full and easy access to computer technology for effective learning and for classroom management. To answer the guiding question of where we are with computer technology in education, the researchers designed surveys and collected appropriate data to answer the following questions:

1. Are there differences in availability of computer technology in public and parochial schools?
2. Do parochial and public schools have teachers adequately trained to use computer technology?
3. Is there a different in how public and parochial teachers use computers in teaching?
4. How does the availability of computers at home affect students of all abilities including gifted and learning disabled?
5. How does the availability of home computers impact teacher use of the computer at school?
6. Does the teacher's perceived level of computer skill impact the teacher's use and the student's use of computers in the classroom?
7. Does computer assisted instruction provide students with a positive learning experience and higher test scores?
8. What are implications from this data for schools and colleges in designing learning experiences for teachers as part of in-school and graduate education experiences?

Findings

Detailed answers to the above questions will be presented in the composite picture at the SITE conference. This summary includes only limited findings from the data and observations.

There are differences in the availability of computer technology in public and parochial schools. At the time of data collection, the public schools seemed to have more access to computers in classrooms and computer laboratories. This may have been a result of grants available to public schools through state and federal funds that the parochial schools have not had. While there seemed to be a difference in availability of computer technology in parochial and public schools, teachers from both systems have been provided with educational opportunities to learn to learn to use the computer in classrooms.

Computer availability at home does have a significant impact on how teachers and students perceive use of the computer for educational purposes. More gifted students reported having computers at home than other students. Fewer students with special needs reported having computers at home. Teachers and students with home computers also reported a higher use of computers in their classrooms. The initial critique of the data collected regarding the use of computer assisted instruction indicated that this process could improve overall grades and test scores. However, the researchers would be in error to say that the academic gains were strictly a result of the addition of computer assisted instruction.

Conclusions

The data collected helps to tell us how far schools have come in the use of computer technology. As rapidly as changes occur within this technology it is impossible to report a complete picture of where we are. However, from the data collected and from observations about teacher needs and requests we must continue to design graduate education courses in computer technology to meet the needs of all teachers. Early in the introduction of computers for educational purposes, many experienced teachers said they would retire before they were required to use the technology. That is no longer true. All teachers need to know about computers and are willing to learn if we provide the proper levels of training. Advanced technology courses and workshops provide experiences for teachers who have advanced beyond basic skills. While we would like to think that all entering the field of teaching are leaving undergraduate education prepared to use computer technology, we cannot be certain. Frequently, teachers ask if workshops or courses that introduce the teacher to basic computer skills can be offered. These courses in basic skills for teachers fill easily and include recent graduates of teacher education programs as well as more experienced teachers, indicating that inservice and other in-school training has not provided teachers with the skills or confidence they need. Are we there yet? We have come far, but we are not there yet for all teachers and all students.

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Canada-Wide Francophone Network of Teaching Expertise

Robert David
Université de Montréal, Canada
robert.david@cyberscol.qc.ca

Judith Cantin
AQUOPS, Canada
judith.cantin@cyberscol.qc.ca

Michel Aubé
Université de Sherbrooke, Canada
maube@courrier.usherb.ca

Abstract : We have developped a training tool to fulfill the important training requirements emerging from teachers' new roles and practices. Built around a web application, this tool makes a strategic use of a collection of videos to foster teachers' ability to translate inservice training into new classroom practices. A characteristic power of this tool rests on its flexibility by allowing trainers operating in different contexts to build specific training paths online.

In January 2001, we have initiated the creation of a Canada-wide network of French interveners involved in training and supporting teachers. The goal for developing such a community was to create a space wherein we could exchange about innovative practices through using videos of teachers that typified good examples (David & Cantin, 2001).

In Canada, as in several other countries, the educational system has been transformed in order to help pupils develop the higher learning competencies they will need in the twenty-first century. The curriculum reform, based on higher learning competencies, has dramatically modified teachers' roles. In order to evolve in such a context, teachers must develop new teaching competencies: managing a complex classroom, integrating technologies and exploiting different resources, managing collaborative work, organizing knowledge and trying to evaluate in ways consonant with this new context (Perrenoud, 1999).

More than ever before, important training needs emerged from these changes concerning the teachers' new roles and practices. Fortunately, videos can play a significant role in this context. They allow showing good examples of what is expected from the teachers in terms of higher teaching competencies in new learning environments. Under certain conditions, video will also help develop observing competencies. The teacher's ability to identify important elements within a learning sequence is usually the first step to appropriate intervention. Ludlow believes that the video tool fosters the acquisition of professional competencies because it brings together teachers, training and the reality of the profession (Ludlow & Duff, 1997). Ensuring a greater impact in the classroom of preservice and inservice training is also a challenge. By providing many significant indicators, the use of video can have an important impact on the teacher's capacity to achieve higher teaching competencies (Copeland & Decker, 1996; Mottet, 1997). The use of technologies also entails giving teachers support when it is most needed and thus allows individualized training paths.

All these reasons explain the high interest for training environments based on the observation of videos. Therefore, we have collected over a dozen projects such as InTime (Plakhotnik, 2001) or CLICK (Chambers & Stacey, 1999). To this day, these projects are mostly closed templates developed so as to meet the specific needs of a university or a region.

The Project

As stated before, French Canadian communities are often small and the training programs as well as trainers vary from one province to the other. Our first goal was therefore to develop a web application to index all the videos produced across Canada and to classify them according to teaching competencies and characteristics of learning situations. Then we wanted people to be able to use this video collection in order to build their own training sequence.

The system we have developed is composed of six units designed so as to achieve the goals described previously. The first unit allows the selection of videos. It is a powerful indexing system which makes it possible to search through the video database and to select sequences on the basis of multiple criteria. The second unit makes it possible to build listening guides. This unit allows the trainer to target precise elements before, during and after the video in a learning situation. For example, it can be a text asking the learner to pay attention to an aspect of the training situation, in order to analyze the impact of transfer (Aubé and David, 2000)

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or to compare the pupils and the teacher's point of view (Rand, 1998). The trainer can also use this unit to insert short video sequences such as the comment of an expert.

The third unit is oriented towards the integration of interactive elements aimed at supporting a reflexive practice. It could be multiple choice questions, open questions or elements making it possible to develop the observation competencies. With this unit and the two previous ones, the trainer can create case studies such as suggested by Merseth (1994). The fourth unit, much simpler, is based on an inventory of necessary teaching competencies. In a training situation, it allows the trainer to identify the competencies that are targeted and the learner to organize his or her professional development. In the same line of thought, the fifth unit allows the learner to build his own journal which contains the list of the observed videos and a repertory of targeted competencies. The sixth unit is a simple discussion group offering the possibility to exchange around case studies.

These six units allow to create diverse training paths in order to fulfill different needs. To complete this tool, we are actually initiating a unit that proposes situations to experiment competencies developed during the process. These learning situations are mostly WebQuests describing projects realized in classrooms.

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Helping In-Service Teachers Facilitate the Use of Information Technology During Pre-Service Teacher Field Experiences

JoAnna Dickey
College of Education
Eastern Kentucky University
United States
JoAnna.Dickey@eku.edu

Abstract: The results of a study completed by the author and two other colleagues inferred that student teachers reported a significant difference between their perceived ability to use and the actual use of information technology during their student teaching experience. Although pre-service teachers perceived themselves as being able to use technology for teaching and learning, they reported little use of these skills during student teaching. Based upon the results of this study, a project was launched during the Summer 2001 session. The goal of the project was to have in-service teachers (K-8) develop information technology application ideas and materials that could be shared with cooperating teachers. In turn, these ideas and materials could then be used to facilitate field experiences with visiting pre-service teachers. This paper will briefly explain the results of the initial study, project development, and project results.

Study and Results

The emphasis in the ability of teachers to use technology in the classroom for teaching and learning is a nation wide trend. In-service and pre-service teachers are expected to meet technology standards designed by the International Society for Technology in Education (ISTE, 2001). In Kentucky, a standard with performance criteria for technology knowledge and use has been established as part of the initial and renewal teacher certification process (Kentucky Education Professional Standards Board, 2001). This state standard is closely aligned with the ISTE National Educational Technology Standards and Performance Indicators.

Because the use of technology skills is an integral part of initial teacher certification, teacher educators Dickey, Long, and Reehm (2001) developed a study to explore student teachers' competencies in relation to the Kentucky technology standard for new and experienced teachers. Eastern Kentucky University student teachers in elementary, middle grades, secondary, and special education certification areas were asked in to complete a survey designed to rate their perceived ability and use of technology during their spring semester 2001 student teaching experience.

Survey participants (elementary N = 43, middle grades N = 26, secondary N = 59, special education N = 10) rated their performance on 27 criteria in each of four different performance areas. Participants rated their performance on a Likert scale (range 1 - 5) for: (1) ability, (2) frequency of use, (3) opportunities to use technology as a student teacher, and (4) observation of the cooperative teachers' use of technology.

Mean scores for each group of survey participants were computed and analyzed for all 27 criteria in each of the four performance areas. Results indicated that: (1) all groups met a high majority of the criteria in the area of ability, and (2) the number of criteria met by each group differed among the four performance areas. A series of t-tests computed to analyze these differences revealed that student ratings were significantly higher ($p < .001$) for ability than for the other three areas.

A regression analysis was computed to analyze students' ability, frequency of use, and cooperating teachers' use as predictors of technology use during student teaching. Results indicated that the frequency of use and cooperating teachers' use were significant predictors ($p < .001$) of opportunity to use technology by student teachers, while ability was not a significant predictor.

Although correlation does not determine causation, the findings in this study have important implications for teacher preparation programs. One implication, is that students may feel that their ability to use technology for teaching and learning is extensive but a specific effort may have to be used to assure that these skills are actually used during field experiences, and in particular, student teaching. Another implication is that cooperating teachers may need assistance in facilitating the use of information technology during pre-service teachers' field experiences.

Project Development

The implications of this study indicated that there was a need to provide in-service teachers with information to help them facilitate the use of technology with visiting pre-service teachers during classroom field experiences. In order to help meet this need, a four-week workshop was developed for K-8 classroom teachers during the 2001 summer session at Eastern Kentucky University. Five elementary, one special education, and six middle school in-service teachers from at least nine different school districts participated in the workshop. After a series of self-assessments in operating system terminology, literacy terms, copyright regulations, and computer ethics, the workshop participants reviewed the Kentucky Education Professional Standards Board experienced teacher standard for the knowledge and use of technology (Kentucky Education Professional Standards Board, 2001). Based upon their self-assessment results and the review of the Kentucky technology standard, the participants were then asked to develop a professional improvement plan to expand their knowledge and use of technology for teaching and learning in the classroom. This professional improvement plan included a declaration of plans to develop a minimum of four portfolio artifacts that demonstrate classroom use of technology for teaching and learning. The goal of this workshop was to compile ideas and materials for elementary, middle, and special education teachers to share and use with field experience pre-service teachers. Therefore, the "sharing of ideas and materials" was an integral part of the workshop. Other activities included: (A) the development of an annotated bibliography; (B) three different field trips to school technology laboratories; (C) at least one software review; (D) at least one web site review; and (E) the participation in at least five presentation and sharing sessions.

Four weeks was a very short time period to assimilate and develop new skills, but all of the participants made dramatic changes in their ability to use technology for classroom teaching and learning experiences. The range of participant technology expertise ranged from novice to well developed. All participants were required to share their knowledge and creative ideas, therefore, those participants who needed technology assistance often contributed creative ideas and those participants that had some experience working with computers helped other students use the computers. A comfortable learning environment was established where mistakes and adventures could be made. The participants were asked to think of this experience as a "think tank" to develop ideas to share with other in-service teachers to help them facilitate the use of information technology during pre-service teacher field experiences.

Project Results

The participants went through several adaptations to be able to work with the software and equipment that was available at the workshop site. Some of these adaptations included the use of provided hardware and software that may have been different than those provided by their school districts. They quickly discovered that the use of digital images, color, or graphics increased file sizes. This factor made files difficult to save and transfer to their home site. All of the participants experimented with the use of color, graphics, sound, animation, and hyper-linking. When presenting their projects, they quickly discovered that a simple project could better introduce information without distracting movement or sound.

The artifacts that the participants developed for their portfolio and contributed to this project could be classified into six categories: (A) lists of favorite web sites for teachers; (B) word process projects with graphics; (C) tables and charts; (D) spreadsheets; (E) electronic slide shows; and (F) web pages. The web site lists contained sites where teachers could get information about lesson planning, unit development, content area, materials, assessment tools, electronic field trips, and "kid" learning sites. These web site lists also contain favorite search engines, government offices, state information, and professional organization sites.

Word processed artifacts usually included the use of graphics. Participants preferred to use color graphics. Ideas covered a wide range of classroom activities. Materials included: a classroom newsletter with a class picture; a school event flyer; a dress code brochure; an achievement award; and a series of reward coupons or passes for behavior management. The artifacts that focused on the use of tables and charts were developed for a variety of purposes. These materials included: a summary of student debit and credit accounts for purchases chart; a multiplication table; a student weekly work log; a weekly lesson plan table; a student behavior checklist chart; a school math curriculum chart; a work station assignment table; and an observation daily point sheet table. Several artifacts used spreadsheets during a content area study. Examples of these materials were: a spreadsheet listing the characteristics of volcanoes; a career study spreadsheet that lists the average salaries earned in various occupations; and a spreadsheet to report the results of a study in the number of blue or brown-eyed students in a class. Some of the content study spreadsheets were incorporated into electronic slide shows. The electronic slide shows that were developed also contained a wide variety of purposes. Some slide shows were developed to help parents learn about the teachers, classroom or school during parent-teacher conferences or school open houses. Other slide shows were developed to be used with the students to: introduce procedures, rules, or teachers; provide fact and content information during a unit of study; and prepare the students for a field trip.

The most challenging type of artifact for participants to produce was the development of a web page. One of the factors that contributed to this challenge was the adjustment that many of the participants had to make because their school district used a different software program than the one supported in this workshop laboratory. Some participants never had the experience of working with HTML. Therefore, there were several learning curves to master before being able to develop a web page. Information that was included on these web pages included: the teacher's name and contact information; the teacher's philosophy about how children learn; units of study for the year; classroom or school rules; helpful tips for parents; school activity announcements; and class projects.

Conclusions

The study conducted to explore student teachers' competencies in relation to the Kentucky technology standard for new and experienced teachers brought an awareness to the investigators that field experiences should be monitored to assure that the pre-service teachers experience the use of information technology. There was also an awareness made that cooperating field experience teachers may need assistance in acquiring information that will help them facilitate such experiences. Different delivery systems may be used to provide this assistance. Workshops, seminars, distance learning, and on-site training sessions can be developed to help prepare in-service teachers to facilitate the use of information technology when working with visiting pre-service teachers.

During the described workshop, participants expressed an appreciation for the risk-free environment; the cooperative and sharing atmosphere; and the time to experiment, develop and create useful materials. These in-service teachers especially liked the field trips to other school technology laboratories where they got to observe new ideas and discuss projects with fellow classroom teachers. Although this experience was offered as a short term workshop, each participant demonstrated growth in the use of information technology for teaching and learning by completing a professional improvement plan and contributing selected artifacts to the class project.

Plans to disseminate these contributed ideas and materials include: (A) providing demonstrations at school district professional development workshops; (B) sharing the project results with university professional laboratory associates; (C) present project information to educators at professional meetings; and (D) publish information in professional journals. There is a similar workshop scheduled for the spring 2002 semester.

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E-Supervison: Employing Videoconferencing in Supervision of Graduate Students

Carol C Dudding CCC-SLP
Communication Disorders Program
University of Virginia
Charlottesville, VA 22903
Phone 804.924.4622
Fax 804.924.4621
Email ccd3c@virginia.edu

David Drucker
Educational Technologies
University of Virginia
Charlottesville, VA 22903
Phone 804.924.0822
Email drucker@virginia.edu

Teacher education programs are always seeking ways to enhance the clinical training of graduate students. They desire to capitalize on the experiences provided from within the walls of the public school systems. In the areas of counselor education, educational psychology and speech-language pathology, this may include the need to supervise students during clinical training experiences. In addition, university programs are seeing a rise in the number of non-traditional applicants. These people are often seeking a career change and have other life responsibilities that make obtaining a degree as a full-time student impossible. With the increased availability of distance learning opportunities, applicants from outlying geographic areas now have access to higher education that they may never have had before. This presents a unique set of problems for programs that require numerous clinical training under the supervision of qualified professionals.

It was in direct response to these issues that the Communication Disorders Program at the University of Virginia began to investigate alternative means of student supervision. After much investigation it was decided that videoconferencing technologies would afford the program the ability to provide two-way interactive supervision to students at geographically distant sites. It allowed the program to expand in allowing students to participate in a masters degree program while maintaining their jobs in the public schools.

The program has developed and implemented a protocol that incorporates the use of videoconferencing technologies into an interactive, efficient and effective model for supervision. This model has greatly reduced the costs and loss of productivity associated with supervision of students in off-ground placements. Students report decreased stress and an increased feeling of independence when supervised using videoconferencing. The technology allows the supervisor to control the video image and provide audio feedback to the student without disrupting the session. This model of supervision has been readily embraced by administrators and technical support personnel within the public schools; thereby fostering relationships between the university and the public schools.

A videoconferencing unit and television were placed in the therapy room of the student clinician. The other unit was placed in the office of the clinical instructor on campus. The videoconferencing unit connected to the television monitor requires minimal space on a desk top or table surface. The most complex aspect of this endeavor was establishing adequate Internet connections to allow for the transmission of the audio-video information between the sites. This was worked out on a case by case basis with the technology personnel at the school. The student clinicians were responsible for obtaining the permissions for observation and videotaping. After the Internet connections were configured and permissions were obtained, a schedule of supervision of the student clinician was undertaken. The clinical instructor was able to remain in her office while conducting supervision of student clinicians in the public school setting. The videoconferencing units allowed for two-way, interactive communication between the clinical instructor and the student clinician. The clinical instructor adjusted the camera throughout the therapy session allowing for excellent viewing capabilities. The instructor could provide audio input to the clinician through personal ear monitors without disruption to the therapy session. Feedback was provided to the student clinician at the end of the session through videoconferencing or as written feedback sent through email. It was possible for the clinical instructor to make video-recordings of the sessions for later review.

This presentation will address the key elements in implementing videoconferencing in the supervision of graduate students. A discussion about the specific equipment and technical support needs will be addressed. The discussion would include information and resources regarding issues of connectivity, administrative concerns and feedback from student clinicians. Participants would be encouraged to participate in a discussion regarding the benefits and perceived drawbacks of the model. Additional applications will be proposed.

A demonstration of the model will be conducted using portable videoconferencing units and personal ear monitoring system. Participants will be able to observe a clinical training session incorporating the use of videoconferencing. There will be an opportunity for the participants to engage in dialogue with the supervisee.

SCAFFOLDING KNOWLEDGE CREATION STRATEGIES IN TEACHER EDUCATION

Alison Elliott, University of Western Sydney, Australia

Collaborative learning environments and scaffolding provide cognitive supports to assist knowledge building in academically demanding situations. In such environments, participants work together to solve problems, develop solutions, negotiate meanings, and challenge ideas. Scaffolding facilitates knowledge construction by providing supports that guide, model and cue higher order processes involved in thinking, *knowledge construction and problem-solving.*

In the past decade, information and communication technologies (ICTs) have become widely recognized as valuable educational tools, yet, meaningful adoption of relevant technologies across curricula has been limited, even in schools that are well resourced. Clearly, teacher educators have an interest in fostering teacher professional development that will strengthen applications of information and communications technologies in classrooms so that student teachers can gain relevant pedagogical understandings, attitudes and skills.

Rethinking educational pedagogy

In recent years there has been considerable interest in developing environments in which learners work together to construct knowledge, seek new solutions, meet goals, and develop shared understandings about issues, processes and outcomes. The cognitive processes generated in these contexts are first manifested at an external level, and then gradually internalized to become part of the learner's independent repertoire of competencies (Bonk & Kim, 1998; Pea, 1987; Salamon, 1990; Vygotsky, 1978).

These interactive contexts require a new role for the teacher- as "facilitator" of learning The idea of "facilitating" has been around since the mid 20th century. Today, we have new insights into the importance of a facilitator as a mediator, strategist, and collaborator in learning, on the interactive nature of cognitions and social behaviors, and on the key roles of technology in education (Elliott, 2000; LaFrenz & Friedman, 1989; Pea, 1996; Rogoff, 1990; Scardemalia & Bereiter, 1996; Wertsch, 1991).

Purpose of the study and research context

This paper reports on a study of teachers' in-service experiences as they used the knowledge creation system, Zing™ (www.anyzing.com) to rethink their role as teacher in a technology rich learning environment. Teachers focused on the ways pedagogy must change if children, and teachers, are to become knowledge creators. As teacher beliefs are formed through processes of enculturation and social construction, and as beliefs are strong mediators of behavior (Mandler, 1975; Nisbett & Ross, 1980), teachers' understandings about ICTs in classrooms are important mediators of their practice. Teachers' scepticism about the role of ICTs in learning often stem from beliefs formed from their own negative experiences of technology, together with long held beliefs about the nature of teaching and learning (Elliott, 2000).

During the teacher in-service sessions examined here, 30 participants worked through activities supported by Zing™ to develop new understandings of ICT pedagogies and of their roles as facilitators of learning. Zing™ helps structure an environment in which participants orchestrate their own change processes in an authentic professional context.

Zing™ was developed in Australia and originally used for facilitating group-based decision making in the corporate and higher education sectors. Using one computer, a multiplexed set of twelve keyboards, and a cluster of monitors (or a shared projector screen) Zing™ sessions are customized to suit participants' learning goals and outcomes. Sessions have a built-in etiquette with times allocated to discussion, response, review and synthesis.

In the present study, Zing™ provided the framework and platform to help teachers examine their beliefs about ICTs and learning and to transform their pedagogy to use ICTs as knowledge creation tools. The mediational influences of the software-generated supports, together with facilitator scaffolding and participants' collaborative efforts, enable joint construction of shared knowledge about issues (Callan, 2001).

Sessions were designed for groups of between 6 to 20 teachers and were of about 12 hours duration. Participants were experienced teachers from both primary and secondary schools. The data reported here draw on transcripts of thirty teachers' responses during sessions. They document teachers' journeys to better understanding pedagogical issues relating to computer use and their roles as teachers in this new environment.

Participants worked collaboratively to examine their attitudes and beliefs about using ICTs in classrooms, and to develop specific facilitation and scaffolding techniques suitable for a classroom context. In the Zing™ environment participants are immersed in the learning and facilitation process through observing, modeling, rehearsing, evaluating and finally creating their own facilitator model. As each participant works through the activities and contributes to the discourse, his or her content is transferred (published) from an individual space to a team space where it becomes public property. Each participant contributes individually to the learning and knowledge development process, and concomitantly contributes to the shared construction of knowledge. Zing™ enables all written responses to be stored on activity logs and archived. In addition, participants undertake a critique of each other's learning and the performance of the facilitator.

Results and discussion: Changing conceptions of ICTs

Analyses of participants' contributions to the sessions indicated clear shifts in their conceptions about the role of ICTs in the classroom. Initially, it was apparent that teachers' views of computer use were confined to traditional computer activities, such as drill and practice, word processing, information seeking, calculating and publishing. Participants' conceptions of themselves as teachers tended to be shaped by historical images of teaching and schooling.

At the conclusion of the sessions, when ICT and facilitation practices had been brainstormed, modeled, scaffolded, and acted, teachers had developed better understandings of ICT pedagogies, including ways of "scaffolding students' learning", "modeling changing pedagogy", "be(ing) active learners *with the* students", "maintain(ing) flexibility of learning styles and
Activities"

When reflecting on their experiences over the sessions, teachers commented that using the Zing™ system in this collaborative and scaffolded sense ensured that each and every voice was heard, that discussions were focused, and that all views were considered and valued equally. Teachers' changing views about techniques afforded in the Zing™ environment indicate new understandings about ICT pedagogical practices as illustrated below:

Importantly, teachers developed new understandings about facilitation through scaffolding and collaborative efforts. They were particularly interested in techniques of modeling, rehearsing, and brainstorming. Techniques to "capture everyone's thoughts and ideas"..."in an organized and systematic way".... "without evaluation from others" were seen as particular strengths to transfer to their own teaching. Equally, experience in actively using the technology and seeing each technique modeled, then rehearsing and later facilitating others' use of strategies were important in internalizing new ways of thinking about effective ICT use.

For teachers, the interactivity within the sessions resulted in information becoming part of a network of beliefs about teaching and learning in technology rich contexts. From this should evolve new beliefs and cognitions and that will, hopefully, be translated to classroom practice. Participants indicated that use of the technology enabled them to make sense of ideas and to construct new understandings of pedagogy. They believed that they would change their classroom pedagogy.

Concluding comments

Results from the present investigation have shown that a guided, mediated, and collaborative environment, which takes teachers through a process of observing, constructing and facilitating can shape new understandings about the role of ICTs in learning and ICT pedagogies. As mentioned earlier, beliefs about teaching develop through processes of enculturation and social construction and are changed by internalizing new conceptions and experiences. Hopefully, the apparent changes in teachers' beliefs about ICT pedagogies, because of their origins in positive and concrete experiences within a knowledge building context, will be strong enough to ensure concomitant changes to classroom practice.

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Books vs. Technology: Bringing Technology into the Children's Literature Course

Candace Figg
College of Education
University of Louisiana at Lafayette
United States
cfigg@louisiana.edu

Abstract: Although the student-learning goal of the Children's Literature Course is to provide students with knowledge of a broad range of quality children's literature, this paper outlines the perceptions of students in a Children's Literature class that utilized technology to support their learning experiences and discusses appropriate use of technology to enhance learning for courses requiring focus on print media.

Introduction

Although the dust surrounding the debate between print media and electronic media has settled, students in courses whose purpose is to provide a broad knowledge base of types of literature, such as Children's Literature, should be able to benefit from the support that computer technologies can provide in enhancing the learning experience. Because the research indicates that learning to use and incorporate technologies into daily practices relies upon training that incorporates "hands-on integration, training that extends over time, modeling, mentoring, and coaching, and posttraining access" (Roblyer & Erlanger, 1998-99, p. 59), providing skills to students without overwhelming them and detracting from the learning required to support course objectives, (e.g., reading vast quantities of literature and developing evaluative and comprehension tools for understanding the literature) becomes a challenge. This study investigates participant perceptions of the value and relevance of the inclusion of technology into the learning experience of participants in a Children's Literature course, and would be of interest to those who wish to use technology to enhance learning for courses requiring a deep focus upon print media.

The Study: Method of Inquiry and Data Sources

Due to the complexity of the learning environment and the multiple perspectives of the individuals participating in this study, this exploration of the perceptions of technology-based activities that students deem valuable within their learning experiences was conducted using Naturalistic Inquiry, the "investigation of phenomena within and in relation to their naturally occurring contexts" (Schwandt, 1997, p. 101). The study design allows the findings to "emerge" from the data as the value systems of the researcher and informants "interact in unpredictable ways to influence the outcome" (Lincoln & Guba, 1985, p. 41). The phenomenon is documented as it emerges through the use of certain procedures for data collection and analysis, as described by Lincoln and Guba (1985) and Erlandson, Harris, Skipper, and Allen (1993). Included in these procedures are the selection of a purposive sample, development of a "Person as Instrument" statement and maintenance of the researcher's Reflexive Journal, preparation of case studies, and collection and analysis of data from which the working hypotheses emerge. Further naturalistic techniques, including member checking, peer debriefing teams, and triangulation of multiple sources of data, were utilized to insure trustworthiness of the study.

The 25 female participants who served as the purposive sample for this study ranged in age from twenty to fifty-two years of age, with technology skill levels varying from little or no technology skills to novice. All participants entered with the ability to do basic word processing of assignments and had an e-mail account, but may or may not have used e-mail. During the semester of course instruction, participants utilized e-mail on a consistent basis to submit work and ask questions of the professor, conducted Internet searches for information and possible resources for inclusion in a thematic bibliography, experienced posting to the Blackboard discussion board on three occasions, participated in two online quizzes provided by the textbook publisher, and reviewed coursework assignments and work of other students on the course website. Little class time was dedicated to skill instruction, but was available from the professor via e-mail or fellow classmates who were taking the basic technology class simultaneously with this class. At the conclusion of their experience, they were asked the general question, "*What are the technology-related events and/or experiences in this class that you believe were valuable to your learning experience?* In addition to the data collected from the interviews, data also collected from student portfolios, journals, and informal comments (made by students during the class sessions and e-mail conversations with the professor), as well as the reflective journal of the professor served as data sources. Analysis was conducted using the constant comparison method as described by Erlandson, et. al. (1993). Rigorous member-checking with participants and review of emerging themes by peer debriefing teams were also conducted in order to balance bias in interpretation. The emerging themes that resulted from this process are the findings of this study.

Findings

These findings are preliminary as the final interviews are still being member-checked, but three main themes (subject to refinement as the data collection/analysis continues) have emerged:

Theme 1: Students perceive technology training as invaluable to their learning process. Regardless of skill level, participants expressed the idea that technology is becoming so interwoven within the fabric of society that it is important for them to acquire as much knowledge about technology as possible. In addition, the use of technology to make their work easier (e.g., sending assignments via e-mail, locating course assignments online after missing class, or acquiring another copy of course documents stored online) was deemed valuable.

Theme 2: Inclusion of technology that students perceive as an authentic part of assigned classwork is valued. Students perceived three technologies: the use of e-mail to deliver assignments via attachments, the use of websites that provided course information and assignments as well as a forum for publication of their work, and the collection of information and resources from Internet sources as the most valuable of the tools used in the class because each of these tools was learned as a part of completing a required assignment.

Theme 3: Regardless of skill level, students valued technologies that they were able to successfully master. As students participating in the study began the course with beginning technology skills and class time devoted to skill instruction was minimal, ease of skill acquisition was important to the participants. E-mail, searching the Internet, and using the class website were easily explained via e-mail or by fellow classmates. Technical problems with some of the other technologies left participants frustrated and unable to participate.

Conclusions

Although the purpose of this inquiry was not to provide findings that are representative of all students, but to explore the perceptions of these 25 students as they reflect upon the value of technology in their learning experience this fall, the findings will provide the reader with a glimpse into the world of these participants thereby providing meaning and insights that might be valuable to the reader's own teaching and learning experiences. Thus, the lessons to be learned from the research presented in this inquiry are generally decisions that remain the responsibility of the reader, but the findings may suggest possible consideration in various contexts of incorporating technology to enhance learning environments of courses requiring a deep focus on print media. These considerations include provision of the following in course development as a means of assuring that students will view the inclusion of technology into their learning experiences as valuable:

- Just do it! Students are eager to use technology and view the learning of technology skills as important to their success.
- Include assignments in which the technology is an integral part of the assignment. For example, in the Children's Literature class, the students were required to create a thematic bibliography consisting of several book and non-book resources. Adding website resources to the requirements necessitated the need for students to locate, review, and apply the same criteria of quality evaluation to the website resources as to the other resources. In addition, the creation of weekly book annotations was a course requirement modified so that annotation files were submitted via e-mail attachments for inclusion in the online database.
- Design these assignments around the basics: e-mail, websites, Internet searching or provide class time for students to acquire necessary skills to successfully complete additional assignments.

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Demonstrating The Use of Instructional Technologies in Enhancing Effective Teaching Skills

Warren Flood, Ohio State University Extension, US
Nikki Conklin, Ohio State University Extension, US
Jo Jones, Ohio State University Extension, US
Linda Kutilek, Ohio State University Extension, US
Walter Warkus, Ohio State University Extension, US
Warren Flood, Ohio State University Extension, US
Nikki Conklin, Ohio State University Extension, US
Jo Jones, Ohio State University Extension, US
Linda Kutilek, Ohio State University Extension, US
Walter Warkus, Ohio State University Extension, US

This session will demonstrate instructional technology products that were designed by Ohio State University Extension to aid extension educators in enhancing their teaching effectiveness. The presenters will showcase a CD-ROM package for individualized learning. The following abstract describes the program.

As the outreach arm of The Ohio State University and with its organizational mission, *To help people improve their lives through an educational process using scientific knowledge focused on identified issues and needs,* it is imperative that the program personnel of Ohio State University Extension (OSU Extension) be skilled teachers. Many of OSU Extension's program staff are hired for their subject matter technical expertise. These staff members may or may not have a preparation in education and/or experience in teaching while incorporating experiential learning strategies.

OSU Extension has traditionally addressed the organization's need to enhance teaching skills among its program personnel via in-service programming that covered the basics of the teaching and learning exchange. With approximately 900 program staff members housed on the OSU Columbus campus, at research centers, and in 93 field offices across the state, providing in-service programming to meet the individual needs of the staff has proven challenging. OSU Extension employs roughly 50-75 new program staff members throughout the year, making the scheduling of a single in-service for all new hires difficult. In addition, experienced employees often indicate a need to refresh or renew their teaching skills.

The development team consists of four professionals from Ohio State University Extension. We also enlisted the help of a multi-media specialist from the College of Food, Agricultural and Environmental Sciences Communication and Technology Unit. Our roles included providing for the training and development of program staff of OSU Extension. Because are audiences teach non-formal educational programs in local communities, we are committed to providing a role model of experiential training methods to be used with both adults and youth. The experiential learning aspect of our research programs make them unique compared to programming efforts offered by other community-based organizations.

Through the development of the *Enhancing Teaching and Learning Dynamics Program,* members of the Employee Development Network intend to individualize the instruction of the teaching and learning exchange. What started as a single computer based training (CBT) interactive multimedia CD has now evolved into a full-scale training module. The program includes a resource CD, coaching for experienced Extension educators, and a set of in-service workshops. The single interactive multimedia resource CD has now become a set of three CD's. Each CD in the set contains the introduction to the set so that the individual learner may determine their own path for using the set.

The experientially-based multimedia CD component of the *Enhancing Teaching and Learning Dynamics Program* will serve as a resource for the staff member, providing video references, text information, still images and audio examples, hyper-linked text, video/text/audio examples of implementation methods, "pretest/posttest" evaluation instruments, comparis on log template, and application exercises. The Enhancing Teaching and Learning Dynamics Program has been designed to be used jointly by the coach, the employee, and the Employee Development Network as a training resource within OSU Extension.

Triadic collaboration: A three-sided approach to technology integration

Amy Gibbons, West Texas A&M University, US
Kathy Burleson, West Texas A&M University, US

Abstract

Triadic Collaboration: A Three-Sided Approach to Technology Integration

Societal expectations for the use of technology in schools continue to increase, reinforced by expectations of federal agencies (Department of Education), educational organizations, as well as national and state agencies. Institutions of higher education have developed a variety of approaches to respond to these pressures, primarily with the inclusion of a separate educational technology course in the pre-service curriculum (Thompson, Schmidt & Hadijiyiani, 1995; Thomas, 1996; Zachariades & Roberts, 1996). However, pre-service teachers are graduating feeling inadequately prepared to effectively integrate technology into the curriculum (Byrum & Cashman, 1993; David, 1994; Drazdowski, Holodick and Scappaticci, 1998). In addition, in-service teachers indicate their greatest obstacle to the integration of technology is the understanding of hoe to use it in instruction (Stuhlmann, 1998; Vannatta, 2000).

To respond to these situations, this study investigated a three-sided approach to modeling the integration of technology in daily teaching. University faculty, pre-service, and in-service educators were given information and demonstrations for modeling appropriate technology use in the classroom. Each of these three groups was given a needs assessment which consisted of surveys to find out what they already had knowledge of and were able to do in the classroom. Each group was also asked informally what they thought they needed to know more about to be able to successfully integrate technology into the classroom. Faculty development workshops that targeted technology implementation strategies were designed based on the needs of each group. These workshops were delivered throughout two semesters to each group separately so their needs could be met.

When workshops were completed, surveys were administered again to each group to perceive the impact of the workshops on the group and the use of technology in the teaching day. Observations of classrooms were made where appropriate to help monitor the types of technology integration that were applied before and after the intervention.

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Online Professional Development – lessons learned

Melanie Zibit Goldman, Boston College, US

"The [online] process has extended my classroom allowing me to have professional dialogue with other teachers. Today's schools are not structured to give teachers the needed time to discuss concerns or just to share innovative ideas. I now have an endless support team. Online discussion allowed me, and in many cases forced me, to rethink how I teach and what I teach. Because it was technology based it also forced me to better use technology as a tool for learning. .... I am now looking at how to use online discussion and collaboration with my students and their parents. (7th grade science teacher –MSTelementoring teacher)

"MSTelementoring", funded by the National Science Foundation, is an online professional development project for K-12 teachers in central New York State's Syracuse and Onondaga-Cortland-Madison Board of Cooperative Educational Services region. It provides sustained support for teachers as they work to change their practice to more inquiry methods in math and science, fosters the integration of the Internet into existing curriculum, and provides an online mentoring group for sharing and learning. Teachers use the Internet during (and after) school hours to find out what each other is doing, to share meaningful personal reflections on their practice, to seek suggestions for solving problems or new ways to do a curriculum unit.

Over the three years of the MSTelementoring project we experienced success as well as difficulties fostering online learning with inservice teachers. This paper/presentation will share what we have learned about:

- **Designing online learning so that it helps teachers grow as professionals**
- **Facets and constraints of online discourse**
- **And strategies to get teachers to exchange reflections, ideas, issues, and potential solutions**

I. Designing online professional development:

It is important to go beyond the conception of professional development as "training." Professional development needs to be defined in ways that include "formal and informal means of teachers to not only learn new skills, but also develop new insights into pedagogy and their own practice, and explore new or advanced understandings of content and resources" (Miles Grant, 1997, p 72) Changing one's practice is not something that can come about by attending an isolated week long workshop but is an ongoing process that must evolve over time and in the context of a teacher's daily work. Overtime, teachers need the support to experiment, reformulate their ideas, change their beliefs, and realize they are the best qualified to challenge themselves and direct their own learning. The key facets in the design of MSTelementoring professional development are:

1. Make professional development relevant

In MSTelementoring teachers take ownership of their growth and collaborate on the direction of the project. As teachers become part of an ongoing learning community, they grow in valuing themselves as a community of professionals, begin to feel more empowered to decide what is of value to them and find a voice to shape their own learning and the project.

What this means for the design of MSTelementoring is that it must be flexible to shift with the changes and needs of its teachers. Through discussion with teachers and monitoring teachers' progress, the project staff design agendas and experiences that relate to where teachers are developmentally and guide them to new skills, content, practices and beliefs.

2. Include a mix of online and face to face

A mix of face to face and online learning worked best to build a strong community. The face to face allows teachers to get re-acquainted, to deepen their relationships, and to enjoy the energy of brainstorming and discussion during the sessions. The face to face has also brought learning of new skills and content that fed into what teachers use and discuss online once back in the classroom. Teachers value the online for anytime, anywhere collegial sharing and support, particularly those who are isolated or in rural districts. Although 86% of the teachers said that online communication was very useful or somewhat useful, teachers still favored the face to face.

3. Teachers formulate a blueprint for their own learning

Every year we have had teachers create Professional Development Plans at the end of the summer session. The development of Professional Growth Plans involves teachers reflecting on what they would like to accomplish over the year related to changes in inquiry-based practice, new math and science curricula, integration of technology, and leadership in their community. Around mid-year we asked teachers to revisit their plans to see what they have accomplished and rethink their priorities going forward. At the end of the year we ask them to again think about where they have been and what they have accomplished.

II. Facets and constraints of online discourse

Online learning takes time, self-motivation, and a focused cognitive process of reading and reflection with the text-based medium. Online discussion requires concentrated blocks of time to read, think and respond. The usual rapid-fire approach we associate with communicating face to face does not work. Thus, with teachers' workloads increasing, it is difficult for them to find time unless it is in the evening or on the weekend.

1. Self-motivation:

The online environment differs from face to face instruction in that it is all computer-mediated. Participants have to read between the lines to compensate for lack of sense cues and a participant's self-motivation to keep involved must be that much greater. The participant must develop a "cognitive language" that makes the ideas expressed in computer text come alive with meaning and excitement. This is a very difficult endeavor considering that teachers spend their days in face to face classrooms, interacting with their students. It also requires self-motivation to read and catch up on ones own when a participant has been absent from the online for a length of time..

2. The environment in which teachers teach

The factors we found inhibiting teachers from making the kind of progress we would hope include: (B. Hunter 1999 , the 1997 NSN Survey Report H Becker).

? lack of time for experimenting, training, planning and implementing
? unstable technical infrastructure
? little local control over resources
? lack of administrator's understanding and support
? no sustained or long term professional development program
? shifts in school system priorities and curriculum
? teacher workload
? lack of equipment access

III. Strategies for engaging the teachers

1. Online environment

Easy to use technology is essential! New possibilities in online learning platforms opened up in the course of the three years so that in this last year, we moved to Blackboard courseware. This turned out to not only facilitate online discussion and sharing of material within the project, but served as a catalyst for innovation in teachers' classroom practices.

2. Teams play a critical role

There are many factors that make one teacher team work together more successfully than another. These factors are 1) individual teacher motivations, e.g., desire to be connected to other teachers or interest in growing professionally; 2) the relevance of the tasks and discussions to his/her needs, 3) easy access to technology, 4) release time, compensation, or support within the school for participation, 5) the degree of isolation of a teacher's situation; 6) having common interests; 7) maintaining a critical mass of exchanges. When we were able to match members in terms of their motivation, desire to contribute, and access to technology we have seen healthy discussions.

3. Moderators are key to success

Facilitating in the online environment is quite different from face to face. Conversation is mediated through the virtual environment where the challenge is to overcome the absences of sense cue and personal presence. Moderators play a critical role in overcoming this lack of cues to build a sense of trust and openness in an online environment. A successful moderator is in touch with individual teachers through personal email exchanges and phone calls, monitors who has not participated, follows up to find out why and finds solutions, and models posts online that are characterized by openness and depth of reflection . Just like your classroom environment, engaging in discussion that moves from short brief answers to deeper meaning and reflection online takes skill and practice. It is critical to have moderators who have expertise in the content of the professional development, are good "listeners", and are experienced or willing to learn how to facilitate online discourse.

Information Society and the New Information Technologies in Portugal

Natália Fernandes Gomes
Instituto Politécnico da Guarda
Escola Superior de Tecnologia e Gestão – Portugal
natagomes@ipg.pt

Introduction

This presentation analyzes the reasons and motivations of the Portuguese Information Society, its origins and characteristics, and the importance that this new society can have in education. Computers and digital networks have proven to be the best way to access information and knowledge that is essential for the development of a country. In order to prevent the info-exclusion of those that can't have access to these technologies at home or at work, it is crucial that computers and networks become accessible in public places like schools and libraries. We will describe the Portuguese government initiatives in relation to this question, which intend to generalize access, improve education and also create jobs.

The Study

Portugal began to define a policy for development in the area of what would become the Information Society in 1995. The Mission Statement for the Information Society and its National Initiative were first created and staged in March 1996.

The National Initiative sparked widespread national debate about the Information Society (which I will hereon refer to as IS), out of which was developed a set of guidelines that would accelerate and democratize the use of modern technologies. The debate also gave wing to the Livro Verde para a Sociedade da Informação em Portugal (which I will refer to as the Green Book), which serves as the essential reference for correct and sustained implantation of IS and its notoriety in Portugal.

With governmental support for the Green Book, various guidelines and vectors of orientation were structured into a clear plan of action, which resulted in projects including:

Science, Technology and Society Network (RCTS[1]); Internet in Schools Program; Computers for Everyone Initiative; Digital City Program; National Initiative for Electronic Commerce; National Initiative for Citizens with Special Needs.

Following the publication of the Green Book and all of the initiatives that grew out of it, policies and measures for the development of information technology were defined and applied in order to guarantee the success of the Portuguese IS.

National Initiative for the Information Society

The National Initiative for the Information Society constitutes an important cornerstone in the implantation of IS in Portugal. In fact, this Initiative played a fundamental role in the accelerated and democratic diffusion of the use of modern information technology, sustainedly integrating the old and the new, knowledge and know-how. It also identified barriers of a technical, organizational, social, cultural or economic nature, problems which could interfere with the full development of an informed, democratic and open society, as the Green Book points out.

This Initiative was founded on the awareness that educating citizens begins in school, which translated into the following measures in which new information technology played an extremely important role, namely:

1. The Well-Informed School, including computers and Internet access in every school (K-12) through RCTS;

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[1] RCTS: Rede Ciência Tecnologia e Sociedade – initial in Portuguese for Science, Technology and Society Network

2. The Open Government, including computer access to governmental services and forms, in an attempt to minimize bureaucracy and improve efficiency, which meant installing computers in libraries an public archives;
3. The Well-Inform Citizen, creating ties among city halls and local interests;
4. Accessible Culture, guaranteeing libraries, museums, youth centers, archive and documentation centers, and research and development information on-line;
5. The Well-Informed Firm, motivating and creating incentives for the use of e-commerce;
6. Health First, computerizing health services and, consequently reducing costs and inefficiencies of the current system;
7. Handicapped Program, encouraging integration of these citizens in the use of information technology.

It was through these objectives that equality of access for all citizens who could benefit from IS was established.

In fact, in current society, knowledge is one of the most important components of development, making it necessary to create structures which contribute to a rapid and efficient spread of knowledge among the most diverse sectors of society, giving particular importance to sectors in which the creation and absorption of information could have a significant multiplier effect. In this vein, the following objectives were defined:

1. Expand RCTS to all K-12 schools and institutions of higher learning, libraries, museums, youth centers, archive and documentation centers;
2. Promote the creation of a network of Internet servers, to enhance the accessibility of cultural issues throughout the Portuguese and Portuguese-speaking communities around the world;
3. Develop support programs for the creation of multimedia projects with cultural content;
4. Promote the computerization and digitalization of historic archive and cultural patrimony;

The Well-Informed School

Of the sectors of society, education probably benefits the most from the use of new information technologies, since it is based on knowledge acquisition, actualization, and use. Within the education system, the following measures were defined:

1. Install computers, as previously explained;
2. Promote the development of educational and cultural content, of support for teacher activities and initiatives, and the educational process, all in ways favoring the use of information and communication technology;
3. Create teacher training programs, for all levels.

Science, Technology and Society Network (RCTS)

The creation of the RCTS reinforced the network connecting Universities, Polytechnic Institutes, and R & D Institutes, really becoming the national "backbone", as cited in the document "Portugal in the Information Society" (my translation), from the Ministry of Science and Technology. This reinforcement allowed for the growth in bandwidth to 4 Mbps. In addition to this growth in national connections, international connections also grew from a bandwidth of 512 Kbps in 1995 to 34 Mbps in 1999. Further to the growth in bandwidth, the objective of installing a digital infrastructure in schools was accomplished and 15 Points of Presence (PoPs) were installed, primarily in institutions of higher learning and R & D institutions all over the country.

The RCTS has also permitted the growing development of communication between scientific, technological and socio-cultural communities, creating conditions for equal access among teachers, students, or library users to new information and communication technology.

Beyond this infrastructure of equipment and logistic support, Internet sub-domains were created, making e-mail addresses and space for publishing pages on the World Wide Web (WWW) available for all connected institutions, as well as a set of Internet tools and services, related to e-mail, chat rooms, and content production for the WWW.

Internet in Schools Program

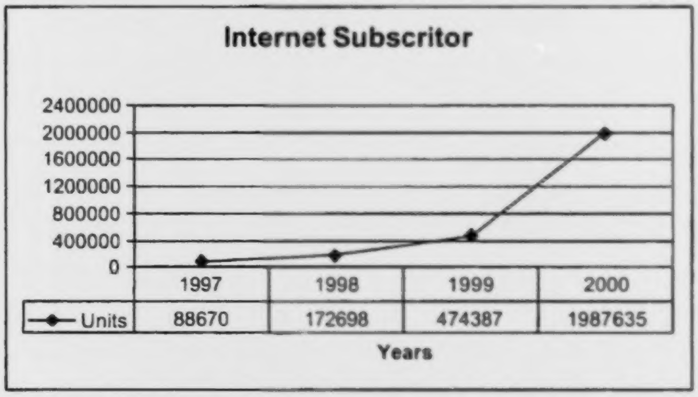
The Internet in Schools Program, through RCTS, brought Internet connection to all schools, both public and private, from the fifth to the twelfth grade, comprising multimedia computers in school libraries and/or school media centers. This has facilitated students' recourse to Internet research and expression and CD Rom publications.

Although the program initially planned on connecting only high schools to public libraries, it was expanded to include fifth grade on and Teacher Training Centers in 1998 in two phases, in cooperation with local authorities. In September 1999, 1700 schools (with students from the 5th to 12th grade), 220 schools (with students only in the 5th and 6th grade) and 80 additional clubs of a cultural, scientific, and educational nature were connected, in addition to 250 public libraries and 15 museums.

Throughout this time, hundreds of thousands of students and teachers have been sensitized, systematically and practically, to the pedagogical potential of the Internet:

1. more and faster information research and recovery systems;
2. more autonomy and democracy in information access and communication among schools and with society;
3. student familiarity with technology and technological processes which could be encountered in their professional future.

The Internet in Schools Program is a project of the Support Group for the Educational Telecommunications and Computer Network (uARTE[2]), in collaboration with the National Scientific Computation Foundation (my translation), with the participation of other entities, such as Regional Government, Citizen Groups, and Municipalities.



Graph 1 : Illustrates the growth in access subscritor to the Internet between 1997 and 2000. The data shows an increase of approximately 182% in the last three year (www.cisi.mct.pt).

Operational Program of the Information Society (POSI[3])

The IS has been defined as a national priority. Its plan, entitled "Towards a Society of Knowledge and Information, 2000-2006", comprises two operational programs:

1. Science, Technology and Innovation, which in the mid-term hopes to bring to bring the country up to speed in science, reaching the average level of the European Union;
2. Information Society, which should build the bases needed for sustained implantation of the Information Society in Portugal.

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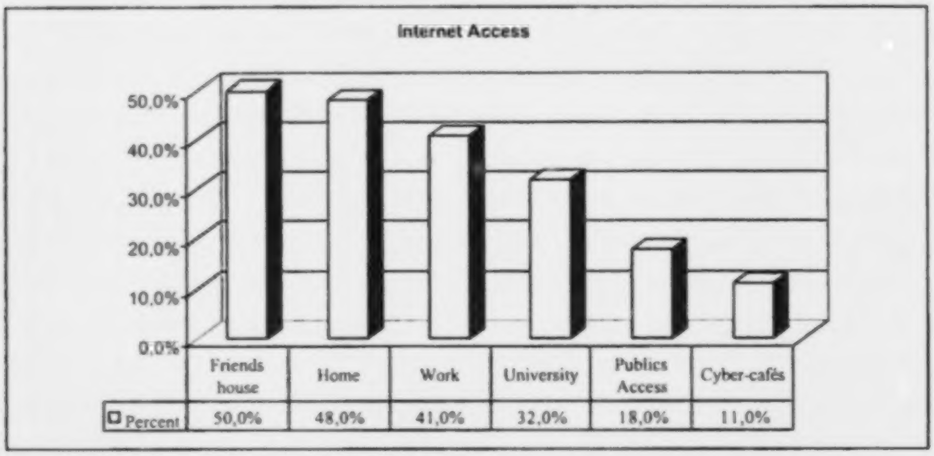
[2] uARTE: Unidade de Apoio à Rede Telemática Educativa –initial in Portuguese for Support Group for the Educational Telecommunications and Computer Network

[3] POSI: Programa Operacional para a Sociedade da Informação – initial in Portuguese for Operational Program of the Information Society



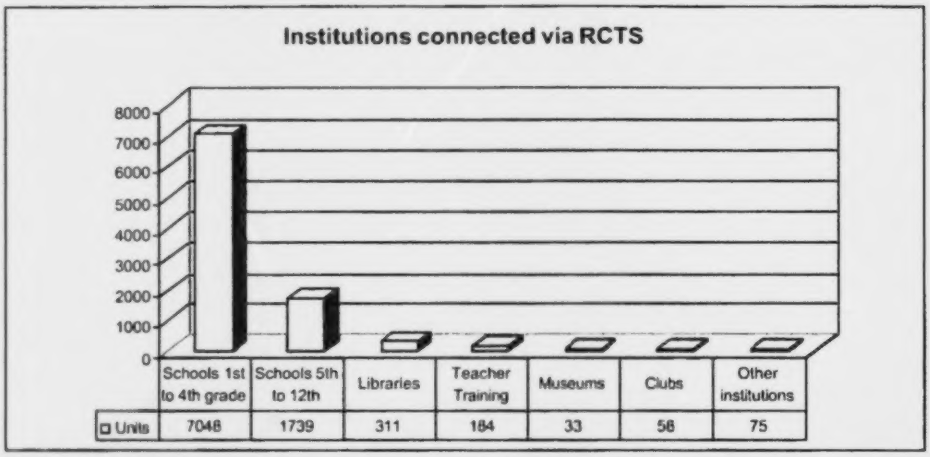
Graph 2: Illustrates the percent access in 2001 by different places in Portugal (www.cisi.mct.pt).

POSI, following on the heels of the Green Book, has come about as a sign of government support for the continuing and growing importance of the Information Society; it has successfully stimulated access and guaranteed a dynamic development and experimentation related to the social use of new information technology in all areas of development. A set of measures has been delineated to reinforce the importance attributed to this growth, namely:

1. Promote the generalized use of the Internet - Internet Initiative;
2. Increase the number of home Internet connections by four;
3. Generalize the availability and use of email and Internet for the entire Portuguese population through the creation of public access areas, like cyber-cafés and media centers;
4. Free access for all educational institutions;
5. Increase the number of Portuguese content sites by one thousand;
6. Create a national training and certification process of basic competency in information technology;
7. Link a diploma of basic competency in information technology to the level of obligatory education (ninth grade);
8. Make all information published by public entities available on the Internet;
9. Carry out the National Information Highway Plan, stimulating offer, interconnectedness, use and regulation of the bandwidth of networks
10. Create an R & D program in the area of IS;
11. Create an R & D program in the area of IS aimed at developing Portuguese language content.

This program is part of the European Community, englobing an investment of approximately €625,035,000, distributed evenly over the years of execution.

The expansion of the Internet in Schools Program gave rise to the signing of a protocol between the Ministry of Science and Technology and the National Association of Municipalities on the 26th of February, 2000, which established the end of 2001 as the final date for connecting the 8,600 schools in the nation. Currently, 9,448 institutions, excluding those of higher learning and research, are connected to the RCTS, distributed as follows in graph 3:



Graph 3: Illustrates the units of institutions connected via RCTS in 2001 in Portugal (www.cisi.mct.pt).

Conclusions

We defend that youth population must have access to the information available in digital networks, and also to the powerful instruments of the Information Society. They must have the possibility and the ability to process text, image and sound in order to create collective or individual work without any frontiers. We believe that only with these creations, is it possible to concretize a cyberspace that guaranties an efficient and fast access to information for all. Universities, as a key element, must contribute as essential entities within digital networks, using both as resources to transmit scientific and cultural knowledge, giving support to professors and schools creating thus the appearance of new electronic means like Internet.

The potential of information technology is ideal to serve the objectives of education. In this context, we believe the Information Society will give rise to new perspectives in education and new forms of study, which will increase the global level of literacy.

The future of Portuguese youngsters should paved via two components: the Information Society and the information technology, in a way that allows for the creation of new skills for the successful development of the country.

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Managing change: Critical considerations for IT professional development for practicing teachers

Jennifer Jenson, York University, CA
Brian Lewis, Simon Fraser University, CA

For the two years our research has examined the implementation of computer technologies in schools across Canada, focusing on the problem of managing change within what we see as a transitional period in education. This paper will report on one significant portion of our findings – the disparity between professional development programs'purported skills training using computers and teachers' actual "uptake" and use of that training in their own classrooms.

We have identified and clarified some of the more pressing questions arising from the implementation of computer-based technologies. These questions involve technological, infrastructure, human resource and learning policy issues, including teachers' professional development; questions of sustainability; and questions of public policy in an increasingly technocentric and commercial education environment.

Each of these issues speaks to the need for strategies designed to address how and why choices are made, who makes them, and with what effect, both intended and unintended. Too often the reverse happens: technology changes rapidly and decisions are made in a more or less ad hoc fashion, as administrators scramble in response to the initial promises of technology. Then these same administrators, as well as teachers, students and parents, must face unforeseen problems and demands triggered by its implementation.

Public Policy: A Global Shift

There is a critical need for a reflexive approach to the implementation of technology in our schools that responds to issues of policy, organizational culture, politics, and decision-making practices. These issues are of particular importance as Canadian public policy in all areas has become concerned with the country's transition to a "knowledge society" – a transition which has brought increased attention to education, as a primary "resource" in the development of a "knowledge economy" infrastructure.

In Canada, among other countries, policy-makers have largely shifted their focus away from cultural protection and protection of the public sphere -- in any traditional sense. The Canadian government's commitment to a globally-oriented, privately-developed, market-based regulatory framework has thrown into question the nationalistic communications policy framework of the past several decades. As a new communications infrastructure is being established, an entirely new policy framework is developing as well.

In justifying their policies, governments have employed idealistic and simplistic visions of what the "information revolution" will mean. In their rush to remain competitive with the United States and the rest of the world, few policy makers are asking traditional, yet fundamental social questions about the risks and changes these new policies will shape. The "education revolution" has become a small but critically important part of a more general information revolution, and subject to similar policy changes. Policies addressing the implementation and use of new technologies within education have become firmly entangled within overall information and economic strategies and objectives. It is as if a major fault line has shifted – social activity has come to be increasingly judged and evaluated through economic objectives and priorities. Education is central to this shift. Education, long a "goal in itself," a "public good," has become more purely a means to the end of a more efficient and competitive economy and workforce, immutably situated within the notion of the "knowledge economy."

"Investing" in Education: New Technologies

One significant result of this broader policy shift has been an added emphasis on information technology in Canadian public schools. Information technology is a tempting answer to education's perceived shortcomings in preparing students for the knowledge economy. Computer technology provides a tangible link between the world of education and the world of work.

In the past few years there has been an extraordinary amount of interest and investment in the deployment and use of computers and computer networking in Canadian public schools. The 1998 federal budget, for example, committed $205 million over three years to Industry Canada's "Community Access Program" and "SchoolNet." As the number of computers accessible to students and teachers in classrooms and labs has increased, there has been a corresponding emphasis on "integrating technology across the curriculum." Teachers' effective use of computers in their classrooms, however, remains an elusive goal. Researchers have identified numerous barriers to teachers' use of computers in their classes, such as limited equipment, inadequate skills, minimal support, time constraints and the teachers' own lack of interest or knowledge about computers (see, for example, Bryson & de Castell, 1998; Berg, Genz, Lasley & Raisch, 1998; Clark, 2000; Ertmer & Addison, Lane, Ross & Woods, 1998; Hadley & Sheingold, 1993; Laferrière, Breuleux, Baker & Fitzsimmons, 1999; Macmillan, Liu & Timmons, 1997; NCES, 1999; Schrum, 1994, 1997, 1999).

Teachers and Technologies: the question of professional development

Rightly or wrongly, teachers have come "under fire" as insufficiently skilled to make use of promising new technologies. Meanwhile, substantial funding resources continue to be dedicated to the purchasing of hardware and software while neglecting the human part of the equation: teacher support and development.

Governments, faculties of education, school districts, schools, communities and individuals have belatedly come to understand the need to give teachers access to training and development in required information technology skills. In British Columbia, for example, in 2001, the Ministry of Education earmarked $1.6 million for professional development in the integration of technology into classroom instruction for 1,000 teachers of grades 6 to 9.

While programs for providing professional development have varied widely and have been examined in detail in a number of U.S. based studies (see, more recently, Hoffman & Thompson, 2000; NCES, 1999; Sorg & Russell, 2000; Schrum, 1999; Swain, 2000; Walbert, 2000) and a Canada-wide study (Laferrière, Breuleux, Baker & Fitzsimmons, 1999) we have looked at three examples of professional development in Canada, each enacted at a different administrative level (faculty of education, school-district and school-based), and each employing a different strategy for professional development.

We have used several methods for gathering data in our work: documentary research, on-site visits, workshop observations and semi-structured interviews with teachers, project developers and administrators. Through these techniques we have identified a common range of issues encountered when teachers' participate in large- and small-scale professional development programs.

Of significance for each of the examples we chose to explore is how teachers and administrators respond to and speak differently about the programs in which they are involved. There exist striking disjunctures between what, from their particular subject positions, teachers identify as salient and relevant professional development, and what the professional development program itself purports to accomplish. Administrators and teachers have divergent perspectives on these issues mapped largely onto their positions within the institutional structure of schooling.

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WebQuests for Course Delivery and Integration Training

Lamont Johnson, Ph.D.
Department of Counseling and Educational Psychology
University of Nevada, Reno
United States of America
ljohnson@unr.edu

Kimberly Vidoni, M.A.
Department of Counseling and Educational Psychology
University of Nevada, Reno
United States of America
kvidoni@unr.edu

Kulwadee Kongrith, M.A.
Department of Counseling and Educational Psychology
University of Nevada, Reno
United States of America
kongrith@unr.nevada.edu

Abstract:
A graduate/pre-service education course was redesigned at the University of Nevada, Reno. Course instructors believed that students would better grasp the course objective of creating a WebQuest for target classrooms if this activity was modeled for them. Therefore, the course's entire content was transformed into a WebQuest. An evaluation was conducted at the end of the semester. Results suggest that students perceived that they learned new technology skills for the purpose of creating their WebQuests while master teachers perceived that the WebQuests created by the students were useful tools for their teaching.

Currently, there is much discussion about *how* to successfully integrate technology into the classroom (Maddux, Johnson & Willis, 2001; Geisert & Futrell, 2000; Jonassen, 2000; Bitter & Pierson, 1999; Alessi & Trollip, 2001). Many educators believe that there are many benefits to integrating technology into educational environments. New technologies, computers specifically, can teach ideas and concepts in exciting, enjoyable and efficient ways (Maddux, Johnson & Willis, Geisert & Futrell, 2000; Jonassen, 2000; Bitter & Pierson, 1999; Alessi & Trollip, 2001). However, bringing computers into classrooms is expensive, both financially and in terms of the time and effort required. Therefore, it is essential that computers contribute to the achievement of important, rather than trivial educational goals. One means that may contribute to the accomplishment of this goal is the use of a Web-based, inquiry-oriented activity called a *WebQuest* (Dodge, 1995).

A graduate/pre-service education course that traditionally covered computer telecommunications skills and concepts as well as methods of integrating information technology into the classroom was redesigned. It was reasoned that if the WebQuest approach to emphasizing the use of the Web in learning was a good idea for K-12 students, it should be a good idea for pre-service educators and graduate students. Therefore, a WebQuest was designed to encompass the entire course's content. The major course project became the *task* section of the WebQuest that required each student to design, build, and conduct a WebQuest in cooperation with an in-service teacher. Most of the correspondence and cooperation between the student and the in-service teachers was done over the Internet via e-mail. This approach has two advantages. First, it models information technology in the curriculum. Second, it provides students with a real-time learning opportunity in using the Internet and World Wide Web to enhance teaching and learning.

Course Design and Procedures

The 18-week course was designed to model a WebQuest so that students would experience WebQuests as students before designing a WebQuest for target students. The course WebQuest was uploaded onto the university server so that students had access to the site from any computer with an Internet connection (Johnson & Vidoni, 2001). Students completed four *miniquests*— or lab-based learning exercises that covered the basic computer skills necessary to create a WebQuest – and submitted their assignments to the instructor via e-mail. Links to journal articles related to course content were also linked to the course WebQuest and in-class discussions were conducted on the readings so that students would critically evaluate issues related to educational technology.

Students designed WebQuests that were used by teachers in real classrooms. Master teachers participating in a PT^3 Grant at the university were paired up with most of the students. Some students preferred to work with university faculty and were encouraged to do so. Although many of the master teachers lived over 100 miles away from the university, students whose master teachers lived in the local area made site visits to their master teachers' classrooms. Students made three presentations during the course. The first presentation was made during the sixth week of the course for the purpose of discussing project ideas with classmates. Students received critical feedback from instructors and fellow students that they used to modify their WebQuests. The second presentation occurred during the tenth week of class once students had completed their WebQuests and just before they posted them on the Web for target students to use. A final presentation was made for the purpose of reporting the results of their project.

Evaluation Results and Suggestions for Improvement

All nine master teachers and 9 students completed evaluations. Most narrative comments were very positive. Students and master teachers rated all 5 statements of the evaluation with a mean of 3.6 or higher on a 5 point scale with 5 being the most positive. Students strongly agreed that the WebQuest required them to learn new technology (M = 4.89) while master teachers agreed strongly that the WebQuest created by the students were useful tools for their teaching (M = 4.33).

Some improvements will be made next time the course is offered. First, master teachers will be invited to a class meeting so that students and teachers can meet before they start working together. There were a few communication problems between students and teachers that face-to-face introductions would eliminate. Second, the class Web site was a little crude and changes to its appearance will be made.

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Using Web-Based Conferencing to Promote Interactivity and Collaboration in Teacher Preparation

Dr. Dennis Knapczyk, Department of Curriculum and Instruction
Indiana University Bloomington, USA
Knapczyk@indiana.edu

Carrie Chapman, Department of Curriculum and Instruction
Indiana University Bloomington, USA
Cechapma@indiana.edu

Mary Kelly, Department of Curriculum and Instruction
Indiana University Bloomington, USA
Malkelly@indiana.edu

Li-Fen Lu, Department of Curriculum and Instruction
Indiana University Bloomington, USA
Lflu@indiana.edu

Abstract: The Collaborative Teacher Education Program (CTEP) at Indiana University offers coursework leading to teacher certification in special education through a distance-learning format. CTEP uses the web as a supplement to synchronous video-based instruction and as a stand-alone course delivery approach. The major aims of the web-based activities are to promote interaction and teamwork among teachers, and to build collaborative skills.

Introduction

The Collaborative Teacher Education Program (CTEP) offers distance education coursework to in-service teachers in rural communities in Indiana. The program is comprehensive in that teachers can earn teaching licenses or master's degrees in special education by completing the twelve courses it offers (Knapczyk, Chapman, Rodes, & Chung, 2001). Our primary mode of course delivery is videoconferencing; however, we integrate web-based activities into the courses to increase instructional opportunities and to promote collegiality and collaboration among the teachers (Rodes & Knapczyk, 1996). Some class sessions meet solely on the web, and one course is primarily web-based.

Collaboration is a key area of emphasis in CTEP. Although the trend toward inclusive educational programs has increased the level of interaction between special education teachers and their colleagues in some schools, many still work in relative isolation. In CTEP, we use a variety of activities and assignments to encourage our students to interact and collaborate with one another and with teachers in their schools. We have found that promoting collaboration in these ways lays a foundation for increased on-the-job professional collaboration, and that the web offers a powerful tool for building these skills.

CTEP uses SiteScape Forum (SSF) as its web conferencing software. SSF is an easy to use web-hosted tool that incorporates two elements for holding discussions: *forums* and *teams*. A *forum* is a collection of related information that allows learners to interact on issues and course concepts. In a forum, our students have class discussions in response to questions or issues posed by an instructor or classmate. A *team* is a shared environment in which small groups work on tasks and problem solving activities. The forum and team interactions we structure are usually asynchronous but we use synchronous 'chatting' occasionally.

Building Expectations and Skills for Collaboration

In order to use the web for instruction, we must consider our students' skill and comfort level in using technology (Rodes, Knapczyk, Chapman, & Chung, 2000). Some learners are fearful of losing personal contact with their instructor. One time we had a teacher who decided not to take one of our distance-learning courses even though the nearest campus-based class was over an hour away. "Oh, no," she said. "I don't think I would like that. I want to see my teacher." The absence of a live, face-to-face instructor, the strangeness of the presentation format, and the different roles demanded of learners are factors that can create anxiety and discomfort in those who are more used to traditional classroom instruction. In addition, students may need to learn new computer skills as well.

In-service teachers bring a variety of expectations and backgrounds with them into professional development activities. Usually, these expectations are set by the patterns of traditional classroom instruction: an active, present instructor; teacher-directed activities and discussions; a passive or merely responsive role for learners. Web-based instruction tends to reverse these dynamics, making the instructor less present and increasing the interactive and self-directive roles of learners. We try to shift our students' expectations about their roles and experiences by increasing the amount of teamwork and problem solving they do with classmates and reducing their reliance on more conventional instructor-centered approaches. We design web conferencing activities to shift student expectations in three areas: participation, assignments, and student interaction.

Participation: From Passive to Active Learners

Collaboration requires students to be active learners. Students must learn to rely on themselves and on each other, both to learn to use the technology and to make up for the range of subtle directions, cues and information they normally receive from a live instructor. Since students taking their first distance-leaning classes are generally used to a more passive model of instruction, we begin the semester with a traditional, teacher-centered approach. We quickly move to a more learner-centered model as students become familiar and comfortable with the distance learning format and technology. For example, at the start of a course, we use e-mail rather than the web to communicate with students because most of them are already comfortable with this form of interaction. As the semester progresses, we require students to participate more actively and assign many team-based activities in SiteScape Forum so web-based communication and learner directed activities become integral parts of the class.

Assignments: From Directed Tasks to Self-Driven Tasks

In the past, we started a course out by encouraging students to use SSF without structure or direction for how to interact. We hoped that a free form type of dialogue would help students become familiar with SSF and develop more independence. However, the typical responses were short, sporadic and aimless, and students saw web interaction as an extra chore rather than as a space for meaningful work. To remedy this pattern, we develop weekly web activities that focus on specific teaching points and their applications. An early-semester activity might be to have each teacher list ten behaviors they observe in their schools that illustrate a particular concept from the text. An activity like this is simple and clearly contained, but it gives experience posting to the web and accessing discussion pages. As students increase their familiarity and expertise in using web conferencing, we assign activities where they choose the issues they will address and where they work collaboratively on projects and problem solving activities.

Interaction: From Non-Evaluative Sharing Toward True Collaboration

Perhaps the most important aim in using web-based instruction with teachers is to build collegiality and collaboration. Through careful nurturing of teams and teamwork, we are able to increase student ownership and support for learning and transfer many of the roles they normally expect of instructors to the group. We encourage students to use SSF to give each other advice and feedback both on course assignments and on everyday teaching situations. Teachers have a wealth of experience and expertise to share that goes beyond what instructors can provide. Unfortunately, in many web-based formats, students are reluctant to give genuine critical assessments of their peers' work and their interactions are frequently cursory or off-topic. To build toward collaboration, our first SSF assignments usually involve sharing work samples, describing teaching situations, and exchanging basic information. As students become more familiar with one another, we have them provide suggestions and feedback to their teammates. Early in the semester we may ask them to suggest assessment procedures or devices their teammates could use before thinking about the methods they will use themselves. In this way, they can give and receive meaningful suggestions to incorporate into their own activities. By the end of a course, they are comfortable enough with each other and the web format to give critiques of each others' ideas.

Considerations for Using Web-based Conferencing

A major advantage of web conferencing is that it allows students to work in teams, a format particularly useful for building collaboration. We use teams of four-five students because this size seems to give students sufficient opportunities to view a variety of examples and suggestions from their teammates. It also insures that they do not have too many reading and replying tasks to do between classes. We vary the way we organize groups based on the course goals we want to achieve. We usually structure groups according to the following characteristics: members from the same or from varied schools, members from the same or from varied age/grade levels, members with varied skill/experience levels, or student self-selection of members.

Activities on the web are usually more demanding than conventional assignments, often because the instructor is not there to explain activities and assignments. We give clear and detailed directions on both the tasks and the type of interaction we expect. We provide students with a model of what we want them to do in the form of a case study, a sample worksheet, a task breakdown or other exemplar. We also give schedules and deadlines with each assignment. The first part of an assignment typically requires students to do a task posted by the instructor, and the second part might have them respond and give feedback to their teammates' postings. We stress the importance of making postings on time so teammates are not inconvenienced or prevented from completing their work.

We also give students feedback about the tasks they do on the web. SSF allows us to see everyone's postings and the times they are made. We often add postings to the class, a single team or an individual student. We can assess both student and team performance and offer suggestions or evaluative comments when needed. Additionally, we may give remedial information to a particular team, suggest ways that members can interact more effectively, give guidelines for response etiquette, encourage individual participation, or acknowledge good work. In these ways, we are able to build a more effective environment for students to interact with one another and support their professional development.

Conclusion

Web-based conferencing is a valuable tool for in-service teachers because it allows them to share experiences and concerns, engage in problem solving, and develop and test out new ideas. To use web conferencing effectively, instructors must consider the gap between the students' expectations about the learning process and the capabilities and characteristics of web-based instruction. Careful, gradual introduction of web-based technologies can guide and enhance the transition from a traditional model of instruction in which student roles are passive, to a model in which they take a full, active role in directing and achieving their own learning. Encouraging and building collaborative skills are key elements in this process.

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Case Studies of Primary School Teachers' Portfolios on Information Technology Competency Training Program – A Reflection on Information Technology Education for Teachers in Hong Kong

Kung, Eton
Instructor
Center for Enhanced Learning and Teaching
The Hong Kong University of Science and Technology

[Keywords]

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[Abstract]

The application of Information Technology in education has been strongly encouraged by the Hong Kong Special Administrative Region government since the outset of "Information technology for quality education: Five-year strategy 1998/99 to 2002/03" (Education and Manpower Bureau, 1998). Its primary aim was to promote information technology in education through teacher enablement, development of curriculum and software, hardware provision, and provide network infrastructure. According to the five-year strategy objectives, the promotion of IT in education is expected "to arouse and maintain our students' motivation to learn", "to broaden our students horizons, so as to enrich their learning experience and facilitate the development of a creative mind", and "to encourage independent lifelong learning and instil team spirit" (1998, p.1).

As school teachers are standing at the frontier of this change, there have been extensive training courses induced by the Education Department for "enabling" teachers' competency in using information technology in teaching and learning activities at three levels: "basic", "intermediate" and "upper intermediate". However, this policy has brought in controversial issues whereas many teachers training programs are ongoing. The issues include the effectiveness of ways of implementation of the training programs as well as lacking an objective and effective assessment system for assessing teachers' information technology competency. Under the policy, assessment of teachers' competency is only done in a school-based format, that is, every teacher has to submit a portfolio of work to the school principal illustrating their ability in using and applying information technology in their

teaching practice. However, there have been queries on the effectiveness of the training program formats as well as whether the quality of their portfolios is reflecting the teachers' competency for meeting the so-called benchmark.

This paper thus focuses on discussing the content and quality of primary school teachers' portfolios as a result of a particular "Basic IT" level training course ran by the Center for Enhanced Learning and Teaching, the Hong Kong University of Science and Technology. Case study approach was adopted for the sake of a close examination and exploration of the 15 chosen teachers' portfolios on their details. Since each portfolio consists of teaching schemes, lesson plans, multimedia teaching packages, etc., all these were analyzed with consent in terms of their subject matter, pedagogy adopted, presentation format and styles, relevancy and appropriateness to the expected teaching and learning situations, etc. Reflection report by each teacher, being part of the portfolio was also analyzed qualitatively for generating implications. Data derived from interviews with teachers also provided essential information for evaluating the training program and gaining a more thorough understanding of teachers' learning processes during the program as well as the processes of accomplishing their portfolios.

Results of analyzing the above data helped drawing implications on: the effectiveness of the format of information technology education for teachers; the effectiveness and formats of assessment system on teachers' information technology competency levels; the development of pedagogical strategies in relation to the application of information technology in teaching and learning activities; as well as the echoes to the general policy on information technology education for teachers in Hong Kong.

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Unobtrusive Digital Video Capture of Live Classroom Instruction

Chris LaMont, Arizona State University, US

Educational videographers face the challenge of recording actual classroom footage without getting in the way of the teaching. Conventional thinking takes one or more video cameras into a classroom setting, with a wireless microphone for the teacher and a boom microphone for student interaction, and records the lesson in real time. This method is very obtrusive. The team at Arizona State University's Technology Based Learning and Research has developed an unobtrusive video capture method. This innovative approach has met with great success and is changing classroom video practices.

Rather than seeing classroom footage as a single or dual camera video, where the two cameras are edited together to form some sort of cohesive lesson, the TBLR video team looked at videotaping a classroom more like a sports event. To achieve an event capture scenario, the first step was to employ multiple cameras. One or two cameras are fine if you are grabbing bits and pieces with extensive editing. The goal here was to walk out of a classroom with an hour of finished program that could be understood by anyone watching it. Capturing the feel and spirit of the instructional lesson was an important detail that should not be stifled with heavy equipment. The intent is to let the lesson and content stand on its own. This presentation will show a video demonstrating an unobtrusive method of digital video capture.

What Did We Learn in the Six Hybrid Courses?

Amy S. C. Leh, Ph. D.
Department of Science, Mathematics, and Technology Education
California State University San Bernardino
United States of America
aleh@csusb.edu

Abstract: The paper reports lessons learned in six hybrid courses during 1999 to 2001. The goal of the research was to investigate students' opinions toward such courses and to examine the impact of using different strategies on online communities. Data collection relied on online discussion messages, observations, interviews, and surveys. Both quantitative and qualitative methods were utilized in this study. The results revealed that students and the instructor were in favor of hybrid courses and that the use of moderating strategies greatly influenced online communities.

Introduction

Technology advancement is changing our society and shifting our educational paradigm. In the last few years, the number of online courses has increased dramatically, and offering online courses is currently a trend in education. "Online courses," "completely online courses," "web-based courses," "web supplement courses," "hybrid courses," and some other terminology are used by professionals. Some educators consider courses containing online features, such as synchronous or asynchronous communication, to be online courses. According to this definition, courses in which instructors use these features but still meet students on a regular basis would be considered to be online courses. Other educators, however, disagree and only view courses in which instructors meet students half or less than half of the regular scheduled meeting time during a semester/quarter to be online courses. Further, even other professionals only recognize courses in which instructors and students do not meet at all to be online courses. To avoid confusion, the author uses the expression "hybrid courses" in this article to refer to the courses in which an instructor and students meet for half or less than half of the regular scheduled meeting time. Such courses are the courses involved in this research.

In this article, the author first describes her hybrid courses offered during 1999-2001 and strategies used in these courses in order to help readers understand the structures of the courses. After that, she reports the action research including data collection, data analysis, and results. Discussions and recommendations are also provided in this article.

The Six Hybrid Courses

Grabowski (2001) has stated that instructional design is closely connected to the beliefs of the course designer. For instructors who view independent study as a primary goal, they might choose to structure an online course as all independent study. Students would receive credits as long as they complete course assignments during the semester, and no interaction with others would be a required part of the course. On the other hand, some educators consider interaction and communication to be essential aspects of a course. These educators might choose to design an online course in such a way that students have to participate in ample interactive activities with others, including their classmates.

The author supported the latter. She believed that social interaction plays an important role in learning (Vygotsky, 1978) and valued active learning and meaningful learning (Grabe & Grabe, 2001; Brown, 1992; Knapp & Glenn, 1996; Means et al., 1993). Agreeing with Palloff and Pratt (1999), she regarded an online community as crucial in a hybrid course and designed her courses in a way that her students had to interact with other students to enhance learning. In a manner similar to Oliva (2000) and Santema and Genang (2000), she encouraged students' active learning and invited students to construct course materials together with her. She met her students four times throughout the quarter—twice at the beginning, in the middle, and at the end. All assignment submissions and discussions were conducted online via WebCT. She constructed a variety of forums (discussion boards) for students to communicate with each other and to share resources. Examples included forums for making announcements, asking questions and receiving help concerning technical issues, submitting assignments, and providing feedback and critiques to their classmates. In all her courses, students had to post their assignments to the forums, review assignments of their classmates, and critique each other's assignments. These activities provided students with basic channels for communication.

In addition to using assignments to enhance interaction, the instructor also employed different strategies to facilitate students' communication. While she used moderating strategies during the second year (2000-2001), she did not use them during the first year (1999-2000). During the fall quarter of 1999, all students conducted synchronous communication every week and discussed topics that were posted by the instructor. During the winter quarter of 1999, students used forums to conduct threaded discussion about topics generated by their classmates. During both quarters, students obtained participation points based on frequency and quality of their posted messages. They were aware that they had to post at least two messages every week to receive participation credits. Such participation requirements were not expected during the spring quarter of 1999.

During the second year, the instructor used moderating strategies in the three hybrid courses in which students took turns to moderate their online community for a week. It was understood that the instructor would not interrupt to answer questions unless it was necessary and that the students would receive credits based on how well they moderated the community. For example, if a question or a problem on a discussion board remained unanswered or not acted upon, the moderators of the week would be marked down. Moderators did not have to answer all questions or solve all problems but they needed to facilitate discussions about the issues within the community.

Based on responsibilities and tasks the students conducted, the moderating strategies varied. The instructor categorized them into three types of moderating: medium-duty, heavy-duty, and light-duty. During the fall quarter while the medium-duty moderating was conducted, moderators posted discussion topics, hosted online discussions, and answered questions posted by their classmates. During the winter quarter while the heavy-duty moderating was conducted, moderators not only took on the same responsibilities as in the previous quarter but also assigned readings, generated rubrics, and further evaluated their classmates' online performance. During the spring quarter while the light-duty moderating was conducted, moderators only needed to host online discussion and answer questions posted by their classmates.

The Research Study

The goals of the research were to investigate students' opinions toward hybrid courses and to examine the impact of using different strategies on online communities.

Subjects

The participants of the study were the students in the twelve hybrid classes (three courses offered at two campuses during two years). They were in-service teachers who were pursuing their Master's degree in Instructional Technology at a state university in the western United Sates and had little experience with hybrid courses.

Methodology

At the beginning of each course, the instructor explained to the students the course and their responsibilities, especially their duties related to the different strategies used in an online community. During the courses, the instructor posted questions for discussion. Examples of questions are: (1) What are benefits and barriers of hybrid courses? (2) What are advantages and disadvantages of conducting synchronous and asynchronous communication in hybrid courses? (3) Do you like the moderating strategies used in this course? During the last meeting of each course, students filled in a survey that contained 10 Likert scale (1-4) questions and open-ended questions. The Likert scale questions were guided to examine the following points: (1) Compared to a traditional class, did students feel that they learned as much as, or even more, in the hybrid course? (2) Compared to a traditional class, did students feel that they spent as much as, or even more, time preparing for the class? (3) Compared to a traditional class, did students feel that they were motivated as much as, or even more, to learn in this course? (4) While taking the course, did students have sufficient access to the instructor? (5) While taking the course, did students have sufficient interaction with other students in this course? (6) Given the choice between traditional courses and hybrid courses, did students prefer a hybrid course if the course content were suitable for a hybrid course? (7) Did students wish that more hybrid courses were offered in the Masters program at the university? (8) Would students enjoy taking another hybrid course? (9) Were students concerned about the quality of hybrid courses? (10) Did students like the delivery format? (11) How many sessions in which the teacher and the students meet would be appropriate for a hybrid course? Open-ended questions of the first year focused on benefits and barriers of hybrid courses while those of the second year emphasized the impact of moderating on online communities.

In addition to online messages and surveys, data was also collected from observations and interviews. The author observed students and activities online as well as during class meetings. Interviews were informal and occurred when there was a need for clarifying students' comments.

The author tabulated the survey data. She also downloaded students' messages related to the research, color-coded messages, and categorized them into appropriate folders based on the topics, for example, benefits of web-based courses and barrier of web-based courses.

Results and Discussions

The results indicated that students were in favor of a hybrid course. The students felt that they learned as much as or more in such course than in traditional courses and that they were more motivated. They wished that more hybrid courses were offered in their academic program, and they preferred hybrid courses to traditional courses.

Most of the means of the survey results went up when time progressed. The instructor felt that this change was partially due to the experiences she and her students gained from the hybrid courses. She also felt that certain characteristics, such as self-disciplines, were necessary for people to succeed in such courses. Since the students and the instructor did not meet every week, students had to be self-disciplined and able to complete tasks without much supervision. More than half of the students revealed in their surveys and interviews that online learners should be self-disciplined and complete tasks on time. Four students who received incomplete grades during the first quarter pointed out a need of such characteristics. One said, "I have difficulty in the online [hybrid] course because I'm not so disciplined and often postpone my work. In a traditional course, I would be reminded every week when I go to class. But this is not the case for taking an online [hybrid] course. "

Although people who tend to delay their work might have difficulty surviving in hybrid or online courses, the instructor believed that preparing students' mindset before they took such courses could be helpful. During the first meeting of her courses, therefore she asked students who had taken her hybrid course(s) before to share with other students tips of being online learners. "Don't postpone your work" was mentioned repeatedly by the students.

As mentioned earlier, students conducted synchronous communication in the first course and asynchronous communication in the second course. In both courses, students received participation credits. In the third class, asynchronous communication was utilized but no participation credit was issued. The different strategies used in these three classes had an impact on the online communities. The research results indicated that synchronous communication strengthened students' sense of belonging. A student stated, "Although we do not see each other every week, the real-time communication makes me feel we belong to the same class." Such a sense of belonging was less common when asynchronous communication was used during the second quarter. During that quarter, a few students addressed that they missed real-time communication and requested the instructor to sometimes conduct such communication while they were enjoying the flexibility that asynchronous communication provided. Observing the three courses, the instructor found that the online community of the third course seemed to be loose and thought that issuing no participation credits might have contributed to the loose community. The instructor suggests online instructors employ asynchronous communication and synchronous communication alternatively and use participation credits to motivate students participating in online communities.

Students listed several benefits of a hybrid course: flexible schedule, being able to work at any time and at any place, and being able to choose the best conditions for learning. They also mentioned that hybrid courses saved them gas and time on commuting and allowed them more access to instructor and to their fellow classmates.

Barriers also existed in a hybrid course. The participants missed face-to-face communication and personal contact. Students with low technology skills felt pressured and anxious. Such pressure and anxiety might create a negative impact on learning. Despite these barriers, students expressed that they would still choose a hybrid course over a traditional one, if they had an option.

Like the students, the instructor enjoyed the flexibility hybrid courses provided and missed face-to-face contact with her students. Unlike the students, she experienced tremendous pressure of responding to students' messages and of their expectations of receiving responses instantly. Meeting students once a week in a traditional course became meeting students 24 hours a day, seven days a week online. In addition, it was time consuming and stressful to communicate with a couple of students who often got confused and repeatedly asked the same questions no matter how clear information was, for example, on when an assignment was due and when the next meeting would be. Such stress was eased during the second year when moderating was used in her courses.

During 2000-2001, the instructor utilized medium-duty moderating in the first (fall) quarter, heavy-duty moderating in the second (winter), and light-duty moderating in the third (spring) quarter. As mentioned earlier, the differences among the three types of moderating were based on responsibilities and tasks students conducted in the hybrid courses. Data collected from survey open-ended questions, online discussions, observations, and interviews indicated that both the students and the instructor favored the use of moderating in the courses. The students felt a sense of ownership of their online communities and learned from their peers by observing how their peers hosted the communities. They received answers much faster than before because every member of the communities tried to help answer questions. The instructor also favored the moderating. She noticed that she was less stressed responding to students compared to the first year and that the students received responses faster and became very active in the online communities. The communities became very dynamic, and she felt the courses sometimes could smoothly move forward like a car with a "cruise control."

Among the three different moderating strategies, the students favored the medium-duty moderating the most and the heavy-duty moderating the least. During the winter (heavy-duty) quarter, the responsibilities of the students and their activities appeared too complicated. Moderators of every week tried to do a good job by assigning readings, setting objectives for the week, and facilitating discussion; often their readings and objectives were too many to be accomplished within a week. Students conducted many different activities when time moved on. At the end, they were distracted by the objectives of different moderators and forgot the objectives of the course. In addition, moderators often had to participate in activities of a week while they were still evaluating their peers' online performance of the week when they were the moderators. This was indeed a hectic quarter, and the instructor learned a big lesson from the experience. Appropriate amount of online communication could enhance learning while too much communication might cause learners to withdraw from the community (Palloff & Pratt, 1999). Students' dislike of such moderating is clearly revealed in the survey results. A number of the means during the winter quarter dropped and consistently appeared to be the lowest among the three courses. Students spent a lot of time (mean=3.93) on the course but did not necessarily learn more (mean=3.15). They liked the course the least (mean=3.27) compared to the other two courses of the year.

Although the winter quarter was hectic, students still favored hybrid courses. Issues addressed during the first year, such as benefits of such courses and their wish to have more hybrid courses in the academic program, repeatedly appeared in the second year. Students also liked the fact that they had to post their assignments and review their peers' work. By doing so, they learned much from their peers. They liked meeting three to four times per quarter and did not seem to favor an online course without a face-to-face meeting.

A hybrid course did provide flexibility and convenience to learners, especially to learners at remote areas. While hybrid courses are blooming in many places, the author thinks that hybrid courses should not (1) be independent studies in which no interaction among students are necessary, (2) be only task-oriented in which social learning is neglected, and (3) lower the quality of education. Instead, the courses should be structured to raise the quality of education because learners have options to choose their best learning conditions and opportunities to enhance their learning using resources beyond boundaries of time and space.

Conclusion

The paper reports action research on online courses conducted from 1999 to 2001. Data were collected from three courses (12 course sections) at two campuses during the two years. Data collection replied on online discussions, observations, interviews and surveys. Both qualitative and quantitative research methods were used in this study.

The results indicated that students and the instructor were in favor of hybrid courses and that the use of different strategies had an impact on online communities. Using synchronous communication and asynchronous communication alternatively could enrich online communities, and moderating strategies with careful design and organization worked well in hybrid courses.

Instructors who employ a variety of strategies to build up and nurture an online community may achieve the most success with hybrid courses. This new delivery method provides students with options of choosing their best learning conditions and with opportunities to enhance their learning using resources beyond boundaries of time and space. One can see the potential of this method for positive impacts on our education and society.

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TNT: Ignite Leaning Exploding Barriers and Obstacles to Language Learning

Dr. Donna Lenaghan -Educational Computing and Technology
Barry University, USA dlenaghan@mail.barry.edu

Abstract: In the statement, "All students can learn and be All Star learners" there is no qualifier -- "as long as English is their first language". The challenge is to identify: how to ignite learning in all learners especially learners with limited English language proficiency and the nuances of learning for all learners? This paper provides: 1) a topical review of Teaching English to Speakers of Other Languages (TESOL), 2) a synopsis of brain-based teaching and learning concepts, 3) a discussion of an instructional design model for infusion of technology resources to augment the teaching and learning process for students with limited English, and 4) a sampling of technology resources for infusing appropriate technology into the teaching and learning process for students with limited English.

The TNT Combination for Learning

TNT (an abbreviation of trinitrotoluene) is a commonly known explosive created by combining three nitro groups into one module (Websters, p.2401 & 2446). Under most conditions, TNT is stable, yet when the three elements are combined in a certain way it becomes a powerful charge to blow away obstacles and barriers to progress. TNT for learning means--Technology Nourishes TESOL learners. It removes barriers and obstacles to learning.

The three parts of the educational TNT are: TESOL/ESL, brain-based learning, and instructional design for infusing technology into the teaching and learning process. TESOL is the field of Teaching English to Speakers of Other Languages and ESL is English as a Second Language. Brain based learning means that strategies and techniques consistent with brain operations are integral parts of the teaching and learning process. Educational Technology is the application of science (in this case computer-based technologies) to learning. A quick review of the literature in each area provides a foundation for understanding this powerful combination to remove obstacles for learning.

TESOL/ESL

Numerous web sites for TESOL/ESL learners and the history of Computer Assisted Language Learners (CALL), demonstrate that technology is not a new concept in the TESOL/ESL arena. When and how technology can be infused to remove barriers for learning is an area for continual and rigorous discussion and investigation by educators and researchers. A selective (not exhaustive but representative) sampling of literature found the following common elements within articles discussing TESOL/ESL and technology: 1) numerous suggestions for types of technology activities to use by or with second language learners, 2) suggestions for the appropriate incorporation of technology into curricula and pedagogy and 3) recommended components of TESOL/ESL learning activities. Suggestions for TESOL/ESL learning activities with technology are found later in this paper

Shared components of TESOL/ESL activities found in the literature included: language development/acquisition, pedagogy to support social communications competencies and academic achievement, contextualization, and cultural influences in second language acquisition (Bowman, Butler-Pascoe, Chapelle, Egbert & Hanson-Smith, & Warschauer). Incorporating technology as a part of the curricula and integrated into pedagogical goals was a common thread found across the literature review. For example, Vazquez-Montilla's & Zhu's (2000, p.17) research comparing the use of web based conferences and e-mail communications for ESL students found that "technology remains an enabler and facilitator or instruction" when it is infused as a part of the pedagogy. Technology should be used to enhance the language learning process. It is a means to the outcome of language learning not an outcome itself. Similar opinions were found in the web-based bulletin board discussion of Computer Technology and TESOL (Healey 2001). Of the pro-technology postings, individuals advocated or documented technology as a part of the teaching and learning process not something to be learned by itself. Douglas, in review of Computer Assisted Language Learning (CALL) resources, postulated that the effective use of technology in language learning requires "putting pedagogy before technology" (Douglas, 2000). Based on her research on using Internet with second language learners, Lynda Terrill (2000) identified benefits and disbenefits of adults learning English with technology. One benefit was that learners enjoy working on the computer. The disbenefits included the language level on the Internet being too difficult for second language learners, limited or no Internet access (also cited by others in the literature), and lower socioeconomic groups unfamiliarity with or limited access to computers.

Warschauer (1998) posed the most provocative perspective about using technology in second language instruction. He advocated for a holistic re-examination of what literacy means in a multimedia communication culture and how this literacy intersects with class, race, gender and cultural identities. He raised the question of examining how the sociocultural context of a particular educational institution or community effects electronic illiteracies. He advocated that the perspective shouldn't be "old language learning plus computers" (Warschauer, 2000, p.2) but what does language-learning literacy in a technological communications period mean.

Brain Based Learning Variables

Brain based learning is a term for strategies that complement how the brain naturally functions (Caine, 1994; Lenaghan, 1999; Sylwester 1999). The brain based learning strategies to be addressed in this paper are: intellectual potential (multiple intelligences) and brain operations.

Intellectual Potential = Multiple Intelligences

Howard Gardner revolutionized educators' understanding of the brain's potential through his Multiple Intelligences theory and definitions of intelligences. He redefined intelligence as "the ability to solve problems or to make something that is valued in one or more cultures" (Checkley, 1977, p.9). This definition has grand potential for multilingual and multicultural learners. It is inclusive and not restrictive to one culture's dominant language. According to Gardner, students are smart in a combination of at least eight different areas. Multiple Intelligences theory is not to be used to classify people, but to understand, plan, and evaluate the teaching and learning process. Each person has two or three dominant intelligences that he or she uses to complete daily tasks, solve problems and respond in stressful situations. Teachers should provide multiple opportunities for students to learn, demonstrate and reinforce their learning through all these intelligences. A sampling of Internet activities and sites related to individual intelligences and TESOL are listed in Table 1.

Table 1: Multiple Intelligences and Internet Activities

Intelligences	Ability to create or use...	Internet Activities
Linguistic	Language, words and verbal expressions	Word Searches, Oral Drill Sites, Passive Voice Practice, Grammar Blast, Illustrated Story Books, Text Translators, Grammar & Poetry Sites, Proof reading and Spell-checking sites, On-line Dictionaries, Foreign Language Resource Center, Cross-word Puzzles, Poetry Sites, Newsgroups, List Servers, e-mail, Chat Rooms, On-line journals, Bulletin Boards
Logical-Mathematical	Sequential, deductive logic and reason, math and science	Math activity sites, Mathforums, Access data bases, data analysis, math and scientific gaming simulations, Graphic calculators, geometer sketchpad
Spatial	Colors, holistic and contextual relations	Museum tours, virtual reality sites, Clip art, graphical displays sites, Desktop publishing, Graphic organizers
Bodily-Kinesthetic	Coordinated hands and body movement	Virtual dissection, Educational games, Lego Logo, Olympics coverage, Centers for Health, keyboarding
Musical	Hear and create music sounds & patterns	Music on the Web, sound files with various texts, digital recording and orchestration
Intrapersonal	Self-understanding	Personal Home Pages, Portfolios, Journals
Interpersonal	Influence, and produce with others	Electronic family histories, Telementoring, On-line discussion, Electronic villages, and CyberPals
Naturalistic	Discriminate and sensitivity to nature	Science & nature exploration sites, Natural virtual field trips, ecology & environmental Sites

Brain Operations

Multiple Intelligences describes the brain's capacities and brain operations describe the natural functioning or neural pathways of learning. Through brain mapping (observing and analyzing the neuron firings in human brains) the biological paths and processes for learning are identified. Emerging from this research, are five key insights for education (Table 2)and strengths of technology related to these brain-based learning techniques (Table 3).

Table 2: Brain and Learning

Brain Based Learning

The emotional brain is the preliminary processor of information thus the gateway to learning.
Neural pathways of previous learning are established through repetition.
Short-term memory storage capacity is limited. Information must be manipulated or applied for transfer from short-term to long-term memory.
New information and experiences shape neural pathways established by prior learning.
Problem based learning requires active neural connections across and between numerous memory & activity centers
Brains operate on a ninety-minute energy cycle then needs a break.

(Source: Hannaford, C. 1993; Sylwester, 1995)

Table 3: Linkages of Brain-Based Learning with Technology

Brain Based Learning	Technology Assisted Learning
Affective Learning	It is fun, novel and students feel in control. Most Internet sites require students to hear, see and do the content.
Neural networks reinforced through repetition	Consistent communication protocols reinforce linear thinking process in some areas (not the Internet). Information may be repeated and summarized in novel and engaging ways
Concepts learned must be used for transfer from short term to long term memory	Active manipulation of data and/or skills on a site requires learners to do something with the information, thus aiding the transfer from short term into long-term memory.
New learning builds on past learning networks	Instructional design and hypertext allow learners to start and review basic concepts and build upon those with additional links.
Problem Based learning requires cross-brain neural activities	Many Internet activities are contextual and problem based-requiring students to research an issue, manipulate data, synthesize and/or evaluate information. This requires brain activity across different brain operations and memory centers.
Ninety minute energy cycle of the brain	Activities and stimuli change so frequently in Internet and software programs that the sensory habituation is less noticeable.

Instructional Design

Instructional design is defined as the systematic planning of ways to accomplish objectives, outcomes and/or learning. It is driven by the instructor's (and hopefully learners) philosophy of learning and theories and technologies to accomplish this. The pedagogy mentioned in the TESOL/ESL literature infers an instructional design process. With infusion of technology into teaching and learning activities, the manner in which the technology (instructor and/or student driven) is used and the design of the actual software (concept presentation/programs were written with an inherent pedagogy) must complement and expand the teachers' and learners' philosophy and learning opportunities.

Infusing technology into the learning environment changes the learning environment. Like Warschauer's question of the meaning of literacy in a multimedia communication culture, the educational technology field is asking itself the meaning or process of literacy in a multimedia culture. The question of meaning is still being debated, but the methods consistently reflect the trend of learning becoming more student directed, oriented to problem or solution seeking, cooperative learning, discovery-focused, and individualized. Teachers and students are cooperatively learning, producing knowledge and solving problems together.

Technologically based learning and instruction are initially attractive (once fear of the dreaded computer monster is tamed) because it appeals to one or more of the dominant senses and intelligences. The learner actively seeks information and solves problems in virtually realistic environments and the teacher coaches. This is a shift from "sage on the stage" to "guide on the side", facilitated by appropriate technology. A powerful paradigm shift is occurring with technology-based learning. Teachers are no longer the absolute source of knowledge, but a designer of learning experiences in which the learners actively seek, use and synthesize knowledge. This shift is exploding some barriers and obstacles to learning.

There are many wonderful frameworks for instructional design. Readers and practitioners should adopt or adapt one consistent with their educational values and preferred teaching methodologies. Many teachers and professors have found Multigogy effective with multicultural and multilingual learners. The acronym M.U.L.T.I. (Many Unique Learning Tendencies Impact) is its prefix (precursor for understanding) to which the Greek root "gogy" (which means teaching) is added. Multigogy is a framework for designing instruction that is learner centered and brain-based. It accommodates a variety of instructional techniques supporting Directed Instruction, Cognitive Constructivists and Social Learning Constructivists theories of learning (Lenaghan, 1999).

Two Multigogy principles--FAST SCORE--are consistent with successful learning strategies found in the

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TESOL/ESL literature. FAST is an acronym prescribing the learning environment conditions to be: Friendly, Active, Solution-oriented and Technologically assisted. SCORE is an acronym summarizing brain based learning principles. To SCORE a learning module, the teacher and/or learner: 1) Sees the information in addition to hearing it; 2) Chunks or categories the information into small units to easy the retrieval and retention; 3) Operates the information in some manner in order to reinforce neural networks and facilitate transfer from short term to long term memory; 4) Repeats or reviews concepts and skills to enhance retention; and 5) Emotionalizes (positively) the learning content and context. Remembering FAST SCORE to enhance the instructional design and lesson planning process and combined with Multiple Intelligences orientation will set-up learners to be All-Star learners.

Infusion of Technology

Infusion of technology into the instructional design for learning has a range of instructional methods options. Most people agree that its purpose is to accomplish standards of competencies and benchmarks prescribing enhanced thinking and concept mastery. And they accept a variety of different approaches for incorporating technology into instruction. TIP MIC, an acronym within Multigogy, is offered as a summary of the variety of ways technology is infused into the teaching and learning process (Table 4). A sampling of tips and ways to infuse technology into TESOL/ESL activities are listed in Table 5.

Table 4: TIP MIC for Infusion

TIP MIC	
Technology	Technology is a tool to deliver instruction and/or engage, equip, inspire and support individual learners
Information	Information is presented and/or accessed with contextualization in a realistic replicated environments with or without the Internet
Production	Production of products and/or problem solutions with technology
Multi-modal	Many unique learning tendencies (multiple intelligences, five learning styles and diverse languages and cultures) are addressed with technology
Internet	Internet is a medium for teachers and students to research, produce, and publish
Communications	Communication (text or visuals) exchanges –synchronous and asynchronous—are possible through intra and internets

Table 5: Sampling of Tips to Infuse Technology Into TES/ESL

TESOL/ESOL Techniques	Sampling of Tips & Technology Infused into TESOL/
Repetition	Drill and Practice Software, Educational Games, Electronic Flash Cards
Oral Expression	Language translators, Say & Learn Programs, Word Processing, Journals
Listen to Sounds of printed work	Recorded voices and sound in Hyperstudio and PowerPoint presentations
Concepts Visual Presentations	Clip Art, Hyperstudio, PowerPoint, Internet, Desktop Publishing
Drill & Practice	Variety of topical software and Internet Sites.
Immediate Success	Developmental appropriate software is available and designed for scaffolding of learning. This is critical to ensure competent and consistent operations of technology so insure that it does not impede learning
Individualized Learning	Integrated Learning Systems and tutorial software have different levels of concept mastery and one can control the speed of presentation
Contextual Learning	With the Internet, the World may be the context of learning. Concepts presented with auditory and visual cues in virtual and real environments
Cooperative learning	Learners work together to research, create, produce, edit, brainstorm and evaluate each others' work
Social Communications	On-line communications (bulletin boards, chats, conferences and e-mails—synchronous or asynchronous) can supplement (should not replace) person-to-person communications. Reluctant speakers or intrapersonal intellects may become very linguistic with on-line communications
Cultural Expressions	Technology has the capacity to replicate, communicate and create cultural expressions ;')

(Note: TESOL/ESL techniques paraphrased from Claire & Haynes (1995) &Butler-Pascoe (1992)

Specific TESOL/ESL websites recommended by practicing teachers (organized into categories of Teacher/Instructional, General ESL/TESOL and Student Activities sites) are found at http://socrates.barry.edu/ADSOE-dlenaghan/tesol/webresources.htm. Readers are encouraged to complete focus groups to validate and expand this list for your specific multi-lingual and multi-cultural contexts and share their findings with others.

Conclusion

The three elements in our TNT for learning are: TESOL/TNT teaching and learning strategies, brain based learning concepts and instructional design. When combined with technology as a tool wisely infused in the teaching and learning process, the mixture becomes a powerful catalyst to blow away barriers and obstacles to learning. This dynamic mixture is more than knowing the independent compounds; it is in the creative and careful blend of the three elements into one module that creates the positively dynamic potential. With the potential to explode barriers and obstacles, the field is now clear to engage all learning capacities with the infusion of technology into TESOL for the success of students and teachers.

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Using Moral Development Theory to Teach K-12 Cyber Ethics

Judith Lewandowski, Purdue University, US

Introduction

Children today face a very different world than that of their parents. A recent television commercial exemplifies this point by illustrating a young teen who, after disobeying her parents, is grounded from the use of the telephone. The commercial depicts the girl joking with her friend, through the use of an Internet-based phone, about the "punishment" she has received. Much to the chagrin of the teen, her mother enters the room and overhears the conversation. Without hesitation, the mother extends the punishment to include banishment from the computer.

Technology, it seems, has permeated into virtually all aspects of our life. Its incorporation has influenced the way in which we communicate, travel, work, learn, and raise our children. Consider the life span of young teenagers born in 1988. For these kids, it is common practice to chat with friends from around the world, watch news events as they happen, interact with experts via the Internet, capture photos digitally, and manipulate historical recordings of events. The environment in which these children will grow is quite different than that of their parents. All of these differences resonate the fact that the skill set that will be required of these children as they mature into adults is dramatically diverse than the skills that were needed by previous generations.

New Societal Skill Set

The role of information technology in our society is increasing at a dramatic rate. According to several governmental reports, there is currently a "critical" need for individuals skilled in the field of information technology. These reports also indicate that this need will grow substantially over the next five years (Critical Infrastructure Assurance Office, 2000). According to a recent National Science Foundation report, by the year 2010, the United States will need more than 700,000 additional scientists and engineers proficient in both content and technical skills (Kopp, 1996). The skills of the past will no longer provide an individual with a secure future. As the needs of our society change, so must our educational system.

Effective and consistent technology use is a critical factor in increasing the information literacy levels of our future workforce. Currently, the amount of knowledge in our world doubles every two years (Withrow, 1993). Consequently, it would be impossible for a worker in the 21st century to memorize all relevant information. Due to this vast amount of knowledge, information literacy skills will need to become a key component of our schools' curriculum. The ability to find, locate, and apply the needed information will require information literacy skills as well as basic technical proficiencies (Withrow, 1993).

According to John Brown (2000), the Internet has the potential to assist in the acquisition of the "new" skills. The use of technology in an educational setting can provide a dynamic framework to enhance and promote the acquisition of the types of skills that our students will need in order to be productive in the future. Technology, in a variety of forms, can help to teach students the process of information gathering, inquiry, collaboration, and simulation (Rice & Wilson, 1999).

Educators, politicians, and parents agree with the idea that technology integration will help to spur the advancement of technological skills in children. This belief has been transformed into school budgets that embrace the integration of technology into the classrooms. The National Center for Education Statistics reports that 66% of public school teachers use computers or the Internet for instruction during class time (2000). According to a 1999 survey, 16 million children (or 14% of U.S. citizens under the age of 18) regularly use the Internet. Of those users, 6 million are children under the age of 6 (Curriculum Review, 1999).

Acquisition of Ethical Guidelines in the Workplace

Familiarity with and utilization of new technical advances are critical components of an educated 21st Century workforce. However, the development of a new skill set goes far beyond simple technical know-how. The Information Technology (IT) workforce must also understand the ethical implications of the programs they write, the actions they take, and the criticality of protecting intellectual property in the online environment. Individuals who learn only the technical side of technology are missing an integral part of the new skill set.

Unethical behavior can be a costly mistake for industries to counteract on several levels. Fines, public embarrassment, negative publicity, professional reputation damage, low employee morale, and difficulty in employee recruitment are all examples of common costs associated with unethical business practices (Nash, 1993). Lands' End, a prominent clothing manufacturer, offers a dramatic example of a commitment to include ethical training as part of the new skill set required of its employees. Members of the Lands' End Information Technology team are routinely placed under security audits which include technical attacks on its information security practices as well as individual ethical tests of the team members (Wilder & Soat, 2001). By utilizing this type of spontaneous performance check, Lands' End is actively working to develop and maintain a workforce that is both secure and ethical in its daily practice. Additionally, a recent Information Week survey indicated that 62% of the reporting corporations monitor their employees use of the WWW, and 54% monitor the email of their employees (Wilder & Soat, 2001). These monitoring practices are deemed both ethical and common by most IT professionals, yet it is not clear as to where the employees are to acquire these skills for discerning appropriate use of the technology.

The nature of the IT world changes the use of ethical behavior for some. In the invisible online world where you can interact almost anonymously, some individuals experience difficulty in translating their real-world ethical guidelines into the online environment. When individuals interact in a direct face-to-face manner, they can see the impact their dialogue is creating. In the online environment, individuals can send dramatic, painful, and derogatory responses without having to witness the pain the receiver endures (DeMaio, 1991).

Acquisition of Ethical Guidelines in Schools

It is imperative that students understand the deep implications that their online behavior may have upon others. If they are unable to draw the connection between real-world ethics and the online environment, the students will need to be guided in this transition by role models, parents, and teachers. Ethical training can benefit students by "increasing their awareness and sensitivity to important issues surrounding ethical problem solving" (Windsor & Cappel, 1999). To this end, it is critical that cyber ethics be addressed as part of the regular curriculum of our K-12 schools. As we teach students the skills to use technology, we must also teach them the proper guidelines for appropriate use.

Ethics and Cyber Ethics Defined

According to the American Heritage Dictionary, "ethics" refers to the set of principles of right conduct (2001). It is "concern with what we consider to be 'right' or 'just' behavior (Gibney, 1999, p.19). Ethics refers to the guiding principles or ideals of good vs. evil. Ethics are not based in law, religion, or standardized beliefs; rather, ethics refer to a general conception of right and wrong which transcend both religion and law (Webster's Dictionary, 2001). "Cyber ethics" refers to the application of ethics into the online or virtual environment (Ethics Connection, 2000).

Justification of Cyber Ethics at the K-12 Level

Ethics intervention demands attention at a young age. The majority of children begin developing significant use of their ethical principles between the ages of 10 and 12 (Geide, et al 2000). To hesitate in teaching ethical principles until adulthood is not only ineffective but also risky. There are countless examples of the horror stories of students who once empowered with technical skills feel the need to practice them in inappropriate ways. Distribution of pornography, sexual harassment, credit card theft, destruction of governmental websites, modification of grades, counterfeiting rings, and software piracy are just a few of the technically-based illegal activities with which students in our schools have been involved (Marsh, 2000)

In addition, common classroom distractions have even been impacted by technology, often with a more vicious twist. One prominent example involves the illegal use of others' email accounts to send inappropriate, threatening, or mean email to fellow classmates. This practice has become so commonplace in schools, that many middle school teachers trivialize it by making it analogous to passing hand written notes about the "un-cool kids" in class (Marsh, 2000).

Not only are students not hearing about the need for appropriate use of technology, it seems that they are bombarded by a constant stream of media clips in which the image of the hacker is portrayed as a romanticized rebel. MTV recently aired a broadcast entitled, "Hackers" which provided the viewer with a day-in-the-life view of a computer hacker. Additionally, several major motion pictures such as "Hackers," "War Games," and "Real Genius" have depicted hackers as the new adventure seekers. The actual hackers do not dissuade these stereotypes; rather, they embrace the notoriety and acclaim the stereotype brings (Governor, 1997).

As technology integration has progressed throughout society over the last several years, it is also interesting to note that the frequency of computer crimes and misuse has also dramatically risen. Specifically, the 2000 Computer Security Institute/FBI Computer Crime and Security Survey indicates that computer crime and other information security breaches are on the rise with 90 percent of the responding 585 participants reporting computer security violations within the previous 12-month period (Smith, 2000). Many experts agree that this trend in increasing rates of computer crime will escalate even further. The consensus from a recent Department of Justice conference on computer-related crime was that due to the increased integration of computers into the K-12 learning environment, the number of potential perpetrators of this type of crime will rise dramatically (Smith, 2000). According to this group, the basic adventurous nature of technology can lead undirected users to misuse the equipment (Sivin & Bialo, 1992).

Other research echoes this sentiment on a more youthful level. In April of 2000, Scholastic, Inc. conducted a survey asking 47,235 elementary and middle school students if hacking should be considered a crime. Alarmingly, 48 percent of the surveyed students reported that it was not criminal (Geide, et al, 2000). Additionally, in a study of 729 high school students conducted by Vincent & Meche (2001), 19 percent of the students indicated that they felt that personal use of company e-mail (designated for company use only) was ethical and 49 percent said that they would use it.

It appears that schools are providing students with the opportunity to develop and learn the skills to use technology; yet, this same curriculum is failing to teach the students the principles surrounding the acceptable use of technology. It is the lack of instruction on these soft skills in the curriculum that has many experts worried about the propagating culture of young Internet users (Geide, et al, 2000).

Society is a dynamic system. It must, by nature, evolve in order to survive. As we develop the new definitions of appropriate behavior in the online environment it is imperative that many members of society be engaged in this ongoing dialogue. An informed community and active discussion of ethical issues will enable society to determine civil and just manners to deal with the nuances of technological advancement (Rezmierski, 1992). By opening this dialogue within the K-12 environment, teachers will be able to prepare students to understand the proper use of technology and explore the issues that will continue to unfold. Unfortunately, many educators are not equipped with the skills to effectively integrate ethics into their classrooms. In order to successfully blend ethical instruction into the K-12 curriculum, educators must develop an understanding of moral development principles, recognize age-appropriate moral dissonance, and learn to advocate for the moral growth of the students' perspectives (Clare, et al, 1996).

The remaining portions of this paper provides a general overview of prominent moral development theories. Its purpose is to provide a general understanding of moral development theories as well as the justification for the selection of Kohlbergian theories as the foundational approach to the integration of cyber ethics into the K-12 curriculum.

Learning Environments in Adult Teacher Education - a Chydenius Implementation

Jukka Mäki
Project Manager
Network University
Chydenius Institute
University of Jyväskylä
Finland
jukka.maki@chydenius.fi

Abstract: Chydenius Institute is a research and education centre of the University of Jyväskylä. It's the only educational department in Finland that selects only adult students for graduate teacher education. This paper raises the problems of adult-students in the use of information technology in studies. It describes especially the use of web-based learning environments as part of their studies.

1. Chydenius Institute, a Network University for Adults

Chydenius Institute is a research and education centre of the University of Jyväskylä. Located in Kokkola, in the western coast of Finland, it gives a regional stample of the University. The Chydenius Institute offers teacher training and in-service training for professional development, makes research in the fields of economics, social and pedagogical sciences, offers open university education and services for businesses and other organizations. It offers also Master's degrees of Information Technology (with University of Jyväskylä) and Electronic Engineering (with University of Oulu). Its newest implementation is European Union -funded project of Network University, which is part of the Finnish Virtual University.

Chydenius Institute has a reputation as a Network University for adults. The history begins from mid 80's, when the Institute was founded firstly to give further education for teachers in the region. The name Chydenius comes from Anders Chydenius who was a famous Finnish politician and economist in 1700's supporting liberal economic policy and freedom.

In the late 1980's there was a lack of elementary school teachers in Finland and that's why the Ministry of Education gave an emergency law for some universities to start a two-year-program of teacher training. The entrance to study was given for those teachers who had long teaching experience, university studies, but who hadn't finished a Master's degree of Education. The Chydenius Institute was one of those training units.

Shortly, the lack of teachers was covered, but it became evident that Finland needs this kind of adult teacher education. The Ministry gave the permission for the Chydenius Institute, as a part of Jyväskylä University, to offer permanently instruction using this model of teacher training. And so today, the Chydenius Institute is the only unit that gives "adult teacher training" in Finland. In 2001 every fourth candidate was taken to study, i.e. 50 students started in the fall 2002.

2. The students of teacher training

The "typical" student of Chydenius Teacher Education is married woman with two children, owner of another degree (usually kindergarten teacher) and five to seven years of experience in elementary school teaching. Most often she has a home not more faraway than 200 kilometers from Chydenius Institute. She dedicates her time for studies every week and the husband takes care of the family. Usually she stays the weekends at home. This kind of organizing the life totally differently, although temporarily, means a big understanding from the side of the family but also a maturity and motivation of the student.

3. The studies of teacher training at Chydenius Institute

The teacher training at Chydenius Institute consists full-time studies from 1.5 to 2.5 years. Because the most of the students are holders of another university degree or at least they have 60 credits (of 160 cr.) of university studies. A student completes the studies by having Lnaguage and communication studies (7 cr), Science of Education as major (75 cr), minor studies (65-70 cr) and optional studies (13 cr). Everybody makes a scientific research of 22 credits (counted in major studies).

All the students are adults with teaching experience. The studies support life-long learning and they are student-centered and flexible. Everyone has an individual curriculum for Master's degree. All the courses give possibilities for team working, personal counseling, projects, workshops and seminars. Often the assignments are implemented individually, pairs or in small groups. Pedagogical theory and practice are in close interaction and the students are able to develop their teaching abilities during their studies.

4. The use of ICT

Because of high level of Finnish educational system and big use of information technology, all university studies consist computers, internet, electronic communication and videoconferencing. The Chydenius students have very different background in ICT. This might to be a problem, but actually it isn't because of big emphasis that is given to ICT as a part of studies. During the first weeks of the two-year-program the students start their computer training. This is seen as a basic for the further studies. They learn to use the computer, word-processing, graphics, presentations, email and internet. They learn to take digital pictures, scanning and image-processing. During every course the students use open or closed web-based learning environments to perform their assignments but also to communicate and inform one another, both students and professors. Table 1 shows the special courses of ICT during the studies.

CODE	STUDIES	CREDITS
CKI081	**ICT-knowledge of a teacher**	**2 cr**
CAM481	**Media education**	**2 cr**
CAM570	**Pedagogy of teaching with networks**	**2 cr**

Table 1. The special courses of ICT in Chydenius teacher education studies.

The course "ICT-knowledge of a teacher" is a basic course for using computer, network, word-processing, email, internet and graphics. The students learn also to process digital photos. All students come familiar with pedagogical use of videoconferencing and www-page design.

The course "Media education" helps the students to understand media reality of today and phenomena of mass media. They get experiences of communication and media culture. They analyze the views and opportunities of media education. They learn to edit digital photos and videos and evaluate illustrated learning material in www and traditional forms.

The course "Pedagogy of teaching with networks" emphasizes the meaning of human, knowledge and learning as a basis for pedagogical use of ICT. The students think the role of a teacher as a tutor in problem-based learning. They learn to create web-based courses and to build communities in a web-course.

Throughout all the studies internet is utilized as a source of information for every course. Because all Finnish schools are connected to internet it's very important to learn how to use the internet in education. In the region where Chydenius-Institute is influencing and the practice of teacher training is

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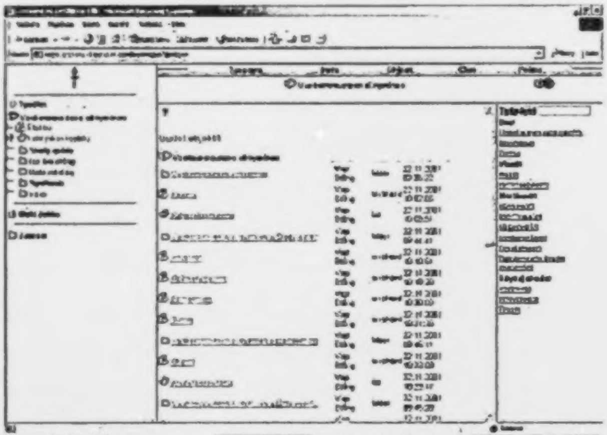
organizes, all the schools have ATM-network and videoconferencing facilities. The infrastructure supports students, teachers and pupils to enjoy the highways of information society.

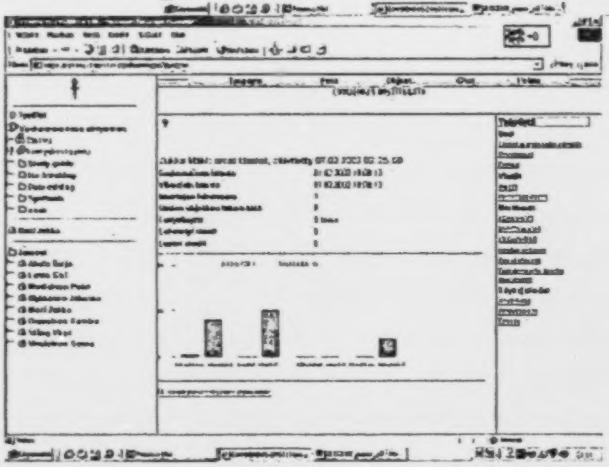
5. Learning environments

Chydenius Institute aims to be ahead of developing the education in teacher training in Finland. An essential part of the studies are web-based learning environments. Most common has been WebCT, but others, e.g. Blackboard and TopClass have been tested. Nowadays there are also many learning platforms created in Finland, e.g. Optima, LCProfiler, R5Vision, Humap, Efodi, FLE.

From 1997 there has been developed the platform Discendum Optima, earlier called Telsi. It has been found as a successful web-based learning environment. Because it is module-based, it gives freedom for administrative person to customize the environment the way that serves the purpose in the best way. A teacher can easily implement the pedagogical model of the learning that he has in his mind. It is pedagogically flexible environment offering diverse possibilities for team working and communication. The main tools of Optima are the usual ones: tools for administration, production and updating, documentation, calendar, teaching material, assignments, statistics, asynchronous conversation and online chatting. The power of Optima is that an administrator is able to customize the desktop very easily. Also it's very user-friendly and simple.

The Discendum Optima-environment is used all through the two-year-program. The Chydenius professors have made own implementations of Optima, according to every course. Here are some screen shots of one course.





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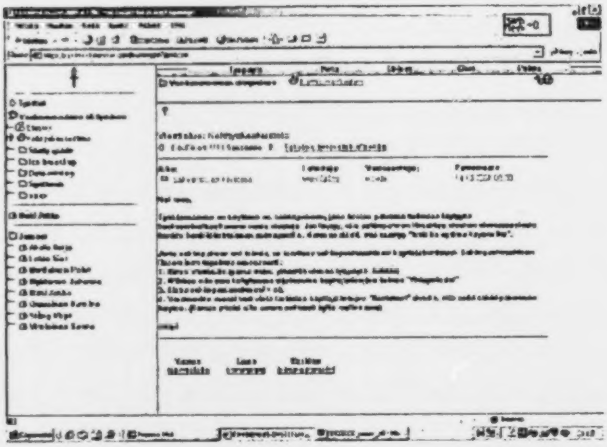

6. Training of teacher training instructors in schools

One problem of teacher training is how to organize the instruction for teachers who take care of teacher trainees in their practical training in schools. The Chydenius two-year-program consists of four periods in elementary schools: the first one is four weeks in a local school in Kokkola, the second one is four weeks in a school that is selected as a training school, the third one is a two-week-period in mixed classes in country-size (preferably in home places of students) or abroad, the fourth one is a practice of special education (two weeks) and the fifth one is again in the training school having a period of five weeks.

The teachers, called training instructors, are given training to support students in their practical periods. Except of these instruction periods the Chydenius professors have organized an environment in Discendum Optima, where they can give instruction and information, but also to communicate with each other during these training periods at schools. In this way the training instructors have the possibility to change their ideas and share their problems.

This model for supportive instruction of teacher training is now in the moment created and implemented in Finnish teacher training. ICT and web-based learning environments give the possibility to develop the teacher training more diversified and flexible. The quality of instruction increases with ICT.

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www.chydenius.fi

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An Examination of the Effectiveness of Types of Learner Interactivity in an Online Professional Development Course

Donna Morrow
Christchurch College of Education

Abstract

A professional development course, designed to examine the connection between learning theory and ICT (information and communication technologies) and taught by three methodologies was examined for learner interactivity. The course was delivered in three ways: a face-to-face class that used the online materials as a resource; an online class that received instruction and materials via the Internet; and a hybrid course comprised of a group of students at a remote location which met weekly for a phone-in conference with the instructor but received materials via the online environment. Four types of learner interactivity were examined: learner-learner, learner-instructor, learner-content and learner-interface. Conclusions drawn from this research indicate that students in the online, on-campus and hybrid classes considered e-mail or face-to-face contact with the lecturer as very important aspect of the class. Interaction with other learners online was rated highly but only if the situation in which this took place was organised and structured. Interaction with the course content varied among the different classes, but similarities among all students in the three classes were hands-on activities and lectures or explanatory content. The learner interface interactivity, although reported as somewhat problematic by all students, appeared not to be an issue, with most students solving problems with computers and Internet access either on their own or with the help from the instructor.

Introduction

Given the dramatic increase in online teaching and learning it is not surprising that online professional development courses for practicing teachers should show a corresponding increase in availability. These courses, offered both by tertiary institutions as well as commercial providers, provide a wide range of topics for the teacher in the classroom (Schrum, 2001), and range from self-paced tutorials with little or no interaction among participants to graduate-level courses with web-based discussion facilitated by discussion boards, chat rooms and e-mail (Branzburg & Kennedy, 2001). Within this new structure of professional development delivered online however, the need clearly exists to define the pedagogical issues, understand how the learners interact with this environment and discover the benefits and possible disadvantages of using this methodology.

Information Technology in the Teaching and Learning Process is a core course in a seven course Diploma of Information and Communication Technology at the Christchurch College of Education in Christchurch, New Zealand. The diploma attracts practicing teachers who want to upgrade qualifications and gain skills in using information and communication technologies. This course is designed to examine the connection between learning theory and technology used to enhance learning in the classroom, and is taught as a face-to-face course with provision for the occasional distance student made available through teleconferencing. At the beginning of 2001, an increased demand from students around the country wishing to enrol in the course as distance learners led to the decision to develop the course for online delivery. Due to the configuration of students requesting enrolment in the course, three different methodologies were identified: a traditional face-to-face class that would meet bi-weekly with the instructor on campus and use the online materials as a resource; an online class that would receive all instruction via the Internet; and a hybrid class involving a group of teachers in a remote location who would use the online resources in addition to an initial two-day, face-to-face start to the class and a weekly phone conference between the instructor and the assembled group. The existence of the three classes presented a unique opportunity to explore how each of the groups interacted with the course materials, the instructor, other class members and with the technological interface used to deliver the course.

Methodology

To examine the learner interactivity, Moore's (2000) model of learner interaction was used. Moore describes this interaction in three forms. The first is learner-content, which is the process by which the learner intellectually experiences the content. Inherent in this type of interaction is the "internal didactic conversation" in which learners reflect on and "talk to themselves" about the content. Intrapersonal interaction, the processing of content within the learner's own head, is necessary if the learner is to construct meaning from the content (Berge, 1998). Moore's second type of learner interactivity is learner-tutor. When this interactivity is high then learners are able to draw on the experiences of the instructor and receive more individualised instruction and feedback. When this interactivity is low, more of the responsibility falls on the learner to interact with the content, remain motivated, diagnose learning difficulties and set an appropriate pace. The third type of learner interaction is learner-learner, which occurs "between one learner and another learner, alone or in group settings, with or without the real-time presence of an instructor" (p. 22). Learner-tutor and learner-learner categories of interactivity correspond to "interpersonal interaction" as described by Berge (1998) who sees this form of interaction as important because students need the opportunity to interact and communicate with other students and with the instructor. This type of interactivity builds a shared meaning and helps to make sense of what is being learned.

In addition to the three types of interactivity described by Moore, a fourth type of interactivity has been described as learner-interface which takes place when the learner must use the technologies to access the content and communicate with the instructor and other learner (Hillman, Willis, & Gunawardena, 1994). Seeing this as crucial to success of online learners, these authors state:

> "Successful interaction in the mediated educational transactions is highly dependent upon how comfortable the learner feels in working with the delivery medium. Learners need to possess the necessary skills to operate the mechanisms of the delivery system before they can successfully interact with the content, instructor or other learners. The challenge to practitioners of distance education is to create new instructional methods that empower learners to work successfully with the technology." (p. 32)

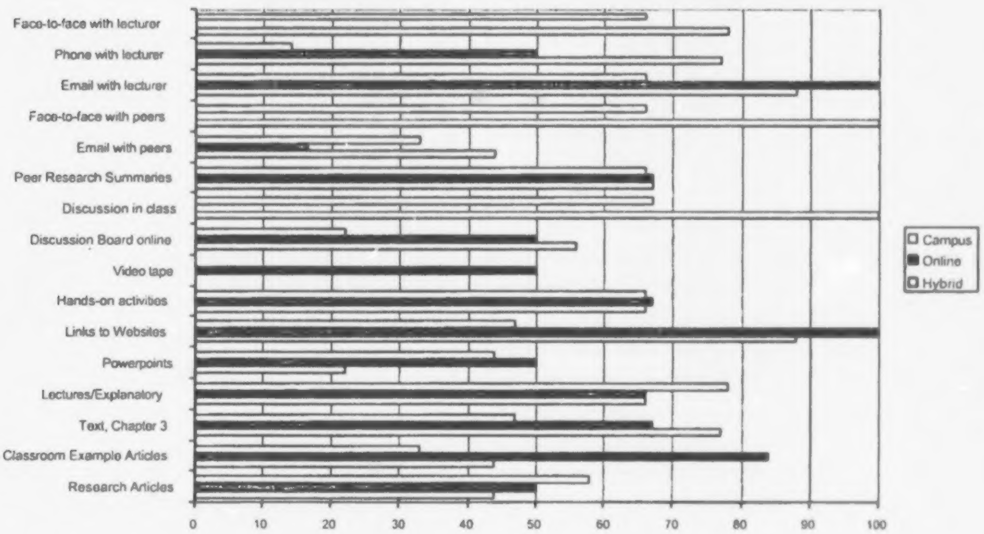
To discover the perceptions held by the students of the media, activities and interactions used within the course structure, students were asked to rate the contribution of each of the elements to their success in the class. The range of these media, activities and interactions included printed articles that were given or mailed to students prior to the beginning of the class, lectures given face-to-face or the same explanatory content online, PowerPoint slide shows presented face-to-face or online, links to websites, hands-on activities, video tape, discussions in class or discussions online, research article summaries by peers, e-mail contact with peers, e-mail contact with the lecturer, phone contact with the lecturer and face-to-face contact with the lecturer. Archival records of the online discussions and e-mail exchanged by the students and the lecturer were used to triangulate the end-of-course survey results.

To understand the impact of the learner-interface interactivity, students were also asked to comment on how the technological interface affected their success in the course. Students were asked at the beginning of the course to rate their technological skills and comment on previous experience with the use of online materials or participation in an online course. The end of course survey results were then compared with this initial data and both were compared with students' reported satisfaction with the course.

Results and Conclusions

The results of the end-of-course survey showed that some of the elements of the course were considered important by students in all three of the classes while other elements were specific to certain classes. Shown below are the results of the end-of-course survey showing the distribution of answers across the classes.

Table 1 Importance of Design Elements



Learner-content interactivity
Interaction with the course content varied among the different classes, but the majority of students in the three classes valued hands-on activities and lectures/explanatory content. Links to websites were considered important by the hybrid and online classes who accessed these more in the course of their study than did the on-campus group. The Powerpoint slide shows and the videos were marked as important by less than half the students, while the research articles and text were considered only slightly more important by students in the course.

Learner-instructor interactivity
Conclusions drawn from this research indicate that students in the online, on-campus and hybrid classes considered contact with the lecturer as very important aspect of the class. Only two groups had face-to-face contact with the lecturer and both considered it an important aspect of the class, while the online group, who interacted with the lecturer only online or by phone, did not consider this contact important to their success. All groups considered e-mail contact with the lecturer to be important. Phone contact with the lecturer was available to all and the online group and hybrid group considered this an important method of contact, while the on-campus group, who used it the least, considered it has having the least importance. The level of e-mail contact with the lecturer was high during the course. Table 2 shows the number of e-mails sent and received during the semester long course.

TABLE 2: E-MAILS SENT AND RECEIVED

Group	E-mails Received	Mean	E-mails Sent	Mean
Online	115	14	128	18
Hybrid	99	7	114	8
Campus	41	5	43	6

Learner-learner interactivity

Interaction with other learners online was rated highly but only if the situation in which this took place was structured and participation was expected. Statistics from the discussion board showed that postings by all groups were high when this was a requirement of a particular part of the course. The majority of the responses in the discussion board were to initial threads with no continuation of discussion. Second, third or fourth level postings, where students were responding to the postings of others, tended not to occur unless this was also a requirement. The hybrid group, which met each week specifically to participate in a phone conference with the instructor, valued the discussion in class highly, with 100% of participants marking this element of the class either 'important' or 'very important.' Sixty seven percent of the on-campus group also considered this element important. Research summaries written by peers and posted to the discussion board or presented face-to-face were considered equally important by all groups. E-mail between students was not considered important by over half the students.

Learner-interface interactivity

The learner interface interactivity, although reported as somewhat problematic by all students, appeared not to be an issue, with most students solving problems with computers and Internet access either on their own or with the help from the instructor. Over 75% of students reported their Internet access as reliable. Since the course attracts students who are already somewhat technologically literate, this result is not surprising. While students in all three classes felt that the Blackboard courseware made access to course materials easy, students in the online group were more positive in their assessment. Sixty seven percent of online students marked strongly agree to the question, "I found the structure and organisation of the Blackboard site made access to course materials easy." This result, probably an outcome of the frequency of access found in the online group, was reflected in the Blackboard statistics. The online class accessed the course most often with a total of 609 times and a mean of 76 times per online student. The hybrid class access the online site 438 times with a mean of 36.5 times per hybrid student. The on-campus class accessed the site 104 times with a mean of 20.6 times per on-campus student. Good learner-interface interactivity is also reflected in Table 1. E-mail with the lecturer, discussion board online and links to websites – all design aspects of the course that required technical skills – were reported as important to the participants success in the course.

Overall, all three groups were positive about the class. The differences were very subtle and would need further research to tease out the distinctions between the methodologies. A limitation of this research study was the size of the sample in each group and the conclusions would need to be validated with other research.

Examining the technology and media shows that for this study students were positive about the technology used to access and complete the course. The use of the Blackboard courseware was seen as an easy and approachable medium in which to work although students were at times frustrated by their lack of timely access. Most students were also positive about the range of media used to deliver the content of the course as well as the forms of communication embedded within the structure of the course. Overall the students in the three groups showed that they valued hands-on activities, content delivered in a variety of formats and being able to have ready access to the lecturer.

Learner-content interactivity appeared to be robust and students reported that they felt that the course had increased their understanding of the connection between ICT and learning theory. Learner-interface interactivity, although all students reported technical problems, appeared not to be an issue, with most students solving problems with computers and Internet access either on their own or with help from the instructor. Learner-instructor interactivity appeared strong with all students reporting positively on responsiveness and effectiveness of the instructor-student relationship. Learner-learner interactivity appeared to be an area that could be strengthened. E-mail between students did not appear to be rated highly and use of the discussion board was limited for most students to posting their weekly assignments.

The online environment appears to be a viable methodology for the delivery of professional development to practicing teachers, although more research is needed to understand how this new medium can be utilised to reach maximum efficiency and effectiveness.

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A Formative and Summative Examination of a Goals 2000 Faculty Development Project*

Rosemary Mullick
SUNY Institute of Technology
United States
rosemary@sunyit.edu

Ronald Sarner
SUNY Institute of Technology
United States
ron@sunyit.edu

Abstract: The Goals 2000 project was designed to facilitate the achievement of the National Educational goals and the integration of instructional technology in the classroom. Eighteen teachers in grades 2-6 and five librarians, from nine different schools, participated. The project consisted of five modules on technological training. Both formative and summative evaluations were made to determine the effectiveness of the project. Formative information was obtained by administering Pre and Post evaluations for each of five modules and a post test for the sixth. Summative information was obtained by having participants respond to a General Pre-test to determine baseline measures for each of the general aspects of the project and a General Post-test upon completion. Results indicated that the project was successful in helping participants acquire knowledge and skills to facilitate the incorporation of technology into the classroom.

Introduction

The purpose of the Goals 2000 Grant is to promote the achievement of the National Educational Goals by providing state and school districts funds to support faculty development to achieve the Learning Standards developed in their state. The major aim of the Goals 2000 Faculty Development Project of the local school district was to provide opportunities for faculty to develop the knowledge necessary to fully integrate technology and to facilitate the use of library resources in instruction.

Method

A total of twenty-three people participated in the Goals 2000 Staff Development Project. Of the twenty-three, eighteen were teachers and five were librarians. All but one participant was female. The participants came from 9 different schools representing grades 2 through 6. The minimum number of years of teaching was 1 and the maximum was 30 with an mean number of years of 10.52. Approximately 56% of the teachers had five or more years of teaching experience. Therefore the teachers who participated in the project were relatively experienced teachers.

Each participant was involved with 14 separate modules throughout the duration of the project. Six of the modules dealt with technological issues and are the major focus of this investigation. The remaining 8 modules dealt with the development of thematic units and materials for achieving the New York State Learning Standards, learning techniques for integration of materials into courses and the development of interpersonal and consensus building skills.

The six technically oriented modules consisted of: PC Boot Camp to familiarize participants with the basic terminology, concepts and skills necessary to use PCs in instruction; Micro-Soft Word as a text -processing software to facilitate written communication; Micro-Soft Power Point for developing presentation materials; and Web Page Design and Web Page Graphics for making instructional materials available to students and for enabling teachers and students to create their own Web Pages. The final technologically oriented module was an extended training workshop for teachers, students and parents for using online library resources.

Formative Results

Formative information regarding five of the technically oriented modules was obtained using a pre-post research paradigm. Each post-questionnaire also provided the participants with an opportunity to make comments about the perceived strengths and weaknesses of the learning experience. The extended training workshop was assessed only by obtaining post session reactions.

Table 1 shows a summary of the paired sample t-tests performed on five of the technologically oriented modules. As can be seen from the table, all of the paired sample t-tests achieved statistical significance. These results indicate that participants believed that each of the technologically oriented modules was effective in teaching new concepts and skills to the participants.

Post test - Pretest	**Mean Difference**	**t**	**df**	**Sig (2-tailed)**
PC Boot Camp	11.33	11.89	20	.000**
Microsoft Word	8.30	14.36	20	.000**
Web Page Design	7.45	6.24	19	.000**
Web Page Graphics	26.70	8.21	22	.000**
Microsoft Power Point	5.13	6.88	20	.000**

****p < .01**
***p < .05**

Table 1: Summary of paired t-tests of changes for each technologically oriented modules.

Summative Results

To obtain summative information regarding the overall effectiveness of the entire project, a similar paradigm as the one reported in Bauder, Carr, Mullick, & Sarner (1997) and Mullick & Sarner (2001) was employed. All participants responded to a general pre-test that tapped their current level of expertise and experience with computing hardware, software and relevant peripherals. Upon completion of the project, all participants completed a general post-test to determine whether changes had occurred as a result of their participation in faculty development project.

Access to and Experience with Hardware

When asked the number of computers available in the classroom the largest number reported was 12. Only one teacher reported a classroom with the maximum reported number computers. Of the respondents, 17% said they had six or more computers in their classrooms, but all but one teacher indicated that they had at least one computer available in their classroom. In addition, 78% of the participants indicated that computers are connected to the Internet.

In general the participants had experience with some hardware. Virtually all reported experience with computers, CD-ROMs, and printers. Most had little experience with microphones, interactive video, video cameras, scanners or LCD panels. Participants reported that they felt comfortable with the hardware they had used in the past. These results are particularly interesting since participants indicated that all of the hardware listed is important in helping to achieve the New York State Learning Standards.

Access to and Experience with Software

Participants also reported experience with a limited number of types of software packages. Most had experience with word processing (Mean = 6.86 on a nine point scale). Some had experience with simulation programs, desktop publishing software, drill and practice, email, and web browsers. Virtually none of the teachers had experience with presentation graphics, hypermedia, student management applications or Web Development software. The participants did, however, feel that these software applications were important for achieving the State Learning Standards. The mean ratings of importance for achieving State Learning Standards ranged from 8.73 to 4.36 with Hypermedia being the only exception. The mean perceived importance for achieving the State Learning Standards for hypermedia/hypertext software was 3.50. Teachers therefore believe that integrating these types of software into the curriculum would facilitate the achievement of the State Learning Standards.

Results

Pre-Post Changes to Determine the Effectiveness of the Faculty Development Modules

A series t-tests for dependent (paired) samples were performed using the Total Frequency of Use of Hardware, Total Frequency of Use of Software, Total Comfort in Using Hardware and Total Comfort in Using Software as the dependent variables to determine if significant changes in participants' responses occurred as a result of their participation in the project. The findings from the analyses of the t-tests are displayed in Table 2.

Post test – Pre test	Mean differences	t	df	Sig. (2-tailed)
Total frequency of use of hardware	4.91	2.57	21	.018*
Total frequency of use of software	12.27	2.67	21	.015*
Total comfort of using hardware	8.86	2.73	21	.013*
Total comfort of using software	15.86	3.60	21	.002**

** *p <.01*

Table 2: Summary of the t-tests for dependent samples on changes in total frequency of use and total comfort in using hardware and software.

An examination of the last column in Table 2 shows that all of the analyses indicated significant changes from pre to post testing. Row 1 and 3 indicate that participants rated their frequency of use and comfort of use of hardware higher at the end of the project than they had previously with t = 2.57 and 2.67, respectively. Rows 2 and 4 show similar results for frequency and comfort of use of software with t = 5.33 and 7.32, respectively. These findings indicate that both frequency and comfort ratings for using both hardware and software, were higher at the completion of the project than at its onset.

Overall Evaluation of the Project

On the post-test, all participants rated each of the technologically oriented modules on three aspects: overall favorability, extent to which they believe that information encountered in each module will help to achieve the state learning standards, and the extent to which they expect to incorporate the knowledge into their future classes. A summary of the mean ratings for each is displayed in Table 3.

The mean overall ratings ranged from 5.35 to 7.70 on a 9- point scale with a score of 1 indicating low favorability. Therefore if a rating of 5 is the neutral point, all modules were rated in the favorable direction. The module that received the most favorable overall rating was Microsoft Power Point (Mean = 7.70). The module that received the least favorable rating was the PC Boot Camp (Mean = 5.35). In examining the average ratings of the extent to which participants' believed that each of the modules would help to achieve the State Learning Standards, once again, participants indicated that the module that would be most beneficial was Microsoft Power-Point (Mean = 7.61) and the module judged to be least beneficial was PC Boot Camp (Mean = 5.91). The final column summarizes the extent to which participants expect to apply information from each module in their future classes. The pattern of results is similar with Microsoft Power Point rated highest (Mean = 7.48) and PC Boot Camp rated lowest (Mean = 5.61). It may be that participants felt that they were sophisticated enough that they knew the material presented in the PC Boot Camp.

MODULE	Overall Rating	Achieve State Standards	Expect to apply in future classes
PC Boot Camp	5.35	5.91	5.61
Microsoft Word	7.30	7.43	7.30
Web Page Design	6.61	6.26	6.48
Web Page Graphics	7.17	6.65	6.87
Microsoft Power Point	7.70	7.61	7.48
Extended Day Computer Lab and Library	6.78	7.30	6.78

Table 3: Average overall rating, extent each module will help to achieve the state learning standards and extent to which participants expect to apply learning to future classes.

Analysis of Variance for repeated measures using participants' overall ratings, extent to which participants believed the modules would help achieve the state learning standards and the extent to which participants expected to apply knowledge from the six technologically oriented modules was performed. In all three analyses, the within-subjects variable filed to achieve statistical significance indicating that participants' overall ratings on all three measures were not significantly different from one another.

In summary, the three repeated measures analysis of variance show that participant perceived all of the modules highly favorably. Participants felt the knowledge they gained from each module would facilitate the achievement of the State Learning Standards. Finally, the results clearly indicate that participants intend to apply the knowledge they gained from the Goals 2000 Staff Development Project in their future classes. The highly favorable ratings also show that participants felt that the information they received in each module would be beneficial in integrating technology into the classroom.

Changes in Library usage

The Pre and Post-test questionnaires also examined the extent to which participants used library services available to them. The results of these analyses are displayed in Table 4. The last column of Table 4 shows that significant increases in library activities occurred as a result of participating in the project. Participants reported that they used local library resources significantly more, were significantly more likely to access the Mid York Library Web Page and to work collaboratively with librarians. Therefore, the project was successful in facilitating participants to increase their library activities.

Item	Mean	t	df	Sig (2-tailed)
Use local library resources	1.32	1.72	21	.050*
Use BOCES School Library Services (SLS)	.91	.036	21	.094
Use On-line databases	1.27	1.80	21	.520
Integrate library resources into your curriculum	1.18	1.82	21	.500
Access Regional On-line catalogs	.77	1.29	21	.105
Access BOCES School Library services Web Page	1.00	1.46	21	.080
Access Mid York Library Web Page	1.50	2.66	21	.007**
Work on collaborative projects with the librarian(s)	1.95	3.00	21	.007**
Total Index of Library Usage	9.91	2.42		.012*

$^{**}p < .01$

$^{*}p < .05$

Table 4: T-tests of changes in extent to which library activities were engaged in by participants

Overall Evaluation of the Entire Project

Three items of the general post-test attempted to assess the respondent's overall evaluation of the entire project. On the item that asked participants to indicate the overall evaluation of their experiences in the entire Goals 2000 Staff Development Project, the mran rating was 7.70 out of a possible 9.0. When asked if the participant would recommend this project to their colleagues, the average rating was 7.70. The final question to determine the overall evaluation asked participants to indicate the extent to which they agreed or disagreed with the statement "If given the opportunity, I would participate in a project like this again". The mean rating for this response was 6.74, indicating a high degree of agreement. Taken together, these results clearly indicate that the participants had very favorable experiences in the project and believe that the knowledge and information they gained will be helpful to them in integrating technology into the classroom. The results also indicate that participants would be willing to participate in similar projects in the future.

Open-ended Responses

Open-ended questions were included in all post-tests. Participants were asked to indicate the single most valuable feature of the module/project and the weakest feature of the module/project. A review of these statements indicate that participants liked the interaction with other participants, hands-on activities, learning strategies for integrating technology into the classroom and the ability to create materials that could be used in subsequent classes. The most common responses regarding the weakest feature tended to focus on lack time; lack of equipment; and the feeling that there was too much material covered in too short of a time period.

Conclusions

The results of the formative examination of each of the separate modules indicated that significant positive changes occurred as a result of participating in the technologically related modules. Participants indicated that they: learned the relevant material; felt they could incorporate the material into future instruction; and rated each module as highly favorable upon completion. The responses to the open-ended questions also provided information about how to improve the various learning modules if they are to be presented in the future.

The findings from both the Formative and Summative analyses indicated that participants' experiences were highly positive and that the participation in the project had a significant impact on their ratings. After each of the separate modules, results showed that participants intended to incorporate the knowledge they gained into their instruction. Upon completion of the project, results showed that participants were using technology more frequently in their classrooms than they had prior to the project. Secondly, participants suggested that the modules of the Faculty Development Project helped them to learn ways of integrating technology into their instruction and assisted in gaining confidence in using technology and in guiding their students in the use of technology. The results also indicated that although participants believed they were using library resources prior to the project, participation in the project allowed them to find new resources and new activities to be incorporated into future instruction.

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Graduate Instruction Combining Online, On-Site, and Face-to-Face: A Study

Priscilla Norton, EdD
Graduate School of Education
George Mason University
Fairfax, VA USA 22030
pnorton@gmu.edu

William Warrick, Instructor and Doctoral Candidate
Graduate School of Education
George Mason University
Fairfax, VA USA 22030
wwarrick@gmu.edu

Abstract: The efficacy of combining face-to-face and online instruction remains unclear in the literature. Nevertheless, for the mature learner, some combination of delivery models might offer a desirable learning option. Thus, in the Fall Semester, 2001, twenty students enrolled in a graduate level course focusing on learning and technology. Students were dispersed over a broad geographical area. A course was designed for these students that combined three patterns of instruction or learning structures: 1.) online discussion boards, 2.) face-to-face classes, and 3.) on-site small group, student run meetings. Students' ratings concerning their learning experience and the quality of their interactions with the instructor and peers in each of the three learning structures are presented and compared. In addition, students' rankings of the three learning structures related to learning and quality of interactions were collected at the end of the course and are presented.

Introduction

Much enthusiasm exists in the higher education community about the potentials of online delivery systems for coursework. Professional development programs and courses are being offered in a variety of ways, utilizing technology to differing degrees. Some simply use technology to improve the presentations, while others use technology to offer courses entirely online. The U.S. Department of Education's National Center for Educational Statistics (NCES), reported that the number of distance education programs increased by 72 percent from 1994-95 to 1997-98 (*Quality On the Line: Benchmarks for Success in Internet-Based Distance Education*, 2000). "However since the quality of these new programs can vary widely, education experts are telling teachers to shop around and ask questions first. Not all online programs offer teachers the right mix of collaboration and feedback (Weiner, 2001).

The efficacy of online versus face-to-face instruction or combining face-to-face and online instruction remains unclear in the literature. For instance, Hall, Watkins, & Ercal (2000) state that web-based instruction can be as effective as face-to-face instruction and that factors that lead to improved performance in face-to-face classes can also increase performance and positive attitude in web-based courses. Conversely, Thornam & Phillips (2001) suggest that those taking an online section perceive less interactivity than those taking a face-to-face section. Additionally, Johnson, et. al. (1999) found slightly more positive perceptions about the instructor and overall course quality in a face-to-face version of a course, although there was no difference between the two course (face-to-face and online) formats in learning outcomes. Cereijo, Young, and Wilheim (2001) examined students' comments while taking a CD/Web-based course. Their research revealed that students reported the advantages of CD/Web-based learning to be its convenience, flexibility, and opportunity for

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enhanced learning. Conversely, students reported concerns about isolation, the learning environment, and technological problems to be significant disadvantages.

Despite concerns about web-based learning, for the mature learner hampered by geographical and time considerations, online learning remains a demanded and potentially viable learning option. It is likely that for many learners today some combination of delivery models offers a desirable and "doable" learning option. Thus, in the Fall Semester, 2001, twenty students requested an online course. These students were geographically distributed throughout northwestern Virginia. Because all students were practicing classroom teachers with full day responsibilities, it was not feasible for them to commute to campus for evening classes. Additionally, because of distance considerations, it was not feasible for faculty to commute to weekly classes in students' varied communities. We asked ourselves if it might be possible to use some combination of online and face-to-face patterns of delivery while continuing to maximize student interactions and learning. A course was designed that combined three learning structures or patterns of instruction: 1.) online discussion, 2.) face-to-face classes held off campus, and 3.) on-site, student-run, small group meetings. Given existing concerns about online learning and the experimental nature of this combination, we asked four questions: (1) How will students rate their learning experiences and the quality of their interactions in each of the three learning structures? (2) Will there be a difference between students' ratings concerning their learning experiences and the quality of their interactions depending on type of learning structure? (3) Which learning structure will students find most useful and least useful for their learning? and (4) Which learning structure will students report as affording the highest and lowest quality of interactions with their instructor and their peers?

Methodology

Twenty practicing educators enrolled in the course. All of these educators were candidates in a Master's of Education program emphasizing the integration of technology with classroom practice. All had previously complete 18 graduate credit hours. Four of the educators were elementary technology resource teachers. One was a middle school administrator; another was a district level technology coordinator. The remaining fourteen students were classroom teachers, spanning the K-12 curriculum.

The fifteen-week course focused student attention on learning and technology, placing attention on constructivist learning theory, the role of symbolic competence in learning, and the connection between theories of learning and the selection and use of a range of technologies to support teaching and learning. The course was conceptually divided into three four-week segments with a remaining three-week period for production of collaborative student projects. In each of the three four-week segments, students participated in each of the three learning structures selected to facilitate the course activities. Thus, students attended one face-to-face, instructor led class meeting during each four-week cycle. The face-to-face classes met in a middle school media center with internet-linked computers. During these sessions students shared the results of their on-site activities, discussed readings, and participated in instructor led activities. In addition, students posted weekly to a Blackboard discussion board. Discussions were prompted by the instructor as well as monitored and shaped by the instructor. Finally, during each four-week period, students met in small groups of three to five (organized around geographical proximity). These on-site groups engaged in activities assigned and described by the instructor using *Blackboard*'s class delivery system. Care was taken to insure that these activities were well designed, comprehensively described, and concluded with the production of a concrete product. In addition, guidance was provided concerning processes the groups might use to successfully complete the assignment. On-site small group activities engaged students in completely a product designed to encourage students to discuss, interpret, and apply insights and understandings from the readings. Products that resulted from the on-site group activities were either shared electronically or brought to face-to-face sessions to be shared. Email was used throughout the course to clarify, remind, and facilitate the work of the course.

At the culmination of each four-week period, students were emailed the link to an electronic survey. The researchers used the *Zoomerang* (http://www.zoomerang.com) survey service. Students were asked to respond to six questions. Students were asked to rate the usefulness (3 - Useful (U), 2 - Somewhat Useful (S), and 1 - Not Useful (N)) of each learning structure as a learning experience. Students were then asked to rate the quality of their interactions during the four-week period with the instructor, with their on-site peers, and with fellow discussion board participants. Students rated the quality of their interactions as positive (P), neutral (N), or unhelpful (U). Survey results were tabulated anonymously and summarized by *Zoomerang*. At the conclusion of the course, a final *Zoomerang* survey was emailed to students asking them to rank the three learning structures and their combination for their importance in students' overall learning experience. In

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addition, students were asked to rank the three learning structures and their combination for the quality of their overall course interactions with the instructor and peers. Students were asked to assign 1 to the most important or highest quality through 4 as the least important or lowest quality. Using the *Zoomerang* survey software facilitated the collection of data. It also insured students' anonymity. However, because of the anonymity of responses, it was not possible to pair student responses across surveys, and thus, statistical analysis of data became problematic. As a result, data analysis was limited to descriptive and summative analysis strategies.

Results

The first question posed was: How will students rate their learning experiences and the quality of their interactions in each of the three learning structures? In order to answer this question, student responses to each of the three surveys were tallied and percents computed. Results of the analysis are presented in Table 1. Examination of the data suggests that more than half of the students viewed all three learning activities as useful. The data also suggest a slight decline for all three learning structures over time. The same basic patterns occur related to quality of interactions. That is, 60% or more of students rated the quality of their interactions to be positive regardless of learning structure as well as revealing a slight decline in ratings over time. Finally, in all instances, the online discussion board structure is rated slightly lower than the face-to-face whole group class and the on-site small group activity.

	First Four Weeks			Second Four Weeks			Third Four Weeks		
Learning Experience Using:	U	S	N	U	S	N	U	S	N
Online Discussion Board	58	37	5	68	16	16	55	25	20
On-Site Small Group Activity	72	22	6	79	16	5	65	15	20
Face-to-Face Whole Group Class	79	21	0	88	12	0	65	30	5
Quality of Interactions with:	P	N	U	P	N	U	P	N	U
Online Discussion Board	68	26	5	74	16	10	60	15	25
On-Site Small Group Members	79	21	0	89	5	5	80	5	15
Instructor	74	26	0	89	5	5	65	30	5

Table 1. Summary of Ratings of Learning Experience Using Three Different Learning Structures

The second question posed was: Will there be a difference between students' ratings concerning their learning experiences and the quality of their interactions depending on type of learning structure? In order to answer this question, means for student ratings were computed for each survey period and for the research period as a whole. Results of the analysis are presented in Table 2. Examination of the means for student ratings of their learning experience related to the three learning experiences further support the conclusion that students found the face-to-face whole group learning structure to be the most useful followed by the on-site small group structure with the online discussion board being the least useful. Students' rating of the quality of their interactions with the instructor cannot be compared with the on-sire and online structures since the instructor played a role during all three learning structures. It is possible, however, to note that students rated the quality of their interactions during on-site activities more positive than the quality of their interactions during online discussions.

Learning Experiences Using:	1st Four Weeks	2nd Four Weeks	3rd Four Weeks	Overall Means
Online Discussion Board	2.5	2.5	2.35	2.45
On-Site Small Group Activity	2.67	2.7	2.45	2.61
Face-to-Face Whole Group Class	2.79	2.9	2.6	2.76

Quality of Interactions with:	1st Four Weeks	2nd Four Weeks	3rd Four Weeks	Overall Means
Online Discussion Board Peers	2.6	2.6	2.3	2.5
On-Site Small Group Peers	2.9	2.8	2.7	2.8
Instructor	2.7	2.8	2.6	2.7

Table 2. Overall Mean Ratings for Learning Experience and Quality of Interactions

The third question of the study asked: Which learning structure will students find most useful and least useful for their learning? In order to answer this question, students were asked to rank the learning structures, using 1 for the most useful structure through 4 for the least useful structures. Percentages for rankings were computed and reported in Table 3. Examination of the data suggests that the majority of students (nearly half) ranked on-site group work as the most useful learning structure with face-to-face whole group receiving the next highest or useful ranking. Discussion board activities received the highest percent of "least useful" rankings, suggesting that this learning structure was not highly regarded as a valuable learning experience.

Learning Structure	Percent Ranking Most Useful (1)	(2)	(3)	Percent Ranking Least Useful (4)
Discussion Board	11.8	23.5	23.5	41.2
On-site group	47.1	17.6	11.8	23.5
Face to Face Whole Group	11.8	41.2	29.4	17.6
Combination of all three	29.4	23.5	35.3	11.8

Table 3. Overall Ranking of Learning Structures as a Learning Experience (Most Useful to Least Useful)

The fourth question of the study asked: Which learning structure will students report as affording the highest and lowest quality of interactions with their instructor and their peers? In order to answer this question, students were asked to rank the learning structures for the quality of interactions with peers and the instructor – 1 for highest quality through 4 for lowest quality. Results for the two questions are presented in Table 4. Examination of the data shows that the highest ranked learning structure related to quality of interactions with the instructor was the face-to-face whole group structure while the on-site group structure was ranked lowest. This is not surprising since the instructor's role in the on-site group structure was minimal while the instructor had a substantial role in the face-to-face whole group structure. Conversely, nearly half of the students ranked the quality of their interactions with peers highest in the on-site group structure. The face-to-face whole group learning structure was ranked second highest for quality of interactions with peers.

Quality of Interactions with Instructor	Percent Ranking Highest Quality (1)	(2)	(3)	Percent Ranking Lowest Quality (4)
Discussion Board	11.8	35.3	35.3	17.6
On-site group	5.9	17.6	17.6	58.8
Face to Face Whole Group	70.6	23.5	0.0	5.9
Combination of all three	17.6	35.3	35.3	11.8
Quality of Interactions with Peers	**Percent Ranking Highest Quality (1)**	**(2)**	**(3)**	**Percent Ranking Lowest Quality (4)**
Discussion Board	11.8	17.6	41.2	29.4
On-site group	47.1	23.5	11.8	17.6
Face to Face Whole Group	17.6	41.2	17.6	23.5
Combination of all three	29.4	17.6	35.3	17.6

Table 4. Overall Ranking of Learning Structures for Quality of Interactions with Instructor and Peers

Discussion

While all learning structures were rated as useful learning experiences and interactions were generally rated positively, the discussion board activities were consistently rated lowest. It seems clear that students found the face-to-face and on-site learning activities more important for their learning. Given that much of online learning centers around individual readings and research and group postings on discussion boards, these results are important. It is possible that the more common learning structure of postings to a discussion may not be the most effective manner in which to organize and conduct online learning. Perhaps Sonwalkar (2001) captures the limitations of discussion boards as extensions of the classroom discussion method of teaching when he writes: "In attempting to harness the capabilities of digital interfaces, the mistake is often made of recreating a classroom-teaching model within an online learning environment. Online technology designed to mimic the classroom becomes a restriction and a barrier to the teacher's ability to impart knowledge. (p. 2)."

Not only do the results suggest stepping away from conventional classroom-teaching models in online learning, the results of this study suggest a manner in which online learning might progress- small groups of students studying with the guidance of a virtual instructor. In all instances, students in this study rated their learning experiences and the quality of their interactions with peers to be highest when using the on-site learning structure. It might have been possible that on-site activities resulted merely in social gatherings or trivial commentary. Instead, students reported that these activities were the most useful for their learning. This not only reinforces the social constructivist perspective of learning – that understanding is achieved through dynamic, negotiated group construction of knowledge – but it also suggests that the most important role of the instructor in an online learning environment may be as designer. When the instruction in this course was carefully designed around a problem and a product – a performance of understanding, students were able to meet, interact with ideas, concepts specified in readings, and each other to build bridges between knowledge and understanding. Once students had solved a problem and constructed a product, they were able to share, elaborate, critique, and expand upon their understanding through both online and classroom presentation. It seems it is possible to have a virtual instructor – one who designs robust learning experiences and coaches and provokes from a distance. On the other hand, it seems that having virtual classmates – posting comments in response to instructor prompts or peer comments – does not facilitate learning in the same way as face-to-face peer encounters and collaboration.

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DEALING WITH DISRUPTIVE PUPILS:
A Professional Development CDRom

Jim O'Brien, Faculty Of Education, The University Of Edinburgh, United Kingdom

Tony Van Der Kuyl, Faculty Of Education, The University Of Edinburgh, United Kingdom

David Thomson, Faculty Of Education, The University Of Edinburgh, United Kingdom

Abstract: The Scottish Executive funded the development of a CDRom to be used for teacher professional development. Following field research a range of stimulus materials in video, audio and text with associated activities were developed and piloted. Teachers are encouraged to review and develop their own skills and school policy and are provided with exemplars and additional references for consideration. The CDRom has now been published and is being disseminated throughout Scotland.

Introduction

The United Kingdom has several legally and politically devolved and autonomous education systems (Greaves & O'Brien 1996). The re-establishment of the Scottish Parliament in 1998 has resulted in even more distinctive Scottish education initiatives emerging despite similar problems and challenges across the UK. For over a decade, Scotland has promoted initiatives in school-based professional development and funded several ICT based support materials (van der Kuyl et al. 1994). The promotion of social competence and social inclusion through meeting pupils' needs in schools and classrooms and building on alternatives to school exclusion is a major UK policy.

Increasing concerns about disruptive behaviour by pupils in schools led the Scottish Executive to fund the "Dealing with Disruption" Project to research and produce a professional development CD-ROM (O'Brien et al., 2001). The identified range of potential audiences included classroom teachers, student teachers, senior management of schools, staff development coordinators in schools. The project (O'Brien and van der Kuyl, 2001) involved reviewing the literature and building on prior research (Lloyd and Munn, 1997; Munn, 1999). The literature search revealed publications with illustrations of work with individual children/young people with social and emotional behavioural difficulties. In addition to trawling recent advice and publications key individuals and organisations with direct knowledge of school and classroom practice were engaged. Existing materials and resources, including video, dealing with the management of disruptive behaviour were identified and reviewed. The most useful material is cited in the resource that also built on good practice and experiences from other initiatives which promote positive discipline and the development of social competence. Case studies based on such practices were prioritised and agreement reached with practitioners to video classroom practices. The CDRom is written in browser format to allow subsequent transfer to the WWW. At the moment, Scottish schools have insufficient bandwidth availability to allow useful video transference and for some time yet CDRoms will be a useful ICT medium for professional development purposes.

The "Dealing with Disruption" CDRom

The CDRom exemplifies for primary, secondary and special school teachers, effective methods for managing behaviour and dealing with classroom disruption and other forms of aggressive behaviour. The exemplars highlight a full range of scenarios but focus primarily on managing mild but persistent disruptive behaviour or low-level interruptions in everyday classroom situations. The CD-ROM includes a menu of situations including sequences of classroom incidents and good practice in managing the interruptions.

The resource developed has a core of exemplification materials in text, audio and video to provide advice and strategies relating to:

- whole school approaches
- positive ethos and reward systems
- departmental and individual responsibilities
- classroom approaches.

Drawing on good practice, the disk illustrates
- identified common principles in dealing with disruption
- comprehensive management strategies for dealing with disruption
- a range of teacher skills and behaviours derived from current knowledge about dealing with disruption and identified good practice

and provides suggestions about sources of support which will help individuals and schools deal with presenting issues.

Post in-school research, a concept development phase determined the scope and nature of the resource, chose appropriate issues and associated content and involved the design of the interface between the materials and the users. Production of the CD-ROM including all programming, engineering, de-bugging and beta-mastering was completed by 31 December 2000. Evaluation in 80 schools began in February 2001, this was designed to test the robustness of the curriculum and the product in the field and provide a final check of curriculum and technical standards before production and dissemination.

The evaluation led to significant changes in the interface and the improvement of a number of activities. One of the underlying principles was that the design allowed the user open access to all the assets and activities on the CDRom. While this remains, a number of portals into the assets have been constructed to allow users such as school managers or probationer teachers to initially familiarise themselves with the approach. Additionally a section for professional development coordinators (O'Brien and MacBeath, 1999) has been added. This has been an increasing focus of the dissemination phase of the Project.

The dissemination phase commenced in October 2001 and involved distribution of the completed CD-ROM to all Scottish schools in association with 25 national conferences. The Conferences involve an overview of the project and a 'hands on' introduction to the CDRom. Feedback and responses to date have been most positive. Each Conference includes a workshop where participants working in groups use assets on the CDRom plus the Professional Coordinator Portal to develop an additional professional development activity. On average 4 such activities are produced per Conference and these are being data-based and categorised with a view to developing a supporting and complimentary website. An important side effect of such conferences has been to encourage teachers to develop or customise CPD activities using ICT resources. The "Dealing with Disruption" CDRom may prove instrumental not only in enhancing teacher skills and knowledge about approaches to discipline issues but also in encouraging the wider use of ICT in learning and teaching beyond professional development.

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ACT Now!: TECHNOLOGY INNOVATION CHALLENGE GRANT LESSONS LEARNED

Wendy Janine Parcel, Doctoral Student
Educational Technology
San Diego State University / University of San Diego
United States
wparcel@ycool.com

Rusty Meike, Manager, Educational Technology
Program Director: ACT Now!
Educational Technology Department
Sweetwater Union High School District
United States
rusty.meike@suhsd.k12.ca.us

Abstract: The Advanced Curriculum through Technology (*ACT Now!*) program began as a five-year old partnership between the Sweetwater Union High School District, institutions of higher education, public libraries, hardware manufacturers, software designers, telecommunications firms and local community organizations. With the aid of a federal Technology Innovation Challenge Grant (TICG), *ACT Now!* has initiated a campaign for systemic educational reform through the effective use of technological resources and learned many lessons along the way about what works, and what doesn't, when dealing with technology integration and professional development on a district-wide level.

Introduction

The position of the National Council for Accreditation of Teacher Education (NCATE) is clear: "Teacher quality–knowledge and effectiveness–is the number one school based factor in student achievement. ....Student achievement increases when students have teachers who are trained in developing higher order thinking skills, who are skilled at implementing hands-on experiences in the classroom, and who are trained to work with special populations" (2001). While much effort and money has been allocated to systematically prepare tomorrow's teachers to use technology well, few ongoing efforts to reach working teachers have been as thoughtfully planned. In 1996 the Sweetwater Union High School District applied for, and was awarded, a five-year Technology Innovation Challenge Grant called Advanced Curriculum through Technology Now! (*ACT Now!*). (#R303A60457) From inception, *ACT Now!* was different than most other infrastructure build-out and professional development grants in that the vision of reform was district wide. All teachers were afforded the opportunity to participate in the program and 72% did in fact do so.

ACT Now!

ACT Now! focused on integrating technology into the existing standards-based curriculum to increase teacher effectiveness through concentration on higher-level thinking skills and innovative use of Internet resources. (See movie at: http://www.suhsd.k12.ca.us/actnow/review/movie.htm). All teachers who participated agreed to voluntarily attend 40 hours of professional development training in return for the use of a high-end multimedia computer with Internet connectivity in their classroom. Particularly unique was the program structure. Wrapped around 16 hours of application specific classes were 24 hours of Advanced Curriculum through Technology (ACT) classes focused specifically on technology integration.

The program participants choose from two courses of study, the WebQuest Series and the Web Experience Series, and used online tools developed by *ACT Now!* to create and publish their own online lessons. All lessons created through the *ACT Now!* program are available through the *ACT Now!* Curriculum Library and are indexed by subject and grade. The ACT Online lessons are also indexed by special program and by SAT 9 content cluster. (http://www.suhsd.k12.ca.us/actnow/curricLIB/curric.htm).

The Teacher Training Quality Assurance Team (TTQAT), comprised of hand-picked district teachers with a combination of technological savvy and excellent teaching skills, provided professional development for *ACT Now!* participants. TTQAT members attended a summer train-the-trainer academy to polish skills and familiarize themselves with changes in the program and its curriculum.

The training philosophy was that:

- Teachers are most comfortable learning from other teachers.
- Learning about technology works best in small doses over a long period of time.
- Teacher created curriculum should align with district approved standards, engage students in collaboration and higher-level thinking, and use the web effectively.
- Training should be hands-on and project based.
- Trainers kept their hands off the mouse.

Lessons Learned

Now that federal funds are exhausted, the team has worked to ensure that core elements of the original program – and the original vision – are now woven into the District professional development platform. The need to reposition has allowed the team to reflect on their successes and failures, and its those lessons learned this presentation highlights. Briefly:

1. A viable infrastructure must be in place.
2. Buy-in among all key stakeholders is critical.
   - Teacher's Union
   - Site Leadership
   - Participants
3. Developers *and* facilitators must take care to neither overestimate or underestimate learners.
   - Self-reported surveys are self-reported surveys.
   - Some teachers are not "experts" in their fields.
   - The product must be scaled to match trainee competence, confidence and motivation level.
   - The team must provide multiple opportunities in scheduling and in credit options.
   - The team must plan for additional assistance (Tech Prep)
4. It's critical that training objectives align with other initiatives when possible.
   - Highly successful with Digital High School (DHS).
   - Missed opportunity with Specially Designed Academic Instruction in English (SDAIE).
5. Program staff must constantly think about documentation and dissemination; these are not merely "final-year" tasks.
   - Attendance tracking
   - Course registration
   - Tracking of equipment
   - Scheduling of instructors
   - Documenting of participant products
6. Performance (and motivation) improve when learners are required to produce an end-product and present it.
   - Motivates the learner
   - Share successes and validate the learners
   - Documentation is much easier
7. Staff must be prepared to update the curriculum and program on a yearly basis as technology and audience change.

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Establishing Graduate Cohorts for In-service Teachers in Rural Regions

Rudy Pauley, rpauley@marshall.edu
Assistant Professor, Elementary and Secondary Education
Marshall University Graduate College

Lisa A. Heaton, heaton@marshall.edu
Assistant Professor, Elementary and Secondary Education
Marshall University Graduate College

Abstract: The rural, in-service teacher is often confronted with many barriers when trying to obtain an advanced degree or additional certification. Geography, time, professional obligations and familial responsibilities are often barriers that hinder the continuing education of teachers today. Marshall University's Graduate School of Education and Professional Development has developed a cohort delivery model that takes degree programs to the teachers. This paper describes the model for delivery that has been developed over the past four years.

Introduction

Participating in Continuing Education courses can be a tremendous challenge for educators who live and work beyond the immediate service area of colleges and universities. Teachers living in isolated regions who want to work toward a Master's Degree, or to simply take courses for professional development, face a real challenge trying to work full time and travel to and from classes. Traditional university formats often fail to provide classes at suitable times for working adults, and in some cases, weekly evening courses are still beyond reach.

Multiple initiatives between the elementary and secondary education program at the Graduate School of Education and Professional Development and public school districts have been established to develop cohort programs in several regions of the state. Through these cooperative initiatives, web-based delivery is used to bring graduate education to working professionals.

Getting Started

The model for developing new cohort programs includes:

- opening lines of communication between elementary and secondary education faculty and school district personnel,
- developing a curriculum for the degree in cooperation with school district personnel,
- developing a working budget for the project,
- advertising within the school district or expanded region,
- conducting an information meeting with interested personnel and university faculty,
- activating student computer accounts, and
- meeting admission/registration requirements.

Program Structure

A program of study and course rotation is established that will allow cohort participants to complete a thirty-nine hour program within two years. Participants typically complete two classes each semester, with three courses being offered during one of the summer terms. Courses are offered in a mixed format, utilizing a combination of online and face-to-face interactions. Each course typically includes three to four face-to-face meetings, or one meeting per month. The remaining coursework and communication takes place via the Web.

The cooperatively designed programs of study can carry a variety of areas of emphasis within the elementary and secondary education program. Recent programs include: science education for elementary teachers, elementary education with an emphasis in reading and computer applications, general elementary education programs, Spanish education for the middle grades, and middle childhood education.

The first course offered in each program is an introductory computer applications course that includes added emphasis on preparing students to use the online course delivery tool (WebCT). For students to be successful throughout the program it is imperative that they are able to function with the technology—navigating through course content and assignments, corresponding with instructors and classmates using mail and discussion features, submitting attachments, completing online quizzes and surveys, accessing online library resources, etc. Once students have mastered these tools they can focus on learning the designated content of their courses without getting bogged down in the technical setup of the course.

All face-to-face meetings are offered onsite within the designated school district. Class meetings are scheduled at the most convenient time possible, which may include a combination of evening meetings, a Friday/Saturday format, or summer weeklong workshops. The cooperating school district provides appropriate meeting facilities.

Students who may never come to the home campus are provided services in a variety of formats. Textbooks can be ordered by phone and delivered by mail. Library services can be accessed online and books and articles can be delivered through regular mail or in an electronic format. Advising is conducted through mail, over the phone, or on class meeting days.

Conclusions

During the past three years the elementary and secondary education program has worked cooperatively with school districts in establishing seven cohort programs within the state. Four of these programs have been completed with a 91% graduation rate (89 out of 98 participants), three programs are ongoing (86 participants), and two additional cohort agreements are being negotiated. The graduation rate and the level of interest in establishing new cohort groups around the state offer strong support for continuing this type of program.

Passive presentation programs and authoring language programs for classroom teachers - which is best for the K-12 teacher? Depends on your ultimate lesson and instruction strategy!

Marvin Peyton, Middle Tennessee State University, US
James Huffman, Middle Tennessee State University, US
Aubrey Moseley, Middle Tennessee State University, US

Over a decade of teaching passive presentation programs (PowerPoint) and authoring language programs starting with PILOT and SuperPILOT (Programmed Instruction Learning or Teaching) to the current – Hyper*.* programs, has convinced me that the specific use of each tool for instruction has become clear. Initially a teacher must define the lesson and then decide which program will meet needs for that lesson and then plan an instructional strategy. Instructional strategy will determine whether to use a passive style program such as PowerPoint or to use an authoring language program. Each program has instructional strengths.

For several years I have taught the Hyper*.* programs using the supposition that teachers were creating their own programs and presenting these programs 'lessons' to their classes. The basic authoring skills combined with teaching and learning theory are taught to undergraduates teacher in training and to the graduate students taking teacher education classes. The purpose of teaching passive presentation programs was to give these teachers some tools to create and present 'new' lessons for their classes. The purpose of teaching hyper style lesson construction was to provide the teacher with a means for creating interactive, not passive, lessons for their classes.

Teachers are using these two different programs to create very different instructional scenarios. The passive presentation programs are ubiquitous in most schools where technology is available. The instructional technique used for passive presentation programs is straightforward - mostly passive teacher led instruction with a mix of clip art, pictures, some sound and in some instances internet connectivity. Animation and movies when available are making these tools very popular. Instruction using hyper programs is not in the creation of total lessons and presentations of individual lessons but in the presenting the properties of the authoring language and then letting the student use their own creative ability to present information, lessons, projects, etc.

Preservice and inservice teachers have received training for years in the preparation of lessons using passive presentation programs. The current programs are extremely easy and convenient for new and experienced teachers to use for a multitude of lessons and lesson presentations. PowerPoint has become the presentation tool for teachers. The use of authoring programs is very popular for many teachers but not as a presentation tool but as a tool for the students to use in their classes. Teachers teach the basics of Hyper*.* programs and the students take the program and create their own lessons, presentations, etc.

Teachers who use hyper programs as software options for their classes are easily distinguishing passive presentation tools from active programming tools. Even those teachers who take the classes offering training in the use of both tools and then never teach using the specific hyper programs have indicated the value of learning new instructional approaches and methods for their traditional class lessons. In particular, the authoring program, HyperStudio, has served well the new and experienced teachers as they learn new instructional methods for their classes.

Project MITTS:
Developing Master Instructional Technology TeacherS

Susan M. Powers, Marylin T. Leinenbach, Susan J. Kiger
School of Education
Indiana State University, USA
Email: powers@indstate.edu

Abstract: In an effort to not only advanced the technology and curriculum integration skills of area teachers, but also to ensure that preservice teachers have technology -rich field experiences, a state grant was pursued and received to support a special project. The project is representative of new-generation of professional development that encompasses teaching performance standards, best practices for professional development, peer mentoring and preservice teaching mentoring, and utilizes the technology within training. The core of participant teachers have grown in their own integration of technology and are in turn exciting their students and the teacher education students about the uses of technology.

Project Background

As technology advances, it also advances on the educational community. This advancement can often feel like an army marching forward and over all those in its path. Indiana is not immune to impact of the ever-changing technology face on education and teachers. In fact, there are five, specific, yet closely related, needs in education in Indiana in which technology can or does play a significant role. These needs are not specific to Indiana alone, but are currently impacting many states.

One identified need is that the State of Indiana is moving toward a performance-based system for new teacher licensure and also for in-service teacher re-licensure. Many of the state adopted performance standards reflect the expectation that teachers effectively integrate technology into curriculum, and into instruction and assessment strategies; the desired outcome being individualization of instruction and increased academic achievement for the diversity of students and needs represented in any particular classroom. As part of this licensure/re-licensure system, a portfolio is projected to be the primary means of documentation of professional proficiencies along these standards (IPSB).

A second need is that while area schools and school corporations are increasing their technology focus through technology purchases and in-service training, most of the professional development has focused on technology competency rather than emphasizing the infusion of technology for enhanced student learning. Third, a new generation of professional development is needed that incorporates technology as part of the vehicle of the training (i.e. while the teacher is learning how to use the technology, technology is itself enhancing the professional development experience through such modalities as web-based instruction, video conferencing, and online tutorials) (McKenzie 1999; NCREL 2000). A new generation of professional development is differentiated according to participant needs; is contextual according to teaching and work assignments; integrates the technology for teaching and learning; and is grounded in the standards and professional development guidelines that affect teachers, staff, and administrators in Indiana (i.e. K-12 curriculum standards, IPSB teaching standards).

Going beyond a new type of professional development, a fourth need is that to promote substantive change and on-going growth, professional development for teachers needs to be readily accessible and needs to provide exemplars of practice. For example, Teacher X is more likely to learn from Teacher Y down the hall that is innovative in integrating technology into techniques for teaching, learning and assessment than from a university course or professional development seminar.

Finally, the National for Accreditation of Teacher Education (NCATE) 2000 standards (see http://www.ncate.org/standard/m_stds.html) requires that teacher education students participate in field experiences that substantively and effectively incorporate instructional applications of technology. Indiana State University, currently accredited by NCATE although not yet accredited under these new guidelines, strives to acculturate students in technology application-rich environments in on campus coursework, but recognizes the need for our students to be mentored in such application on-site in their field experiences.

The MITTS Project

In order to address these needs, a group of university faculty and area teachers banded together to seek a modest grant to support the necessary work. The group was successful in winning the Eisenhower Grant from the state and university support. The project was labeled Project MITTS – Developing Master Instructional Technology TeacherS. The project began in January of 2001 and continues for an 18-month period.

To address the statewide needs outlined above, MITTS has four goals. First, the project addresses state performance standards by not only directly addressing the educational need concerning effective infusion of technology, but also by providing specific evidence of professional development for participants: Teachers plan their own professional development throughout the grant period by participating in self-assessment and then the creation of a professional development plan of action. Second, the project also supports the incorporation of technology as a training vehicle, especially as it increases the accessibility of idea and information sharing. Much of the training is done through online workshops that have been located for the teachers, the project website, and support, announcements and discussion all evolve through electronic discussion forums instead of traditional workshops. Third, the target of this grant is multi-fold, by first developing the skills of participant teachers, who will foster technology integration with teacher education students, and then mentor colleagues in their buildings. Finally, the long-term focus and outcome of this project goes beyond the 15 participant teachers. The focus is also on the creation of technology application-rich sites and teachers to mentor preservice teachers.

Project's Successes and Concerns

The grant project has not yet reached its conclusion, but some elements are already apparent. First, the participants are noticeably more proficient with technology and display an increased confidence and comfort level in using and attempting different technology applications. This higher comfort level has translated into an increase in the number of ideas for technology integration as reflected in the professional growth plans of participants. Many of the growth plans initially submitted by teachers during Spring of 2001 were extremely conservative in their integration plans. Following a number of interactions with consultants, over half of the participants asked to modify their professional growth plans to make technology more inclusive and more integrated throughout their academic and classroom plan. This change is less a result of any interaction of grant participants, as much as the direct result of peer mentoring. The consultants that were brought in to work with teachers in small groups and one-on-one sessions are practicing classroom teacher who have been successful with technology integration and come from schools that have comparable technology levels. By observing peers who have found creative ways to meet learning goals with technology, and that it may have been done with little help, equipment, or experience, participants discovered a great capacity within themselves to use technology for teaching and learning. Participants have continued to seek out the expertise of these consultants as they continue to plan and create their own learning environments.

The project has not been without its problems. Originally, 27 teachers committed to the grant concept and participation. When the grant was awarded, 8 of these teachers elected to withdraw. The grant team quickly assembled 8 more teachers to replace them. Then, during the course of the semester, twelve more teachers dropped out for a variety of reasons. Although the limited participation from what was originally intended is disappointing, the remaining core of fifteen have been very dedicated to the work and enthusiastic participants. And although the seeming mass exodus of almost half the participants has been extremely unsatisfactory, the remaining teachers have been a joy to work with and the grant resources have been extended further for these participants.

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Using Online Sessions in Traditional Face-to-Face Graduate Education Classes: Lessons Learned and Suspicions Confirmed

Richard W. Schmertzing, Ed.D.
Education Center
Valdosta State University
GA, United States
rwschmer@valdosta.edu

Lorraine C. Schmertzing, Ed.D.
Education Center
Valdosta State University
GA, United States
lschmert@valdosta.edu

Abstract: As society becomes increasingly entrenched in its commitment to integrating technology into educational settings (Boyer, 1983) teachers are expected to model technology use for students, teach technology skills to students, and integrate technology seamlessly into students learning. However, teachers and administrators who have recently enrolled in graduate level education programs at a regional university in the south have been found to lack the ability to use technology for their own learning, lack the vocabulary to use proper terminology when referring to computer-related technologies, and lack the confidence necessary to construct technology integrated lesson plans. The proposed article will draw on qualitative data collected in four traditional face-to-face graduate education classes to promote the idea that periodic online class sessions help introduce educators to technology integrated learning in a way that is new to them and more importantly, valuable.

Introduction

As society becomes increasingly entrenched in its commitment to integrating technology into educational settings (Boyer, 1983; Achieve, 1999), teachers maintain their pivotal role in society by holding the position of those responsible for carrying out the tasks required to fulfill the commitment. Teachers are expected to model technology use for students, teach technology skills to students, and integrate technology seamlessly into instruction. As Murray (1999) points out, however, "As schools and districts jump on the technological bandwagon, committing significant portions of their budgets to the purchase of hardware, software, and Internet access, they too frequently neglect to provide for the professional development that will ensure the integration of the technology into the curriculum" (p. 33). Teachers often report that they have had few experiences that prepared them to adequately complete the varied phases of the task (Ravitz, Wong, & Becker, 1999; National Center for Education Statistics, 1998). Administrators, and educational leaders too, must be more aware of the new learning environments created by technology innovation so that they can better supervise instruction, as well as design and support professional development.

Across the country teacher training institutions are being required to integrate technology training into pre-service certification curriculum in order to more appropriately prepare new teachers to face the challenge (NCATE, 2001). There are, however, millions more teachers in the field who were trained prior to the infusion of a technology component into formal education and who are not equipped to model, teach, and integrate technology into learning environments. Even with staff development workshops, state mandates on technology skills for recertification (Ga. PSC, 2001), and numerous grant funded nation wide projects (U.S. Department of Education, 2001), experienced teachers and administrators who have recently enrolled in graduate level education programs at a regional university in the south have been found to lack the ability to use technology for their own learning, lack the vocabulary to use proper terminology when referring to computer-related technologies, and lack the confidence and skills necessary to construct technology integrated lesson plans.

In this essay we draw on qualitative data collected in four traditional face-to-face graduate education classes to promote the idea that periodic online class sessions help introduce educators to technology integrated learning in a way that is new to them. Reduced seat time and increased time in an online learning environment can expand their professional development opportunities, challenge their desire to learn, help them identify learning styles, increase sensitivity to student needs, and allow them to experience technology integration in a manner that can translate to changed teaching practices. Although it is generally accepted in the academy that lifelong learning and continued professional development is important, using the Internet as a conduit for personal training and learning has not yet been incorporated into the education system in a way that inspires teachers to want to use it with their students.

The Study

The study on which this article was based was an action research descriptive case study (Yin, 1993) conducted in four graduate education courses at a regional university in the south. Two professors (also the two researchers) teaching face-to-face classes used online class meetings as a substitute for some of the traditional face-to-face classes. The four classes included; 1 technology course, 1 curriculum course, and 2 research courses. According to Stake, (1994) "Case study is not a methodological choice, but a choice of object to be studied" (p. 236). The object, or in this case subjects, who were studied in this research were students who were in a traditional face-to-face masters program and who had little to no exposure to online learning environments. The combination of the 4 classes makes a "unique case" (Yin, 1998, p. 238) that has multiple cases embedded within. Each graduate education course included in the study had characteristics that were specific to it, and therefore, each course was considered an embedded case (Yin, 1998) within the larger unique case. All embedded cases shared a similar physical setting, which was the traditional classroom. The embedded cases functioned as units of analysis in this action research based case study (Yin, 1998). However, the data reported in this essay was common to all embedded cases and is referenced henceforth as coming from the larger "unique case." Online discussions, course websites, email responses to research questions, and student comments made face-to-face were shared between researchers and used as data.

The Data

Several quotes form students are included in this section. The quotes are representative of the types of comments students made throughout the study.

> "I spent about 4.5 hours on this assignment. It was definitely a learning experience for me. As you know, I am not a very experienced computer (on-line) person, but this assignment taught me so much. I posted a web site that didn't have anything to do with statistics, but I thought it would be so useful to teachers so I wanted to share it with the class. I'm not sure I would want all my classes to be online, but I am glad I had the experience. The statistics are hard to understand, but I'm sure I'll get a better understanding after class tomorrow night."

> "The web class assignment was a new and challenging experience for me. I kept getting the same results over and over before I finally understood how to get to where I was supposed to be to post my information. I am still wondering how I could find the discussion board, and couldn't find the board to post my website. [...] I don't know if this is better for me, I think hearing you lecture gives it more meaning because you give examples with explanations and we actively participate."

> "This was my first attempt at an online class. [...] It's been very informative and I think I've learned a lot. The websites were the most interesting. I hope I've completed the assignments correctly."

Findings

With all the state requirements, technology mandates, and increase in the number of homes with access to the Internet, it was disturbing to realize the discomfort that our students, most of whom were teachers in P-12 classrooms, expressed with learning in web-based environments. Prior to any web assignments, each class met face-to-face for several weeks, which gave the students the opportunity to get to know each other, the instructor, and the type of expectations that were inherent in the course. A few times throughout the semester students were introduced in the face-to-face class to the website that had been designed to guide them through the next week's course requirements. Demonstrations were given to enable the students to use the discussion boards and students were given the opportunity to ask questions regarding the online course. Students had 7 days to complete the assignments on the web and could access the site anytime during those 7 days. The freedoms associated with asynchronous learning were explained to them. However, it was also emphasized that discussions depended upon participation in an ongoing manner and therefore they should check the discussion boards repeatedly throughout the week.

After each online session students communicated a sense of uncertainty or lack of confidence in their performance of the activities that were assigned as web activities. They routinely admitted the online experience was a new one that they benefited from but that they preferred face-to-face learning environments. Students commented on the value of learning from websites and occasionally transferred the concepts to their own teaching. Self reported time on task varied for students from one and a half hours to fifteen hours on the same assignments. It was evident that different types of tasks and different content made a difference in student attitudes about the online session.

When students were given the opportunity to find tutorials (some tutorials related to statistics others to learning technology skills), learn the material, evaluate the website, and share high quality resources with peers, reactions were quite positive. Students were able to choose tutorials that catered to their particular learning style, practice Internet searching skills, explore components that help make websites useful, and participate in collaborative learning. When students were asked to read, review, and discuss information they expressed a preference for having the professor tell them the information in class and some students considered lecture instruction to be more interactive than similar activities translated to the web.

Lessons Learned

Instructor's, whether teaching in higher education or P-12 classrooms, face new responsibilities in the age of the Internet. It has often been said that integrating technology into teacher education face-face classes allows the professor to model best practices that teachers can use in their own classrooms. However, rarely are professors encouraged to cut down seat time in face-to-face classes and model ways that online learning can be effective. By incorporating the online class as an instructional tool in our traditional classes, students were forced to improve their skills with the Internet, and in turn increased their level of confidence with it. Students were exposed first hand to the enormous range of resources available on the Internet and challenged to apply those resources to course specific tasks. Students, although it was not easy and they did not necessarily enjoy it at first, they developed a level of comfort with using web-based communication to participate in collaborative learning activities. This comfort moved the students to the necessary starting point for using web-based activities with their own classes - they succeeded at it themselves.

Suspicions Confirmed

Technologically mediated interactions between learners, instructors, and content in web-based environments are quite different than communicating in face-to-face environments. All of the traditional signals are removed from the communication process and students sensed awkwardness when they tried to decipher messages that were text only (Clevenger-Schmertzing, 2000). By transitioning students to online learning environments at the same time that they are taking face-to-face classes the students can begin to adjust to the different culture of the learning environment and still have access to the traditional culture as a safe space to discuss the new online experience. In this way the online class sessions not only provide new learning opportunities, but they also add to the learning that occurs in the traditional classroom. Framing discussions of the online learning experiences as problem-based challenges sharpened students' critical thinking skills and helped them discover benefits to online learning. When we took the opportunity to familiarize our students with learning via computer interactions while at the same time offered the support of the familiar, traditional learning environment, our suspicion was confirmed that they had not considered the Internet a key to lifelong learning and professional development.

Conclusions

According to Mann & Shafer, (1997) 'When school districts and teachers make a commitment to instructional technology, student performance improves. Or at least that's what everyone hopes" (p. 22). At this point in history there are still arguments about the connection between technology and achievement (Phipps & Merisotis, 1999; Russell, 1993). There may always be these arguments, but what is clear to us is that unless instructors, instructional designers, and researchers systematically investigate new technologically based learning environments in deep and meaningful ways, the arguments will not move toward resolution. Evidence, such as that presented in our study, not only moves those arguments along, it challenges us to find new connections between technology integration and learner performance. It is our belief that one area that deserves more attention is the use of the Internet as an opportunity for individualized learning within traditional, face-to-face classes. Modeling such activities in graduate teacher education programs may not only improve those programs but also may trickle down and have an impact on P-16 learning environments as well.

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Computer Camp for Teachers

Merryellen Towey Schulz, College of Saint Mary, US

ABSTRACT

Summer camp is not just for children. At College of Saint Mary we conduct a summer Computer Camp for Teachers. Student teachers are excited to enter the classroom and use the skills they have learned during their pre-service education – including technology skills. They have learned to use technology and write lesson plans integrating technology with learning. Unfortunately, they often encounter cooperating teachers who make little use of technology in the classroom and have limited skills in the area. Many in-service teachers received their training prior to the integration of technology into teacher education programs and were left out of the loop for meaningful training. With Computer Camp for Teachers we are building a cadre of technology-using teachers to serve as cooperating teachers who support pre-service teachers in integrating technology in their student teaching experiences. It is a win-win situation for the college, the students and the practicing teachers.

Introduction

The purpose of this presentation is to inform educators and administrators of a model for teacher educators and in-service teachers to cooperatively learn and implement technology in the K-12 classroom. Just two years ago, much was written about the need to integrate technology training into teacher education. Like many institutions of teacher education, College of Saint Mary acquired additional equipment and software and taught pre-service teachers to use various forms of technology and write lesson plans integrating technology into student learning activities. However, it has been difficult or impossible to require student teachers to use their technology skills in student teaching experiences, because it was found that only a limited number of cooperating teachers used technology at the level the students had learned. To overcome this barrier, the college offered a Computer Camp for Teachers to train cooperating teachers to use the same technologies that student teachers were prepared to implement in their classrooms.

Three objectives of the PT3-funded Nebraska Catalyst Project were combined to create a cadre of K-12 teachers with expertise in educational technology who will serve as cooperating teachers and provide technology experiences for student teachers from College of Saint Mary. Objectives of the camp were: to design and conduct a graduate level summer workshop course to train a cadre of K-12 teachers in educational technology and assign student teachers to cadre teachers during the 2001-2002 school year. Ten K-12 teachers were identified and invited to participate in Computer Camp, for which each received three hours of graduate credit, Inspiration software, and a text.

The camp was conducted in a computer lab and education classroom at College of Saint Mary from 8:00 A.M. to 5:00 P.M. everyday for one week in June, 2001. Working lunches were used to discuss technology projects and demonstrate multimedia classroom equipment to participants. The structure of the camp was based on Jamie McKenizie's book, *How Teachers Learn Technology Best*. A teacher-friendly comfortable environment was created: lights in the lab were lowered to avoid the harsh environment created by fluorescent lighting, teacher friendly posters were displayed on the lab walls, music was played and plants were placed in the room. Two students served as lab assistants, providing participants with a 3.3 to 1 ratio for instruction and assistance.

Making the Classroom Computer Connection, by Tammy Worcester was the text for the course. Instruction in creating authentic projects to be used in their classrooms was given and teachers created web sites on which projects were submitted . Projects, including student goals for the course, were to meet ISTE standards for Teachers and Students and Nebraska Technology Competencies for Teachers.

Projects created were: graphic organizers with Inspiration® and Kidspiration® Software; digital camera photos; newsletters; WebQuests and Treasure Hunts, using Filamentality; Power Point Presentations; lesson plans integrating technology and strategies to manage classrooms with one or more computers. Assessment strategies were included in all projects

As a pioneer in the use of technology in elementary and middle school classrooms and as a professor of education courses, it has been natural for me to take this step to bring the process full-circle by including classroom teachers. Since becoming a college instructor, I have integrated the use of technology into all courses I have taught and trained other faculty to do the same.

The presentation will consist of Power Point slides and the camp web site, http://drmts.com/camp/index.htm followed by a question and answer session if there is time. This easily replicable project is significant and relevant to teacher education in that its purpose is to assure student teachers of placement with cooperating teachers who possess skills and motivation to integrate technology into K-12 classrooms. A symbiotic relationship develops between the teachers and the pre-service teachers as they work together to implement technology projects they have been taught to use. During the 2001-2002 school year teachers will be surveyed to determine their use of technology in the classroom.

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Using a Resource-Based Learning Environment to Foster Self-Directed Learning in In-Service Teachers

Mary Shoffner, Georgia State University, US

Presentation Plans:

Self-direction is a necessary characteristic in lifelong learners. Teachers, in order to make best use of the new tools and changes in approaches to teaching, must be life-long learners. As technology is ever changing, simply providing the in-service teacher with basic technology skills will not be enough. They must be able to self-direct and self-regulate their learning for the duration of their careers if they are to effectively practice their profession. A resource-based, WWW-based learning environment was developed for a course in teaching methods, lesson planning, technology skills, and technology integration strategies for students in a graduate teacher education program. This presentation will briefly present the philosophy behind the course design and development, including self-directed learning and resource-based learning environments. A brief review of prior research examining self-directed learner readiness and pre-service education will be given. Pre- and post-test versions of a technology skills inventory that matched the NETS-T profile and the Self-Directed Learning Readiness Scale (Guglielmino, 1977) were administered to as part of the course. Data is currently being collected during the Fall 2001 semester.

This exploratory study examines an alternative approach to technology education for in-service educators. In-service educators were introduced to a resource rich environment, and then given opportunities to use, and thus learn from, this environment. By interacting with this environment, it is hoped that in-service educators will learn not only technology and integration skills, but will at the same time develop or increase self-directed learning skills which in turn might prepare them for successful life-long learning.

Methods

A resource-based learning environment was developed in Fall, 1997 to serve as the basis of a course for in-service educators as elective service course in instructional technology for the College of Education graduate students. Pre- and post-test versions of a technology skills inventory and the Self-Directed Learning Readiness Scale (form A) (Guglielmino, 1977) were administered to as part of the course.

The technology skills inventory is a locally developed self-report instrument containing thirteen demographic items and 25 technology skill items based on the NETS-T performance profile for First-Year Teachers. Technology skill items include open-ended, multiple choice responses, as well as Likert-type indicators of skill level descriptions, and address skills and attitudes toward technology use.

The Self-Directed Learning Readiness Scale (form A) is a 58-item questionnaire with Likert type responses design to indicate a person's readiness to engage in self-directed learning activities. The SDLRS is the most widely used instrument of this type and was therefore chosen for the study.

The basic factors said to underlie the construct of the SDLRS are as follows:

1. An openness to learning opportunities.
2. Self-concept as an effective learner.
3. Initiative and independence in learning: tolerance of risk, ambiguity, and complexity in learning.
4. Acceptance of responsibility for one's own learning.
5. The love of learning.
6. Creativity; risk taking, skill in designing atypical solutions, and ability to conceive of multiple approaches to topics.
7. Future orientation; self-perception as a lifelong learner.
8. Problem-solving skills; skills for study and problem solving (Long, 1991).

All of the above skills are necessary for teacher success in the technology infused classroom.

In addition, students were asked reflect on the following questions a the beginning, middle, and end of the course:

1. What do you hope/expect to learn while you are in this course? /Have your expectations for what you hoped to learn in the course changed since you wrote your last Reflection Paper?
2. How much do you feel you have learned/grown in this course to date?
3. Do you feel you have gained a better understanding of how to tackle challenges?
4. What are you doing differently with technology than before you took the course?

Final reflection questions include:

1. How prepared do you feel to enter the classroom and use technology in a lesson?
2. What might help you to put what you've learned in this class to use in the classroom?
3. What impact will the level of technology resources in your school or future school of employment have on your teaching?
4. In your opinion, can technology help teaching and learning?
5. How do you plan to keep up with changes in technology as your move through your teaching career?

Responses in the reflection papers will be examined to gain further, richer insight into how students are using the learning environment to address teaching and technology concerns.

Students completed the skills inventory and SDLRS as part of the course. Students were given an explanation of the study, and students indicated their willingness for their data to be included in this exploratory study by affixing their signature to an "informed consent" form. To date, data has been collected from 40 students in the Fall 1998 semester and 40 students in the Spring 1999 semester.

Evolving Uses of Technology in Case-Based Teacher Education

Janet C. Smith
National Center on Adult Literacy
University of Pennsylvania/Graduate School of Education
United States
smith@literacy.upenn.edu

Ricardo Diaz
National Center on Adult Literacy
University of Pennsylvania/Graduate School of Education
United States
diazr@literacy.upenn.edu

Abstract: This presentation discusses the evolution of technology-facilitated, case study-based professional development for adult education professionals by examining three projects involving the National Center on Adult Literacy (NCAL) and the International Literacy Institute (ILI) at the University of Pennsylvania/Graduate School of Education. The projects in order of development are the *International Literacy Explorer: A Teacher Training Tool for Basic Education*, *Captured Wisdom: Stories of Integrating Technology Into Adult Literacy Instruction*, and the *Professional Development Kit (PDK): Multimedia Resources for Instructional Decision Making*. These projects are in various stages of completion and represent an evolving variety of solutions to the challenges of effective, technology-facilitated teacher education. We briefly discuss some of the conceptual background for using the case study method for teacher education and some of the limitations of using written case studies. We then discuss how technology can facilitate the use of case studies in professional development. Finally, we look specifically at the three projects, which were developed over a period of several years, how each responded to the issues raised in earlier projects, and how they provide crucial background information for a new initiative, *TECH.21: A National Technology Laboratory for the Improvement of Adult Education*.

Introduction

In 1986, the Carnegie Task Force on Teaching as a Profession published their report entitled "A Nation Prepared: Teachers in the 21st Century," which recommended using case studies as a major focus of teacher instruction (Carnegie, 1986). Lee Shulman advocated the use of case studies for teacher education, feeling that they were a good means of connecting theory with practice and of showing that teaching itself was a complex activity that demanded high level decision-making skills (Shulman, 1992, p. 28).

Case studies can be teaching and/or learning tools and the key element is that they are situated in real world contexts. Merseth (1994) saw cases as serving as exemplars, opportunities to practice analysis, and stimulants to personal reflection. Case studies were understood, as they had long been in law and medicine, as ways to hone analysis and decision-making skills with authentic situations. More recently, when Putnam and Borko (2000, p.8) discussed the renewed interest in situated cognition, they pointed out that cases provide vicarious encounters with real classroom environments because they are *situated* by their very nature. Some of the benefits they mention include opportunities for reflection and critical analysis that are not possible when acting in a real classroom setting, exploration of the richness and complexity of authentic pedagogical problems, and shared experiences for groups of teachers to explore together.

The limitations of text-based case studies for teacher education can be summed up by saying that they fail to capture and communicate the reality of the nuances and immediacy of actual classroom settings, just as they fail to capture the drama of a courtroom for aspiring law school students. The tone of voice, facial expressions, and gestures of the teacher as well as the learners give color to the starkness of black and white text detailing case studies. Video provides all of this and more to preservice and in-service teachers.

The Use of Video in Case Studies for Teacher Education

The introduction of video into case-based teacher education was a great step towards more accurately portraying the complex, real life situations that characterize the reality of teaching. Video is able to capture the complexities and realities of the classroom (including facial expressions and gestures) while providing the time for analysis and reflection that is impossible when actually sitting in a classroom observing. Analysis and reflection are essential for transforming a simple videotaped lesson into a true learning experience for preservice and in-service teachers. Not only can the video be stopped to allow for guided discussion and reflection at various points, but it can also be reviewed several times in order to search for nuances in the teacher's decision process and to examine the action from various different perspectives (learner, teacher, administrator). Unfortunately, linear video without discussion and guidance to help teachers actually change their practice over time is not very effective (Lauro, 1995, p. 65). CD-ROMs, DVDs, videodiscs, and multimedia Internet websites can all help overcome the limitations of linear video viewing and increase teachers' interaction with the case. In this way, teaching is seen more realistically – as a multifaceted problem-solving process.

Each of the media mentioned above has its own characteristic benefits. Linear videotape is important for conveying a sense of the overall lesson and the flow of the classroom. Videodisc technology has the benefit of allowing teachers to quickly focus on specific, shorter segments of the whole and therefore interact more immediately with the material (Atkins, 1998). The Internet and its innumerable websites add (a) the dimension of anytime/anywhere learning; (b) the capacity to utilize listservs, chats, bulletins boards, and so forth for communication; and (c) access to the most current materials through relatively easy and inexpensive updating. The following section will discuss how the various media were utilized in the three technology-facilitated NCAL/ILI professional development projects for adult education teachers.

The Evolution of Three Multimedia Professional Development Projects

Quality professional development that actually changes current practice (and its outcomes – adult learning) is one of the keys to effective adult instruction just as it is to effective K-12 instruction. The National Center on Adult Literacy and the International Literacy Institute at the University of Pennsylvania have been working on solutions to this challenge for well over a decade. The following three projects were designed and implemented by many of the same team members and therefore benefited greatly from the experiences and lessons learned in all of other projects.

International Literacy Explorer: A Teacher Training Tool for Basic Education

The *International Literacy Explorer* (ILE) is a multimedia teacher training tool for basic education designed to give an overview of literacy and basic education issues and practices in an international context. The *Explorer* offers ideas, discussions, and activities to teachers/practitioners, policymakers, and researchers in order to enrich literacy thinking. In the context of the worldwide effort to more fully and effectively increase the literacy skills of all people, the *Explorer* focuses on several innovative, useful, and/or effective literacy projects and programs across the globe. Also included are supplementary sections on general literacy concepts and statistics to help the user to better understand the consequences of widespread illiteracy, the need for and importance of literacy education, and the achievements of the specific literacy projects. The *Explorer* has four main sections: "Literacy Overview," "Literacy Projects" (case studies), "Statistics," and "Resources." The product is available free in its most up-to-date state on the Internet (www.literacy.org/explorer/index.html) and also in the original CD-ROM version.

The "Literacy Projects" section contains 12 case studies grouped under the following headings: Language and Culture, Gender and Development, Teaching and Learning, Quality and Innovation, and Technology for Learning. Each individual case study contains the following elements: (a) Background (the issue in brief and in that country's context), (b) Overview of the Project, (c) Activities (teacher/practitioner focused), (d) Outcomes and Implications (researcher and policymaker focused), (e) Resources, and (f) Questions. The case studies are quite text heavy and represent an almost *textbook* model of case study methodology. Short segments (10 to 20 seconds) of video are in the Activities sections and there is the potential for some interactivity on the Questions pages, where users can email the creators of the site with inquiries.

The benefits of using technology for this project were multiple and at several levels. Although it was originally planned solely as a CD-ROM (so as to be available in locations where Internet access was minimal), the developers, who were located in several different countries, found it most efficient to design on the web for ease and rapidity of communication. The website was then simply transferred to CD-ROM and involved only the challenge of making the database functional. While it was useful to have the information on the web in terms of a wider audience, the time length of the videos was severely restricted by connection speed over what might have been possible on CD-ROM. The benefit of that decision, however, was that the videos were very targeted and to the point, so viewers actually watched them in their entirety as opposed to what often happens when users move on without completing the videos or just read the transcripts. Because of the hyperlinking potential of the web, multiple perspectives could be delineated for those users with limited time to browse. Thus teachers/practitioners could jump directly to the Activities sections of all 12 case studies and researchers/policymakers could likewise jump directly to the Outcomes and Implications sections without destroying the integrity and flow of the site as a whole. The "Help" (FAQs) section of the website not only walks the user through the organization and navigation, but provides specific suggestions to the various user groups on how to use the site as a professional development tool.

Our retrospective view of the website is that it (a) is probably too text heavy for a website, (b) would benefit from an effective mechanism for information sharing (such as a database interface for new case studies, resources, etc. and a discussion board), and (c) needs an efficient means of updating. The Questions page could have been expanded with some discussion and reflection questions to enrich the user's learning experience. We do see the site as most effective as a stimulus for group discussion and reflection during guided professional development activities. We know that it has been used that way as well as a resource for college classes and for individuals in various countries throughout the world.

Captured Wisdom on Adult Literacy: Integrating Technology Into Adult Literacy Instruction

Captured Wisdom (www.literacy.org/capturedwisdom.html) is an interactive resource that is designed to help inform educators of successful practices of integrating technology into adult education instruction. Innovative, replicable activities are shown, described, and discussed by front-line classroom educators and learners so that other teachers feel that they have had an opportunity to actually visit and chat directly with the learners and teacher about their work together. The two CD-ROM set contains 7 different 20 minute videos of authentic adult education classrooms. To develop each of the *Captured Wisdom* stories, teachers and learners were filmed describing and demonstrating how they use technology in classroom-based projects. Each edited, videotaped segment was then viewed by focus groups of adult educators. These educators wrote down questions that they wanted to ask the teacher. The focus group teachers felt the answers to these questions would prepare them to use activities in their own classrooms. The questions were divided into the following categories: Learners, Instructional Activities, Project Management, Technology Issues, and Products and Assessments and directed to the presenting teacher. Responses were tape-recorded and included as companion segments on the CD-ROM. This development process assured that the implementation needs and concerns of real teachers in real adult education programs were addressed. Also included with the set is a short instruction booklet that explains how to use the *Captured Wisdom* CD-ROMs effectively in professional development. The video vignettes (case studies) are also available on two videocassettes with an accompanying booklet for professional developers with suggested activities on how to use the vignettes in group professional development on topics as varied as alternative assessment, multidisciplinary teaching, and project-based learning. The model for *Captured Wisdom* was developed by the North Central Regional Education Laboratory (NCREL) for K-12 teachers and was extended to address the needs of adult literacy instruction by NCAL.

The *Captured Wisdom* CD-ROMs enrich the experience of linear video for adult education professional development with the questions and answers (in text and audio) posed by real life teachers about the implementation of the technology integration in their classrooms. Although there is no specific mechanism for information sharing and easy updating with *Captured Wisdom*, the focus group questions and answers provide additional insightful comments about the classroom experience viewed on the video. These can lead to further discussion and reflection on the part of individual teachers or groups of teachers. The print booklets that accompany both CD-ROM sets and videocasette sets contain suggestions and activities that can be used directly by professional developers or groups of interested teachers seeking to improve their practice.

The portability of the self-contained CD-ROMs is a distinct advantage over web-based, video-enhanced professional development that necessitates a fast Internet connection. The CD-ROM medium can contain substantial video segments and is extremely inexpensive to produce. However, without a projection system, the CD-ROM provides a relatively private experience of the product on a single computer screen. There has been discussion of adapting this product for the web, but the length of the videos is problematic. Considerable adaptation would have to take place to customize the videos for typically impatient web "consumption." The videocassettes of the vignettes are more easily shown on large size TV screens to groups, whether they are preservice/in-service teachers, administrators, or board members.

There has been considerable feedback on this product, which has been available for about a year. Professional developers have used it with much enthusiasm as have literacy program directors who have shown it to their funding boards as a vision building exercise for how technology can motivate learners and contribute to their learning.

Professional Development Kit (PDK): Multimedia Resources for Adult Educators

The *Professional Development Kit* (PDK; www.literacy.org/pdk.html) is a multimedia resource for adult educators that utilizes print, video, CD-ROM, and the depth, flexibility, and complexity of the web. It consists of a reflective framework that supports participants' efforts to generate questions and brainstorm solutions to challenging professional situations. PDK aims to support community-building and collaboration among adult educators by providing opportunities and tools for communication. PDK consists of a variety of resources, including

- 10 hours of video investigations containing interviews with learners, teachers, researchers, and administrators; examples of classroom practice; and in-depth exploration of specific topic areas such as ESL, ABE, GED, math, writing, assessment, integrating technology, and much more;
- a website that contains online tools such as discussion boards; teacher portfolios with self-assessment activities, data collection suggestions, action plan infrastructures, and reporting frameworks; and
- five knowledge databases to search related resources, and a participant's guide that describes the system and identifies possible applications in various contexts.

The three main sections of PDK are the "PDK Community," "Investigating Practice," and the "Knowledge Databases." The "Investigating Practice" section contains 5 video case studies called Classroom Investigations. Each of these includes (a) a 15 to 20 minute narrative with teacher reflection and student reaction, (b) a highlights video section of 5 minutes about the specific lesson, and (c) topic area videos of about 2 to 3 minutes that address techniques or skills that the teachers use to deal with the issues of learner anxiety, motivation, diversity, and disabilities, just to name a few. The taping and editing of the 10 hours of video took place over a 3-year period of time. The role of the video was not to create a model of perfect teaching, but rather to capture what was happening in an actual classroom as well as teacher' and students' reflections about those interactions.

Although PDK videos are available on conventional videotapes for viewing in group or classroom settings, the full power of the program can only be experienced through the interaction of all the components on the web and on CD-ROM. The CD-ROM contains the Quicktime™ video that is accessed from within the computer's CD-ROM drive as one navigates through the different organizational elements of the PDK website. In this way, the user is not hampered by Internet connection speed for the delivery of significant amounts of video. This carefully

edited video is surrounded with the resource and communication structures of a comprehensive website.

The "PDK Community" is composed of a My Portfolio section (self-assessment activities, data collection, action plans, reporting frameworks with all information saved to an individual's personal online portfolio) and Discussion Boards (for national as well as small group listservs with tools for creation and management). The My Portfolio areas contain information and learning activities that help users articulate questions about their practice, brainstorm creative solutions, implement plans, and write up the results of this process. Not only can users keep track of their own development, but they can participate in larger learning communities via the discussion boards. This leverages technology's capacity to connect people and ideas in information-sharing activities.

The online, searchable "Knowledge Databases" is divided into 5 parts that complement the PDK learning activities. The 5 parts are (a) PDK practitioner reports (contributed by participants in the program), (b) PDK TIPs (short papers providing information on integrating research and theory into teaching contexts), (c) online articles complementing the video case studies, (d) professional development resources (annotated list of online resources with links to conference information and other learning opportunities), and (e) lesson plans. This database will continue to grow with contributions from users of the PDK system and it leverages technology's capacity to store and then locate large amounts of information.

Although this project is not yet complete, prototypes have been tested and used in professional development groups with positive feedback. The community section currently hosts many small groups of practitioners from various areas of adult education and the databases contain materials selected for their appropriateness to the issues presented. The product will be most effective in facilitated group professional development with the extra benefit that the group can be virtually present (via the Internet) if not physically present in one room.

Brief Analysis of the Projects

The ILE began with the goal of providing a readily accessible teacher education tool for adult basic education by utilizing video case studies and information and communication technologies for delivery. The limitations of web-based video delivery resulted in very short videos and a quasi-textbook model. The *Captured Wisdom* CD-ROMs and videotapes *captured* classroom practice and complexity more realistically and allowed for more substantial video and actual teacher questions and answers. However, the presentation on CD-ROM was relatively static and unable to respond to user's questions and personal professional development. PDK, which encompasses print, extensive video on CD-ROM, and a comprehensive web-based structure, truly uses the available technology in a seamless, unobtrusive fashion. All the technology tools work together to support the growth of teachers.

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A Comprehensive Formative Evaluation of an Online Master's Program

Laura E. Sujo de Montes, Ph.D.
Center for Excellence in Education
Northern Arizona University
United States
Laura.Sujodemontes@nau.edu

Elizabeth M. Willis, Ph.D.
Center for Excellence in Education
Northern Arizona University
United States
Becky.Willis@nau.edu

Michael J. Blocher, Ph.D.
Center for Excellence in Education
Northern Arizona University
United States
Blocher@nau.edu

Gary Tucker, Ph.D.
Center for Excellence in Education
Northern Arizona University
United States
Gary.Tucker@nau.edu

Abstract: This paper discusses the importance of conducting formative evaluations. The Master's of Education in Educational Technology at Northern Arizona University is a young online program in its second year of implementation. Because online degree programs are new to the educational arena, little is known about the best pedagogy, workload for both faculty and students, and effectiveness of the program. This formative evaluation will collect information from stakeholders to the program. Data sources are online surveys, synchronous and asynchronous interviews, and anecdotal data. Preliminary results are discussed.

Introduction

Even when teaching is usually one of the last professions to adopt the changes that happen in society at large, it has moved from being a mainly solo endeavor to become a collegial experience (Wise & Leibbrand, 1996). Colleges of education are now offering degrees that take advantage of technologies that promote exchange of ideas and the building of communities of learners through online settings. In fact, many institutions fear that they will be extinct if they do not offer web-based distance education courses (Roblyer, 1999). Because degree programs delivered through online environments are so new to the education arena, it is necessary to evaluate the program as a whole to understand the dynamics that happen in the virtual classroom. Manning (cited by Osborne & House, 1995) discussed that one of main reasons for conducting an evaluation is to determine what has been accomplished and how it might be accomplished better. Although there are several approaches to conducting program evaluation, a valid and accepted approach is for the institution to set its own evaluators to identify its own strengths and weaknesses (Warren & Curley, 1998). It is believed that when the institution takes the first stake at an evaluation process, faculty are more likely to make the necessary changes to improve the program (Osborne & House, 1995). Program evaluation provides valuable feedback that allows administrators and faculty to examine the effectiveness of the program to then correct, change, improve, add, or delete components of the same. A successful program is one in which the systemic evaluation of the program philosophy, goals, design and outcomes become an integral part of the same and not a reaction to external demands for accountability (Warren & Curley, 1998). Comprehensive evaluations must include all stakeholders: administrators, faculty, students, graduates, and employers.

The Master's of Education in Educational Technology (MED in Ed Tech) at Northern Arizona University has a strong PK-12 emphasis. This 36 credit-hr. degree program is delivered totally online using several interfaces, such as WebCT, Blackboard, and in-house designed Web Tools. Because of the convenience of taking courses without having to travel to far away campuses, this program attracts not only statewide students in Arizona, but students in other states of the country as well as students in different countries. In order to design and implement a comprehensive and effective formative evaluation, two phases are planned. The first phase will collect the perceptions of the closest stakeholders (students enrolled in the program, faculty teaching for the program, and administrators directly involved with the program), while phase two will collect and integrate the perceptions of the farthest stakeholders (university administrators, graduates' employers). This paper discusses the planning, processes, data sources, data collection, and data analysis to evaluate formatively the first phase of the MED in Ed Tech program.

Goals and Objectives

1. Understand the type of students who enroll in the program and their needs. Since this program was conceived as a program serving PK-12 teachers, it is important to know if it is attracting the target population.

2. Look at the processes for program admission and whether they are user friendly and user oriented. Students in this program usually do not meet in person with a faculty for the application process or advisement because the program serves mostly students who are not physically close to the university campus facilities. It is important to measure the clarity and easiness of the application process and whether it is client oriented.

3. Measure the change in self-reported classroom practices and technology adoption that the students experience as a consequence of taking courses in the master's program. The goal of the master's program is to provide teachers with tools and skills to integrate technology into teaching, so it is important to measure this change in daily classroom applications.

4. Gain an understanding of the student as an online learner. It is important to identify the cognitive and metacognitive strategies that students use when interacting with the class material. Also, because most of what happens in an online course is text based, we need to know the student perspective on online course expectations for time, rigor, workload, and accommodations that facilitate or hinder learning in this environment.

5. Investigate the perceptions of efficacy and workload of faculty who teach online courses. Online faculty have many questions regarding what it constitutes a rigorous but time-wise reasonable course. This objective will help identify strategies that faculty use to make an efficient use of time and resources in an online course and whether online courses constitute a burden to faculty's duties.

6. Look at the administrators perceptions of the program in such aspects as revenue, allocation of resources, prestige for the department, and any other administrative issues related to the master's program. Administrators that work closely with faculty in this program will be able to provide perspectives that will inform the scholarship and issues related to budget of the master's program.

Methodology and Plan of Research

Lapan (in press) discusses that the best evaluation studies incorporate data collected through both qualitative and quantitative methods. Data to evaluate the MED in Ed Tech will come from both quantitative and qualitative sources. The quantitative sources include interactive online surveys that are described below.

Personal Information Database. This survey provides information on the background of the students and the current positions they hold in the school setting.

Hardware inventory. This survey gives faculty information about the hardware and software the students have at their disposal to complete the MED in Ed Tech program.

Online Technologies Self-Efficacy Survey (OTSES) (Miltiadou, 1999). The OTSES is a self-report of student beliefs of self-efficacy with specific Internet applications and basic computer skills.

Stages of Concern About Technology. This survey, originally designed and validated by Hall, George, and Rutherford (1977) measures the seven hypothesized stages that an individual moves through when adopting a process of product innovation, i.e., technology.

Motivated Strategies for Learning Questionnaire, (MSLQ) (Pintrich & De Groot, 1990). The MSLQ is a self-report of motivational factors, cognitive and metacognitive strategies that students monitor and regulate when studying or working on course assignments.

Qualitative data will include letters of application to the program, messages to a Virtual Conference Center (a bulletin board), student asynchronous exit interviews, and faculty and administrator synchronous interviews. Data collected through quantitative instruments will be analyzed using parametric and non-parametric statistics, while data collected through qualitative methods will be analyzed using content analysis and analysis of emerging themes.

Preliminary Findings

Currently data have been collected on fifty students and preliminary results indicate some interesting findings. Initially students have reported relatively high average ratings of self-efficacy for technology skills. However, a little over 10% of the students had individual total SES ratings that ranged between 2.7 and 3.0 (2="Not Very Confident" 3="Somewhat Confident"), indicating they may have difficulty accessing course materials or interacting with their peers in their courses. These students may indeed benefit from advisement on specific technology skills at the beginning of their program. However, the most interesting finding has been in regard to the motivational scales (7 being highest) within MSLQ. Overall students averaged 6.57 (7 being highest) on Intrinsic Goal Orientation items while only a 4.14 on Extrinsic Goal Orientation items was reported. Not surprisingly, students averaged 6.84 on Task Value items (which were worded as computer tasks) and 1.98 on Task Anxiety items suggesting that they valued the tasks, but were not necessarily intimidated by them. Also of interest in the MSLQ, was the overall students' average of the Peer Collaboration items within the strategies section. Here students reported a 4.87, the lowest average of all of the cognitive or metacognitive strategies.

Conclusions

It is expected that through this project, administrators and faculty will be able to identify the strengths and weaknesses of the MED in Ed Tech program. Early identification of weak points in the program will help build and grow an online master's program that has the potential of becoming nationally recognized for its quality and student-centered approach. Analyzed data will be disseminated to the stakeholders in the form of a written report and/or a web site.

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PalmOS Handheld Computers And Standards, Assessment, And Accountability

Penelope Walters Swenson, Advanced Education, California State University Bakersfield,
United States of America, pswenson@csub.edu

Abstract: Teachers and administrators are expected to be increasingly accountable. Standards, normed referenced testing, and other forms of accountability are part of the daily routine. How can teachers keep up with the increased demands and little time? Handheld computers can assist the teacher in meeting these requirements and they can lighten other parts of the teaching load too.

Assessment and accountability is one of the prevailing movements in schools across the US, Canada, and many other areas of the world. In the US and Canada, teachers have scant time to perform the standard functions of teaching and record keeping. Now they are being required to maintain testing records, perform additional assessments, provide extra help for students below standard, and develop strategies for meeting standards that they seldom had a voice in establishing. Teachers and principals are changing the way they conduct their business to accommodate the increased demands of the standards and assessment movement. Some are turning to handheld computer technology.

A typical middle school teacher's schedule in a California school is full. Kate Johnson routinely arrives a half-hour to an hour early. She then embarks on her marathon day. Five classes, four preps. Scheduled potty break. Half-hour lunch. Meetings after school twice or three times a week. One to five parent conferences a week. Afternoons, evenings, and even weekends are filled with meetings, school activities, preparation, grading, and school improvement work. What once might have been called dedication is now considered routine by this teacher.

Where does she find the additional time to chart each student's progress toward standards, work with individual needs, and prepare students for the high stakes testing upon which the reputation of her school and her reputation as an excellent teacher depend? The new reality in education is that teachers have great diversity of backgrounds and abilities in their classrooms. They are teaching in a time of an information explosion, so their traditional role has changed. Schools are not the source of community pride they once were and funding is not at the levels of four of five decades ago. With less money, there are increasing demands. Many of those demands are related to standards, assessment, and accountability.

Having critical teacher and leadership functions in the "palm of the hand" is helpful. Handheld computing enables teachers and administrators to plan and organize, carry reference information, gather and analyze data, exchange information with other handheld computers, and even collaborate more effectively.

State standards and benchmarks, local standards, and even site benchmarks can be loaded into the handheld computer. Rubrics also can be kept in teacher's personal "data bubble". Individual student tracking, including grades, progress toward meeting standards, and other indicators of progress, can be done using the handheld. Scoring of assignments can be done "on the fly" while students are presenting projects or working in groups as the teacher moves about the room. Progress reports can be beamed to a student's handheld, a printer with an infrared port, or sent as a batch for emailing or snail-mailing to parents. Additionally, the teacher or administrator can even use the handheld to create memos, take inventory, or make a list for a lesson plan. All of these can be sent directly to the printer or downloaded.

While handheld computing cannot solve all of the problems of teachers and administrators, there are many functions, assisted by software, that can support and make the data-collection and maintaining tasks easier. Available information and the ability to track standards, assessments, and student progress is critical to school improvement and, more importantly, increased student learning. Handheld computers are part of a solution.

Several universities are involved in research projects using handheld computers. One focuses on pre-service teachers, another on enabling teachers to engage students in handheld computing projects, and another on using handheld computers in supporting teachers and administrators in a data-driven environment.

As a Learning Circle attached to the Project TNT PT3 grant at California State University Bakersfield, we are exploring the uses of handheld computers for teachers and administrators within the high stakes, standards and accountability environment of K-12 public education (Swenson, 2001). Currently, the focus is at the middle school level. Teachers and administrators have been supplied with PalmOS handheld computers and software. They are using these handhelds in their work and reporting on their successes and challenges. The Tools 4 Schools Learning Circle is preparing ways to better equip teachers with data needed to help students achieve greater success.

At the University of Michigan, Elliot Soloway and his team of researchers and teacher participants are developing and field testing software tools for student use. Soloway believes every child should have a handheld computer. He suggests these computers are necessary tools, just like paper and pencils (Soloway, 2001). To this end, Soloway and his team have developed PicoMap concept mapping software, a simulation called Cooties, and PalmSheets worksheets for student use. Designed to inspire teachers and students, these programs are available without cost for school use.

East Carolina University embarked on a project that places PalmOS handheld computers and selected software tools in the hands of students preparing to be teachers. The emphasis is on wireless technologies to support anywhere, anytime learning. Through innovative tutorials, targeted support, and courses where the technologies are incorporated, ECU is changing the way professors teach and students learn (Educause, 2001).

Handheld computing is inexpensive and easily learned. Software applications are being developed rapidly. From personal organization to keeping track of student assessment data and even writing and rewriting papers or articles, the handheld computer is beginning to have an impact in K-12 education.

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Incorporating Cognitive Learning Theory and Instructional Design Models in Graduate-Level Multimedia Development Courses

David Tarcy
Educational Communication and Technology program
New York University
United States
pdt205@nyu.edu

Abstract: This paper is a description of two, graduate-level, multimedia development courses taught at New York University during the fall term of 2001. One course emphasized an instructional design model to guide the development of student projects, the other focused on cognitive learning theory associated with media types, both shared some learning theory content. A qualitative analysis of the projects and experiences of the students accompanies instructor reflection on the varied approaches. The practice of teacher education may be informed by the discussion of course development incorporating the 'living systems' instructional design process and cognitive learning theory. Theory topics included: cognitive load theory, information processing and models of memory, cognitive flexibility theory, dual-coding theory and its descendents.

Introduction

This paper describes two, graduate-level, multimedia development courses taught at New York University during the fall term of 2001. *Instructional Design for the WWW* (ID for the WWW) emphasized the Living Systems instructional design model (Plass & Salisbury, 2001) to guide development of student web-based projects. *Communicating with Computer- Based Interactive Telecommunications* (CBIT) appropriated a three-pronged approach to the study of media types adapted from a similar course taught in the computer science program at George Washington University. Four media types (text, graphics, sound, motion) were evaluated from three distinct perspectives; cognitive learning theory informing the use of the media type, the science or art of the media type, and the technology producing the media type. Students created an instructional project in Flash 5.0 for delivery over the web. Some learning theory content was shared in common by both courses, particularly discussions concerning information-processing models (Mayer, 1997, 1999; Mayer & Anderson, 1991; Paivio, 1971, 1986), limitations of human processing capacities (Miller, 1956), cognitive load (Sweller, 1994; Sweller, Merrienboer, & Paas, 1998), and the influence of multimedia on learning. The courses diverged in their respective emphases. *ID for the WWW* focused on the process of instructional design, *CBIT* more critically analyzed the use of media types and only cursorily discussed the instructional design process. Students in both courses exhibited an eagerness to learn the technology and its practical application in educational settings. This paper explores qualitative differences in their final projects and in their experiences.

The Study

The forty graduate students in the two courses varied widely in their level of prior computer experience and expertise, educational background, program of study, and familiarity with educational and cognitive learning theory. All students produced instructional projects to be delivered over the internet, regardless of prior experience. Students in one course developed projects in Dreamweaver 4, incorporating hand-coding of HTML, JavaScript, and the inclusion of a Flash 5.0 file. Students in the other course developed their instructional projects entirely in Flash 5.0, incorporating the media types discussed during the course. Projects will be vetted for conformity to the stated instructional goal/objectives of the developer, coherence of navigation system, appropriateness and use of media types employed, and self-reported explanations of authoring considerations. Feedback from students concerning their experiences in the courses will be elicited.

Findings

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Based on initial reviews of works in progress and on the differing emphases of the courses, students in the *ID for the WWW* course are expected to have more internally coherent navigation schemes within their projects, and will describe the development process with greater clarity than students in the *CBIT* course. The Living Systems ID model guides developers through design steps commonly found in many other models, though it encourages an evaluation of any step at any time in a somewhat recursive manner. The course emphasized the information architecture of the project, the interaction design (defined by instructional methods and navigation options embedded in the project), and use of the media types within the page design.

Students in the *CBIT* course are expected to describe individual instructional design features of their projects with greater detail and theoretical support than their counterparts. The possibility exists that students in the *CBIT* course will intuitively follow the instructional design process (only briefly mentioned in the course) due to the course emphasis on critically analyzing the use of media types. Some transfer of this analysis may occur at the instructional design process level. Evaluation of course topics and sequencing of content will accompany this paper to aid those who are currently developing or instructing multimedia development courses for educators.

Conclusions

Conclusions will be forthcoming as the semester, final projects, and informal interviews are completed.

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Evaluation of an Integrated Constructionist Model for Meaningful Online Learning

Gary R. Tucker, PhD
Northern Arizona University, USA
Flagstaff, AZ Gary.Tucker@nau.edu

Michael Blocher, PhD
Northern Arizona University, USA
Flagstaff, AZ Michael.Blocher@nau.edu

Shadow Armfield
Northern Arizona University, USA
Flagstaff, AZ Shadow.Armfield@nau.edu

Abstract: To facilitate this meaningful learning in an online course the course was designed around a model based on the Constructionist Learning Theory. The Integrated Constructionist Model that was implemented was initially developed in a face-to-face (F2F) environment. In the F2F setting, the model was exceptionally successful. However, online environments are often characterized by what Shaw termed as, "social relations that are fractured and social interactions and communications that are strained." This paper reports on a study that indicates the Social Cultural Environment aspect of the model may reduce its effectiveness in an online environment.

In the Spring of 1999, The Center for Excellence in Education at Northern Arizona University began an online Masters Degree in Educational Technology. One of the required courses for this degree is ETC 567: Education, Technology and Society. As with all online courses, meaningful learning was a primary goal when the course was designed for online delivery. To facilitate this meaningful learning, one aspect of the course was designed around a model based on the Constructionist Learning Theory (Papert, 1990; Kafai and Resnick, 1996). Constructionist theory is based upon the concepts of constructivism but goes beyond in it's emphasis on artifacts, asserting that meaningful learning happens particularly well when learners are engaged in building external sharable artifacts. In designing this online course a model based upon the constructionist theory was implemented.

The artifact is the goal, but it is the engagement in the building that provides the context for learning. The sides of the pyramid are paradigms that provide the learner the techniques of engagement for ascending to the artifact. The model is based upon the work of Gargarian (1996), Akerman (1996) and Shaw (1996). Gargarian's (1996) boundary idea, "Freedom in Restrictions," is the counter-intuitive notion that restrictions provide a learner freedom rather than restraint. Without restrictions, a learner is unable to choose from numerous possible actions and becomes over whelmed and paralyzed. So well defined broad restrictions provide the learner with parameters that result in a sense of freedom to choose a course of action. Akerman (1996) points out that we know from Piaget, Kegan and others (Winnicott, 1971) that the ability to reach deeper understanding also requires moments of separation. People need to get immersed in a creative process, but there also comes times when learners must "step out" and detach themselves from this process. The purpose is for them to become their own observers, narrators, and critics. Then they can "dive back" into the creative process with a new understanding. Both "dive in" and "stepping back" are equally needed to reach deeper understanding. Shaw (1996) points out that social settings are not neutral grounds in which creative activities take place. He emphasizes that the Social Cultural Environment is intimately involved with the process and should not be underestimated. The individual and the social planes are intrinsically linked and when social relations are fractured and social interactions and communications are strained, the social setting is affected and the meaningful learning can be disrupted.

The Integrated Constructionist Model that was implemented into the ETC 567 was developed in a face-to-face (F2F) environment. In the F2F setting, the model was exceptionally successful. However, online environments are often characterized by what Shaw termed as, "social relations that are fractured

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and social interactions and communications that are strained." Does the Social Cultural Environment aspect of the model reduce it's effectiveness in an online environment? For example, most students engaged in online learning environments do so alone at their computer where they engage socially with their peers. However, these interactions are mediated through the electronic communication systems utilized within the learning environment. Furthermore, are online courses or programs more attractive to specific types of students based upon the delivery system? For example, do students taking their first online course perhaps thinking they will be studying alone, prefer less social interaction? If so, what do students think about collaborating in the Social Cultural Environment aspect of the model? Although students applying to the M.Ed. online program have suggested that they utilize peer help seeking and peer collaboration as cognitive learning strategies that they employ, do they prefer them?

When asked to rank their feeling of success with this model, 32% of the students reported a positive experience while 32% reported a negative experience, and the remaining 36% were neutral. The ranking was based on a 1 to 5 Likert scale where 1 was extremely negative and 5 extremely positive. Out of an N of 22, four responded 1. When asked to give specific difficulties with the model 75% of these students directly mentioned difficulties in social interactions. Three of the students responded with a 2, and 66% of these directly mentioned difficulties in social interaction. Seven of the twenty-two students responded with a 3, of these 57% directly mentioned difficulties in social interaction. Six of the students responded with a 4 and only 40 % of these students directly mentioned difficulties in social interaction. The one student who gave the course a five did not mention any social interaction difficulties. From this preliminary data there is an indication that the social cultural aspect of the model does reduce its effectiveness in an online environment when the social interactions of the students do not develop properly. This would indicate for this type of model to be successful online careful attention must be given to the Social Cultural Environment.

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Special Cases: Writing Scenarios for Learning to Teach with Technology

Raven Wallace, Michigan State University, US
Shane Cavanaugh, Michigan State University, US

Teacher education and professional development for teaching with technology have presented many problems for the education community. Teachers need to learn to *use* technology, but they also need to learn to *teach* with technology. They need principled knowledge about teaching with technology, but they also need to be able to use the specific technology that is available to them in their schools. Programs have taught general computing skills like word processing or creating Web pages. Others have taught specific software like Hyperstudio or Inspiration. But for a teacher in a specific school with specific software and hardware available, and a curriculum to attend to, the offerings of such programs miss the mark. Being able to create a Web page or use Inspiration may be useful skills in some respects, but they may be entirely inapplicable to our specific teacher's needs.

This study proposes a different approach to professional development for teaching with technology, one that lets teachers use the specific contexts of their own teaching as the content of their professional development. This is done through scenario writing, in which teachers imagine their own teaching with a new technology, and write it up as a narrative, paying special attention to the affordances of technology. They use general principles of technology use to develop and describe plans for their own teaching. These scenarios are then used in the Master's class as the basis for discussion and anaylsis – they provide a text for the class itself.

The question of this research is this: *Can writing cases which imagine and anticipate future teaching episodes help teachers learn to use new tools in their teaching?*

It is proposed that scenario writing gives teachers strategies for planning for technology use, as well as for interacting with students as they use computers. It is intended to help teachers develop a frame of mind that allows them to approach teaching with computers in a different way, focusing on the substantive issues of subject matter and interactions with students.

The scenario assignment consists of the following parts: a lesson plan describing the purpose of the lesson, the activities planned, a rationale for using technology in the lesson, and expected outcomes; a narrative describing the lesson as imagined; and reflections on the lesson after the narrative has been written. The narrative is expected to focus on subject matter learning with attention to discipline or classroom management only as it relates to particular issues of using technology. It includes evidence of the following: What the teacher sees on the screen; how she interprets it; how she thinks students will interpret it; what questions students are likely to ask; and how she will respond to those questions.

One rationale for the scenario assignment is that, without some method of stepping back from the moment of practice and considering how best to teach with a particular technology, teachers find themselves in the flow of the classroom doing the things they know how to do best. Their responses in the moment may not be what they would have done if they had time to consider, but these initial responses can establish dispositions that are hard to change, even if they are less than optimal. Thus, teachers may find themselves using routines and strategies suited to working with printed materials, small group discussions, or physical manipulatives, but perhaps not as well suited to the virtual world of the computer. The scenario assignment attempts to give teachers a way to "pre-experience" the chaos of the computer-filled classroom; to anticipate management, subject matter, and pedagogical issues that arise; and to consider how best to handle them.

Teachers in the study (n=19) were students in two sections of a Master's level class focused on teaching with technology in the subject areas. Four academic subjects were included in the class – mathematics, science, language arts, and social studies. Teachers were from elementary and middle school classrooms. Most of the teachers were teaching full-time; others were former teachers pursuing a degree full time. Each teacher developed two (fall semester) or three (spring semester) scenarios during the course. Scenarios were analyzed to identify patterns across teachers, and development in individual teachers over time.The teachers were interviewed after completion of the class to probe their response to the scenario assignments and their ideas about how the course affected their knowledge of teaching with technology.

Preliminary Conclusions

The scenario assignment is very different from retrospective case writing and it had a different impact on these teachers. Several teachers reported using what they had learned from their own scenarios and from the work of other teachers in the class to be more involved with students as they worked on computers and to keep the focus on subject matter. They approached this teaching with new found enthusiasm and confidence even though most of what they had the opportunity to learn in the class came from reapplying their own knowledge and expertise, not from being introduced to new technologies.

The scenarios revealed that practicing teachers may look like novices when technology is introduced: they pay less attention to subject matter and more to management and tools; they focus on their knowledge of techniques (software and hardware); and they downplay their own role in facilitating student learning.

ChalkTalk OnLine

Hilary Wilder, Education Department, College of Saint Elizabeth, USA, hwilder_edm85@post.harvard.edu
Pat Schall, Education Department, College of Saint Elizabeth, USA, pschall@liza.st-elizabeth.edu
Joel Reiser, Education Department, College of Saint Elizabeth, USA, jdrwealdnj@aol.com

Abstract: ChalkTalk OnLine is the technology component of the Alliance to Support the Preservice and Inservice Retention of Educators (ASPIRE) program at the College of Saint Elizabeth in Morristown, New Jersey. We are using ChalkTalk OnLine to provide mentoring and support for preservice and novice teachers via web-based message boards and other posted support material and references. Experienced teachers as well as experts in school administration and school law have been selected to be mentors to help teachers with the various challenges that may face them during their first few years. In this presentation we will discuss our experience in setting up this program and findings to date.

Background

The Alliance to Support the Preservice and Inservice Retention of Educators (ASPIRE) is a new program at the College of Saint Elizabeth, currently funded under a Teacher Preparation Quality and Capacity Grant from by the New Jersey Department of Higher Education. The ASPIRE program aims to increase preservice and novice teacher retention by providing a series of "embodied" workshops, called Chalk Talks and ChalkTalk OnLine, a mentored on-line support web site for preservice and novice teachers with less than three years of classroom teaching experience.

It has been found that mentoring can help these teachers deal with the many challenges will that face them, improving their effectiveness in the classroom as well as their commitment to stay in teaching (Breeding & Whitworth, 1999). It is important to note that ChalkTalk OnLine is not meant as a replacement for any face-to-face mentoring or other supportive measures that the teacher is part of, but rather, to be used in conjunction with these arrangements. While many teacher mentoring programs are more structured and systematically instituted (Newcombe, 1988; Feiman-Nemser, 1996), ChalkTalk OnLine provides an informal arena for any teacher to get opinions and engage in discourse with others outside of his or her school setting. By providing online mentoring that is accessible from any connected web browser, teachers can get support when face-to-face meetings are not feasible (Johanson et. al., 1999; Kerka, 1998).

The ChalkTalk OnLine Web Site

ChalkTalk OnLine is the technology component of the ChalkTalk project and is available free of charge to any teacher who registers. The ChalkTalk OnLine web site uses the Blackboard® learning management system platform. Once a teacher has registered and received a user id and password, they can access the site, which has a *Discussion Board* section that lets them post questions to the ChalkTalk OnLine mentors. The (paid) mentors we have hired are local teachers and school administrators who are experts in areas such as special education, school law, school management, urban and suburban school needs and conflict resolution in addition to the core curriculum areas of math, science, history and English. We have also selected a few novice teachers as mentors with the expectation that they will offer a unique and similar perspective for new teachers. The mentors receive training in the usage of the web site as well as general mentoring guidelines.

Each mentor manages an assigned discussion forum and responds to questions posted by the teachers. Discussion questions are threaded and open for further response from any registered teacher. A search capability allows teachers to look through all posted discussions for specific topics. In addition, the site has an *Announcements* section which has news of upcoming events and other relevant news; an *Information* section about ChalkTalk OnLine and ChalkTalk Workshops; a *Documents* section of germane resource files; and a *Web Sites* section with links to relevant government, organization and commercial Internet sites. A *Staff Information* section contains information about the ChalkTalk staff at Saint Elizabeth and the online mentors. In conjunction with site monitoring, there is also an ongoing "Give us your feedback" survey so we can modify and improve the site as needed.

Current Status

As of this time, the ChalkTalk OnLine web site has been set up and we will be registering teachers. The initial target population will draw from participants of the ChalkTalk workshops and students from the undergraduate and graduate education program at the College of Saint Elizabeth.

Future Plans

We anticipate that word of mouth and mailings to local schools will increase the community as the program continues. We will also be exploring the expansion of this program to include preservice and inservice teachers in Namibia, where one of the authors has worked, in an effort to foster cross-cultural best teaching practices.

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Learning to Teach for Understanding in a Technology-Mediated Professional Development Environment

Rodney Williams
Educational Studies Program
University of Michigan
United States
rodw@umich.edu

Abstract: This paper describes a design experiment where I examined whether and how three first-year teachers' ideas about teaching complex subject matter changed as they learned about a new approach to teaching during a six-week technology-mediated professional development program. Findings suggest that although teachers developed new insights into their teaching, their ideas did not change in substantive ways. Teachers' responded to the program according to their entering ideas about teaching, subject matter, and student learning. Demands made on them as first-year teachers, and the design and duration of the program also influenced their responses. A subsidiary question investigated how teachers responded to the technology-mediated learning environment. A report of these findings is the focus of this paper. Despite problems encountered as they used technology, teachers suggested that, with modification, a technology-mediated environment held promise as a tool for professional development. Implications for future professional development programs are discussed.

Introduction

Along with other subject areas in K-12 education, social studies and history are the focus of various reform initiatives. Among these initiatives, new standards designed to facilitate improvement in teaching and learning social studies and history figure prominently. The standards call for new approaches to teaching that result in significant learning outcomes for students. However, until recently, little research has focused on how teachers can learn to teach in ways that standards documents and other reform initiatives claim they should (Putnam & Borko, 2000), with almost no research focused on how experienced teachers can learn to teach social studies in new ways (Newmann, 1990).

In an effort to understand this process, the study described here examined teachers' ideas as they learned about using one theme addressed in standards about civic education in their teaching. The theme, core democratic values, or ideals of democracy, is addressed in various social studies standards documents (Michigan Curriculum Framework, 1996; National Board for Professional Teaching Standards, 1998; National Council for the Social Studies, 1997). A professional development program situated both in teachers' classrooms and in an online technology-mediated environment served as the site for this study. This program was a design experiment (Brown, 1992) where an innovation, a new framework for planning and teaching, was introduced into teachers' practice. It was expected that this innovation might facilitate the development of teachers' insights and shared understandings about new approaches to teaching social studies and history, particularly in the context of civic education and ideals of democracy.

The program integrated several approaches to teachers' professional development that research suggests holds promise for helping teachers learn to teach for understanding. One approach, *Teaching for Understanding*, a reform-based conceptual framework for teaching and learning (Wiske, 1998) incorporates several elements that are critical for new standards-based approaches to teaching. A second approach, based on research on learning in general, and on teachers' learning in particular, suggests that learning to teach ought to be situated in teachers' practice (Brown, Collins, & Duguid, 1989; Lave & Wenger, 1991; Putnam & Borko, 2000; Wilson & Berne, 1999). Two approaches to professional development that create occasions and environments in which to situate learning to teach are classroom research about one's own practice, and case-based learning. Case learning based on *Cognitive Flexibility Theory* (Spiro, Coulson, Feltovitch, & Anderson, 1988) is especially promising. Other models of professional development suggest the importance of collaboration among teachers, usually characterized as a community (Wilson & Berne, 1999; Putnam & Borko, 2000; Little, 1993; Lave & Wenger, 1991). Using this integrated model of professional development, teachers collaboratively planned and studied a new approach to teaching and learning social studies

New communications technologies designed to facilitate teachers' professional development, and technologies that teachers used to study classroom practice, were interwoven in a technology-mediated environment for this study. The program web site contained a variety of information and links, including links to programs mentioned here, as well as social studies resources. Technologies used for communication included *Tapped In* (*Teachers Professional Development Institute*), an online chat environment for teachers which was used for meetings, email, which was used for a variety of purposes, and the telephone, which was used on occasion. *ENT* (*Education with New Technologies*), a web site at Harvard, was used to help teachers learn about the *Teaching for Understanding* framework and to plan their units using an online planning tool, *CCDT* (*Collaborative Curriculum Design Tool*). As part of an effort to understand their entering beliefs about teaching about core democratic values, teachers were asked to examine and respond to two examples about such teaching found on the Web; one a hypermedia case study, the other a detailed lesson plan. They examined and responded to both examples at the end of the program as well. To document their research about students' learning, teachers collected artifacts, including digitally recorded videotape, transcripts, images, and text that were assembled as hypermedia case studies on CD-ROMs. Although they were not required to do so, each teacher also had students use technology to help accomplish unit goals. This environment offered advantages over conventional approaches to professional development that included the ability to record instances of practice for later analysis and sharing, the use of electronic communication and collaboration to accommodate teachers' busy schedules, and mediation of distance constraints and problems of scalability usually involved in school-university collaborations.

The Study

This study was conducted in urban and suburban areas of a large Midwestern state. Three first-year secondary social studies teachers interested in advancing their understanding about how to teach about core democratic values participated on a voluntary basis. Lisa Stuart taught 10th grade *Civics and Economics* at a high school located in an affluent suburb of a large metropolitan area. Kathy Miller taught 9th grade *Global Studies West* at a high school located in another affluent suburb of the same metropolitan area. Brad Nelson taught 8th grade *American History* in a middle school located in a working class community in a medium-sized city. All were recent graduates of the large Midwestern research university where I was then a doctoral student and teacher educator. I designed and facilitated the program and participated as a co-researcher. It was hoped that the program would demonstrate that teachers who are separated from each other and from university programs across distances can, with the aid of new communications and collaboration technologies, learn about a new approach to teaching and collaboratively study their classroom practice.

Research focused on teachers' ideas about how to teach about core democratic values, and their students' learning. Data was gathered during the six-week professional development program. Teachers constructed, implemented, and reflected on units about core democratic values, as outlined in the state standards (Michigan Curriculum Framework, 1996). For several reasons, including limiting the scope of this study and teachers' units, and to provide for clarity in the analysis of these activities, teachers focused their teaching on four ideals of democracy - liberty, justice, equality, and the common good. They used principles of *Teaching for Understanding* (Wiske, 1998) as a conceptual framework for designing, implementing, and assessing the units..

The process was documented with electronically recorded interviews, classroom observations, online discussions, reflective field notes, and hypermedia case studies. Along with discussions about planning and implementing units, teachers also reflected on classroom-based hypermedia case studies constructed with artifacts of their teaching that focused on understanding students' learning. The hypermedia case studies, which feature videotape of teachers' teaching, teachers' interviews with students, and other artifacts of teaching and learning were recorded on CD-ROMs and distributed to program participants. Teachers' research focused on the study of the cases. Some discussion and activities took place in person-to-person meetings, but most occurred in online synchronous and asynchronous settings designed for collaboration and communication. Exceptions were the initial and final interviews with teachers, and most classroom observations conducted by me.

Data analysis involved the description of emergent themes and patterns from observations, interviews, discussions, and communications, and comparative and contrastive analysis of teachers' ideas about teaching, including analysis of teachers' ideas about their case studies.

Findings

In this section, I first offer a brief overview of the study findings. Then, in more detail, I report findings about how teachers reacted to and evaluated the technology-mediated environment in which the program was situated.

The data suggest that a lack of in-depth understanding about subject matter and how to teach about it was an important reason teachers responded as they did. Both of these factors were related to teachers' lack of an informed focus about student learning, and this resulted in problematic outcomes for their own research. In short, the data suggest that teachers' own entering frameworks for teaching rather than the *Teaching for Understanding* framework informed their responses. The framework, as it was presented and as teachers interacted with it, did not help teachers develop more in-depth understanding of subject matter, how to teach about it, or to develop an informed focus on students' learning. Another reason to emerge from the data that explains teachers' responses was the program itself. As it was designed and enacted, the program did not adequately anticipate or accommodate teachers' novice status, their busy lives in and out of school, or their status as learners who apparently did not know much about either core democratic values or how to teach about them. Despite flaws in the design of the program, however, teachers may have fared better had they had a deeper understanding of the subject matter, the tools used by historians to investigate history, and strategies to help students make sense of the content.

Both specific technologies and ways in which they were used proved to be problematic during the program. All three teachers had experience using technology before the program began. During the year previous to the program, Kathy and Lisa had been students in a course I taught at the university where they were required to make extensive use of technology, including *Tapped In*. Brad had been a monitor in a computer lab at the university and appeared to be a proficient user of technology. All three had passed state certification technology requirements for pre-service teachers. They also understood that the program would be situated in a technology-mediated environment. Despite all of this, technology related problems were ubiquitous throughout the program. Some problems were the result of conditions beyond participants' control such as network and server problems or hardware failures. Other problems, however, resulted from a lack of user proficiency (teachers' and my own) with software programs used in the program, particularly *Tapped In*.

Plans for online meetings changed quickly after it became clear that time constraints, and teachers' busy and somewhat unpredictable schedules prevented them from meeting regularly. After a few problematic initial meetings, teachers suggested that meetings be held one-on-one as-needed, a suggestion I heeded. Besides time constraints, there were difficulties associated with the online virtual conferencing environment where we met, *Tapped In*. Two of the teachers had used *Tapped In* previously but still had difficulties because of software and connectivity issues, as well as usability issues. At times the conversations on *Tapped In* were so discombobulated that it was hard to figure out who was saying what or when they said it. This seems to be the nature of chat environments though. Without firm structures in place that allow users to communicate more effectively, it seems as though participants in discussions are talking at random instead of to each other. Although I attempted to impose a sort of discussion protocol in one meeting, teachers ignored it.

Lisa encountered problems with technology throughout the program. Our second interview was to be conducted online, but Lisa was not able to logon to *Tapped In*. After attempting to resolve the problem, we decided to try to have our conversation using email. This worked for a brief time, but a server problem that delayed the delivery of our messages frustrated this attempt as well. Lisa was unable to attend other online meetings because she had not figured out how to access *Tapped In* through her service provider, AOL™, at home. Lisa also had problems with technology at school. I tried to show her how to access *Tapped In* on her computer at school but the computer was not functional and had not been for several days. When Lisa asked for my help after looking over the program plan and finding it "bit overwhelming," I responded by locating and sending her several online resources to help her think about how to integrate core democratic values with economics. She never mentioned these resources, perhaps because she had not been able to access them online either at home or at school. Only at the end of the program was she able to resolve some of her technology problems. In the final interview, referring to the program, she told me, "... if I would've never had any of those technology problems, you know, it would've been much more of a breeze to me." To what degree these problems actually interfered with Lisa's ability to understand the program and meet its goals is not clear, but it is clear that technology was a formidable problem with which she had to contend.

Kathy experienced technology problems of a different sort. She had an older computer at home that lacked sufficient memory to open multiple windows. This proved problematic when we met for an online orientation session where I intended to introduce her to the Teaching for Understanding and the associated planning tool. *Tapped In* software allows users to open a web page so that all conference participants can see and discuss the page. Because of computer memory problems, Kathy told me she was afraid to open too many windows at one time, frustrating this part of my plan. In addition to memory problems on her computer, Kathy also found the online planning tool to be confusing and at one point exclaimed that the session was "frustrating." During the final online meeting with all three teachers, Kathy was disconnected momentarily. This caused her to miss Lisa's response to a question, and when she reconnected she continued responding as if Lisa had said nothing. This was not only disconcerting; it also threw the conversation out of synch for a short while.

Brad did not own a personal computer. Since many program activities were scheduled in the evening, it was necessary for me to obtain a computer from the university to loan Brad for the duration of the program. This is obviously not a practical solution to such a problem for programs with many more participants. For an online interview with Brad, I had prepared questions to paste into the text window on *Tapped In*, hoping to save some time. However, at one point in the interview, because of a glitch of some sort, I pasted in a whole series of questions at once! Brad was overwhelmed and indicated some irritation by asking me to ask one question at a time. He then continued answering a previous question which proved confusing to me since I expected him to answer a different question. Again, this proved to be a frustrating meeting.

It seems that almost every technology problem that could have occurred did occur during this program. A few of these problems included lost network connections, insufficient computer memory, software that didn't work with certain web browsers, server problems that delayed delivery of email, network problems on school computers, computer viruses, software crashes, etc. Teachers were frustrated with these problems, as was I.

Teachers offered valuable suggestions about redesigning the program, including extending the program over a much longer time period (a semester, a year, or two years) so that problems of the sort described here could perhaps be overcome with less frustration. Brad suggested that a much longer program might also promote an environment where teachers could establish a rapport that allowed them to feel more comfortable about talking about their teaching. He also liked the idea of finding someone at a distance to work with since he appeared to feel isolated at his school. Kathy suggested that directions needed to be much more explicit than what had been provided. This was surprising to me since I thought I had provided directions and guidelines that were too detailed. Kathy also suggested that I design planning and assessment tools based on *Teaching for Understanding* and include them on the program site. She said switching sites was confusing, and that the program should be self-contained. Lisa suggested that programs should be tested for compatibility before using them. Both Brad and Lisa suggested that many teachers are still very leery about using technology and requiring them to use it may be counterproductive.

Despite all of the problems we encountered, and much to my surprise, when I asked teachers at the end of the program whether they thought technology was an effective tool for professional development purposes, they resoundingly supported its use. They all felt that new technologies can provide the means for teacher collaboration and learning about new approaches to teaching.

Conclusions

Despite demonstrating possibilities for teachers' professional development, findings from this study suggest that designing and facilitating technology-mediated environments for such purposes is more problematic than much of the rhetoric on this subject suggests. For instance, I had assumed that these teachers were proficient users and could use program technologies with little difficulty. I based this assumption on my personal experiences with teachers knowing that they had used at least one of the technologies (*Tapped In*) previously. I also assumed they had adequate technology resources of their own that would allow them to participate in the program. However, I was wrong on both counts. It cannot, therefore, be assumed that once teachers have used a particular technology a few times that they will remain proficient in its use over time or that they possess adequate resources to participate in such programs. A thorough assessment of teachers' technology skills and resources before the beginning of such programs needs to be undertaken so that teachers have an opportunity to learn technologies they are not familiar with and obtain resources needed to participate. Findings from this study also suggest that the technologies used in the program were far too complicated and that valuable time was expended on solving problems associated with the technology that could have been used more productively. These conclusions are not meant to discourage the idea of using technology-mediated environments for professional development; rather, they are meant to inform future development of those environments.

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Content-Based Teacher Education

Marisa Wolfe, New Mexico Tech, US

New Mexico Tech, home to the Very Large Array, Energetic Materials Research and Testing Center, Langmuir Laboratory for Atmospheric Research, and other first class, nationally renowned research centers, offers teachers the opportunity to earn an advanced degree working side by side with the scientists of these institutions. The Master of Science Teaching (MST) Program emphasizes, not pedagogy, but hands-on experiences and content-based courses for teachers of all math and science disciplines.

Began in 1969 to address the needs of New Mexican science teachers, the MST Program has thrived and grown to address the needs of teachers in five states and two countries. Courses are delivered through a variety of methods – intensive two-week on-campus sessions, field experiences, laboratory research, independent projects, and distance delivery. On-line chat rooms for each course and a general science-teaching listserv promote discussion and solidarity among students. Two full time program staff members on campus provide advocacy and administrative support for the students.

The hectic nature of a teacher's life requires practical, useful experiences in their continued education. Through required curriculum development, joint research projects, and special programs, the MST Program strives to offer education teachers can immediately transfer to their classrooms. In essence, the students learn from the program as their teacher learns from the professor.

Through participation in this institutional session, conference-goers can learn more about New Mexico Tech's Master of Science Teaching Program. Selected course material, student work, special projects, and program outlines will be on display.

INSTRUCTIONAL DESIGN

Faculty Guidelines for the Video Development Process

Ronald J. Abate
Cleveland State University, USA
r.abate@csuohio.edu

Kathleen Benghiat
Cleveland State University
k.benghiat@csuohio.edu

Abstract: Original video materials have been employed in undergraduate and graduate teacher education courses at Cleveland State University (CSU) for the past thirteen years. These videos include K-12 teacher and student use of technological tools as well as traditional methods of instruction. This paper provides a brief rationale for implementing video materials in pre-service and in-service education courses and outlines a process for faculty to follow when they undertake production of video materials.

Introduction

Video can demonstrate how materials, strategies, and lessons can be implemented in the classroom. Historically, video has provided a mechanism for bridging theory and practice in the classroom. (Abate, Atkins, Hannah, Benghiat, & Settlage 1996). In addition, video may furnish focused learning opportunities because edited video affords a quality control mechanism not available in traditional field placements. Video used in conjunction with computers has proven effective in "anchoring" instruction in real problem situations and thus improving student comprehension of content, and problem solving abilities (The Cognition and Technology Group at Vanderbilt, 1990). The increasing connection between video and computers is making it easier for non-professionals to produce and implement video-based materials in the classroom.

Videotape is a relatively mature technology but digital video cameras, non-linear editing, and mass storage devices have only recently become sufficiently inexpensive for non-professional use. The availability of simple-to-use video production and post-production tools is making it possible for faculty to create effective video based instructional materials. However, the availability of sophisticated video editing software, though necessary, is not sufficient for creating high quality video.

Simplified Video Development Process

Thirteen years of video production at CSU have led to an understanding of the key components for the production of video by education faculty, in particular, faculty with little or no experience in video development. Video pre-production, production and post-production include both conceptual and practical/ technical steps. These steps compare favorably with the steps of the writing process (pre-writing, creating drafts, and revising and editing) and this similarity provides an understandable context for faculty new to video development.

Pre- production steps analogous to pre-writing include generating ideas, scripting and organizing. The generating ideas step tends to be intuitive to faculty since most enter the development process with a distinct idea of the story they wish to communicate via video. Scripting matches nicely with pre-writing in that it requires the creation of drafts. However, not all scripting is text based. Within the simplified video process model, faculty "script" in broad strokes 1) the events that they anticipate transpiring during video recording, 2) the order of each event, and 3) the purpose or focus of the event. Once these conceptual components are documented, the organizational step focuses on technical issues revolving around the people and equipment required by the script.

To begin organizing, a checklist is suggested to document the practical and technical pre-production issues essential for post-production success. These issues include; 1) recruiting teachers and classroom settings, 2) providing and collecting model clearance forms, and 3) visiting the classroom site. The recruitment of teachers and classrooms is straightforward as faculty members regularly begin the video development process with specific teacher candidates and classrooms identified. CSU has a standard model clearance form, and historically over 90 percent of parents have given permission for their children to participate in classroom video recording. However, arrangements for non-participants must be resolved prior to production. During the site visit, the faculty member documents the physical environment of the room including participant locations, the projected flow of the classroom activities, and the location of power, light and audio sources. From this documentation, the faculty member tests potential camera placement locations. By the conclusion of pre-production, the faculty member has a sensible plan for video production, which may be analogous to an outline or graphic organizer for a written piece.

Whereas a writer has control over temporal constraints and may develop numerous drafts, the videographer has a single opportunity to record events. As such, to provide opportunities for numerous drafts during production, the videographer must record events from multiple perspectives. Thus, a two-camera arrangement is recommended. One camera is placed in a location to capture a wide shot of classroom events. A second camera is placed outside of the line of sight of the wide camera to capture medium and close-up shots of the participants. This simple arrangement makes it possible for a single cameraperson to capture a comprehensive record of classroom activities.

To improve the opportunities for success during K-12 classroom videotaping, CSU faculty members are provided with a list of do's and don'ts. Audio quality is a major focus in this list as it is a frequently overlooked aspect of video production by novices. To compensate for the limitations of consumer quality cameras, a wireless microphone receiver can be connected to one camera. The wireless microphone is usually worn by the teacher since much of classroom audio is conveyed through or to the teacher. An alternative arrangement is to connect a directional microphone to the wireless and vary its location in the classroom according to the focus of the lesson. This method is frequently used for recording interactions of student group work.

Revision is the cornerstone of process writing and it is equally important in video post-production. Viewing footage and logging video segments remain prerequisites to editing despite advances in non-linear editing software. However, the ability to cut and paste video clips has proven to be a tremendous advancement for novice video developers. It is now possible to return to finished works and make substantive revisions. Working on one's desktop has further simplified the revision process by eliminating the need to schedule dedicated facilities. Also, desktop editing places the faculty member in direct control of the finished product. Novice faculty video producers at CSU have benefited greatly from workshops that guide them through the video production process from first idea to final product, much like a process writing workshop.

Conclusion

The technologies of digital video and non-linear editors are making it possible for faculty members with little or no experience to produce instructional video materials. Guidelines for pre-production, production, and post-production simplify the process for novices and increase the likelihood of successful video development. Videos developed via this approach may be ephemeral and not of broadcast quality, but they fill a niche for teacher educators who heretofore have been limited by developmental costs and the limited classroom video market. For guidelines on the video development process visit http://mimic.ed.csuohio.edu/video.html.

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Evolution of an Online Graduate Course in Educational Multimedia

Peter Albion
Department of Education, University of Southern Queensland, Australia, albion@usq.edu.au

Abstract: Online education is relatively new and effective course designs are still emerging. A course that was originally offered successfully with small groups has evolved into two courses, which seek to achieve similar goals with greater scalability using divergent designs.

Online courses take different forms. In some cases the term may signify little more than a web site supplementing standard classes. In others all aspects of a course are handled online. As educators seek to develop online formats that work in their particular circumstances, sharing of experience with online courses is an important source of information. This paper describes the evolution of a course in interactive multimedia design offered by the University of Southern Queensland (USQ). In the USQ context, an online course is one where all interactions among teachers, learners and instructional materials occur online.

The course title is *Creating Interactive Multimedia* but it will be referred to by its code, 81530. The author has been responsible for design, development and teaching of 81530 since December, 1998. From 1997 to 1998 the course was developed and taught by others (Kirkwood & Ross, 1997; Lefoe, 1998). The first few offers of 81530 during 1997 and 1998 were to small groups ranging in number from 6 to 12.

The initial design of the course has been described as an example of a constructivist approach (Lefoe, 1998). It was presented as a simulation in which the teacher, Dr David Ross, acted as CEO of a company in which the students were members of a project team. The team was required to conceptualize, design and prototype a multimedia product for offer on the web, beginning with development of a business plan and culminating in a product launch. The course website was intended as a supplement to a textbook. Its skeleton structure included audio messages from the CEO, a skeleton structure and links to web resources. The core of the course was in the interaction among the group mediated by newsgroups, electronic mail and a weekly IRC meeting with the CEO.

The innovative design of the course attracted strong positive reactions from students and others who were exposed to it during the first couple of offers. However, the activities, which worked well with groups of up to 12 students, were not easily scalable. Moreover, the course was strongly dependent upon the personal style of the CEO. When, in the second semester of 1998, he was unavailable and enrolments rose to 30, the overall experience with an alternate leader proved less satisfactory for some students.

The author became responsible for 81530 in the following semester. Its key strength appeared to be the interaction around a common project, which served as a focus for learning. The principal deficiency appeared to be in the course materials, which were little more than a list of links to support the project work. There were concerns about the dependence of the course upon a particular personal style and its scalability if enrolments continued above 15.

Brief instructional modules were written for each core topic. Because the textbook provided most of the content, the materials were produced as a commentary on the text with links to supplementary resources. The design retained a group activity focus in assessable project work. Of three assignments, only the second, weighted at 20%, was an individual task. The first, also weighted 20%, was a WebQuest (Dodge, 1997) about tools for creation of web-based multimedia, for which students were arbitrarily assigned to groups by the course leader. The third assignment required students, individually or in self-selected groups of up to 5 or 6, to propose, design, develop and evaluate a prototype for a web-based multimedia project and report on the process. This task retained the essential group activity from previous offers but, because the entire class did not collaborate on a single project, it was expected to be more easily scalable. The report requirement provided opportunity for students to demonstrate a grasp of more than the practical skills as was appropriate for a course in a masters program. The course was offered as described, with minor adjustments reflecting accruing experience, during each of five semesters in 1999 and 2000. Enrolments in the various offers were 9, 12, 7, 37 and 13. Over that period the typical composition of the classes changed to include a greater proportion of classroom teachers rather than industry trainers or instructional designers.

An issue that emerged related to group work. All of the students were part-time, most were in full-time work, and most were enrolled through a program which had a policy of permitting individual students to delay submission of work for up to a full semester thereby making it difficult to form effective groups (McLendon & Albion, 2000). In the first minor revision, group work was made optional. Thereafter most students chose to work individually.

A second issue arose from the requirement for students to propose an original project. It seemed that indecision about their project caused some students to delay their proposal and hence completion of the course. Many students selected current work projects, which had the advantage of being realistic and relevant but were prone to restrict students' opportunity to demonstrate their learning because certain forms of media were not justifiable in terms of the real project. A further consequence was wide disparity in the standards, both in difficulty and performance, of work submitted for assessment. Ensuring comparable assessment under these conditions was very difficult.

Finally, it was apparent that students found difficulty in meeting both the practical requirements of the project and the more theoretical demands of the reflective report. Most concentrated their efforts on the practical elements, which contributed equally to the assessment and were often directly related to their employment. As a consequence it was difficult to maintain the level of theoretical treatment required to justify inclusion in a masters program.

In revising 81530 for the 2001 offer, it was decided split the course. The 81530 course continued with the practical orientation implied in the course title. A new course, 81537 *Multimedia Applications in Education*, was created to deal with the theoretical aspects of educational multimedia.

Much of the course material from 81530 was retained but the open ended project work was replaced by a series of carefully sequenced required exercises. This approach was adopted to avoid the difficulty experienced by some students in selecting a suitable project and to ensure that, so far as possible, all students would gain a similar range of basic skills in multimedia creation. Activities were structured so as to allow students to reuse content once they had created it and to complete similar activities using different tools. In one example of such a sequence, students write a haiku, set it as text in a font of their choice and convert the text to an image for display in a web page. They subsequently embellish the image, animate it and record their own voice reading the haiku mixed with music or sound effects. The sound and image(s) are then presented first as a QuickTime movie and later using Macromedia Flash. This process affords students opportunity to practice a variety of skills without needing to generate large volumes of content and to compare the capabilities of various multimedia tools. Assessment of these components is by presentation of an online portfolio based on the individual activities.

The 81537 course is distinctly different. Students are provided with a variety of readings and are asked to prepare a proposal for a paper to be delivered in an online conference. The proposals are graded and students are each required to provide anonymous peer reviews of two proposals. The reviews are also graded. Using the grading and reviews for guidance, students complete their papers, which are presented online and used as the basis of discussion over a two week conference period. As a final activity students are required to select 8 to 10 papers from the conference and write an introduction to their collection. The design is intended to ensure that students have opportunity to pursue a topic of individual interest at depth as well as a requirement to gain broad familiarity with the field.

Both 81530 and 81537 have been offered during 2001. Student evaluations reported strong satisfaction with most aspects of both courses. Issues emerging in the earlier version of 81530 appear to have been successfully addressed.

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PT3 Technology Enhanced Lesson Plans for the Elementary School

Mary Kay Bacallao, Ed. D.
St. Thomas University
16400 NW 32nd Avenue
Miami, Florida 33054 U.S.A
mbacalla@stu.edu

Candace Lacey, Ph. D.
Barry University
Miami Shores, Florida, U.S.A.
clacey@mail.barry.edu

Joseph Furner, Ph. D.
Florida Atlantic University
Boca Raton, Florida, U.S.A.
jfurner@fau.edu

Tom W. Frederick, Ed. D.
Golden Glades Elementary
Miami, Florida, U.S.A
tomwfred@yahoo.com

Abstract: The concept of virtual teams is relatively new. However, a virtual team, like any other team, progress through various stages of development and is dependent upon the clarity with which performance outcomes and goals are communicated for achieving success. This presentation focuses on the analysis of the transcripts of on-line meetings of a PT3 virtual team composed of subject area team leaders and project administrators. The lessons learned from this experience helped develop an understanding of the role that clear communication and trust play in building bridges across the digital divide. Lessons from practice will include Internet Field Trips.

The St. Thomas University Plan to Bridge the Digital Divide in South Florida

A consortium of schools with St. Thomas University in Miami, Florida as the lead partner was awarded a PT3 Capacity Building grant during the first year of the PT3 program. The teacher education program at St. Thomas University serves students of many ethnic groups. It is located in an urban area with a large African American population along with immigrants from many Hispanic countries and the Caribbean.

The purpose of the initial grant was to work with area elementary schools, such as Welleby Elementary, to train the pre-service teachers at St. Thomas University and Trinity International University to use computers effectively in classroom instruction and thereby impact the diverse students in Miami-Dade County. The grant sought to train teachers who will not only teach in the inner city schools but stay in the inner city schools. By serving pre-service teachers who represent these underserved populations, the program sought to impact inner city classroom instruction.

What Has This Program Accomplished?

All of the program objectives were met in the first year and a three-year PT3 Implementation Grant was awarded the following year with more partners, including Florida Gulf Coast University and Golden Glades Elementary. The purpose of the Implementation grant changed the focus from the pre-service teachers to a team of professors, pre-service teachers, and K-6 teachers. It became apparent that, in order to effect systemic change, it was essential to train the professors. It was also essential that practicing K-6 teachers become an integral part of the process. Golden Glades Elementary, located several blocks from St. Thomas University, is a school with a student population that is completely either African American or Black American from the Caribbean. Florida Gulf Coast University is the newest Florida State University located on the West Coast of Florida and equipped with the latest technology in each college classroom.

How Did the Virtual Teams Work Together?

Subject area teams of professors, pre-service teachers, and K-6 teachers were formed. The teams focused on Math, Science, Reading/Language Arts, Social Studies, Exceptional Student Education, Curriculum, General Methods, and English as a Second Language. The focus on ESOL is important in Miami-Dade County because all teachers who are hired must also be certified to teach ESOL because of the large number of immigrant children attending school in Miami-Dade County.

During the first year, each team communicated on-line weekly. They met to discuss both successes and failures in their attempts to integrate technology into their classes. They also completed 50 hours of professional development in technology. In the second year, they worked together as a team to write and field test technology integrated lessons. It was determined that the convergence of learning that takes place in the classroom can be written in detail through lesson planning. The professors and pre-service teachers would begin their attempts to integrate technology into the curriculum with written lesson plans. With assistance from a new partner, BEACON, which hosts an on-line database of lessons, from Bay County, Florida, the professors and pre-service teachers worked together to write lessons that are field tested in the K-6 teacher's classrooms. In this process of working together, the professors and pre-service teachers learned about the technology available in the partner schools and the classroom conditions such as class size, high stakes testing pressures, and behavior management concerns that they need to consider as they write their lessons.

How Important is Technology Support?

The participants in this program have benefited from expert technology support. The support they have received seeks to decrease reliance on outside sources by empowering the participants to do things for themselves. The effort will be sustained when the federal funding ends as the participants learn enough about technology to be self-sufficient. Instead of the technology support specialist holding the mouse while others stand amazed, the learner maintains control of the mouse. The process is similar to learning how to drive. The technology support specialist is there to assist and direct, but encourages the learner to take charge.

Why is it Important to form a Collaborative?

The fact that this grant is applied for and awarded as a collaborative can serve to strengthen the work effort and bridge the digital divide. In the first year of Implementation, a cost share crisis developed for the collaborative at St. Thomas University. Two of the original partners, Trinity International University and The 21st Century Teacher's Network, dropped out of the program; their cost share commitment was lost. St. Thomas University also had a problem with resources whereby they were not able to meet the cost share they had committed. Because the PT3 program requires a matching commitment of funds, officials at St. Thomas University temporarily suspended the grant program until documentation of cost share could be established. This was where the title of the grant, "Bridging the Digital Divide in South Florida," became the reality of what happened. Representatives from Florida Gulf Coast University were able to supply the missing cost share. Other partners responded in the same way and contributed more then they had committed in the grant application. In this way, the digital divide was bridged because those on one side of the digital divide were able to rely on their partners to help them in a time of need.

On-Line Presence

Information about our project may be viewed at: http://garnet.fgcu.edu. To view these discussions, one may register for the PT3 Fall and/or spring courses and create an identity. Once this is done, posting will be enabled for the viewer. Our website also contains information that documents our workshop activities with our partners. Our website is located at: http://coe.fgcu.edu/PT3/home.htm.

Case Study: Internet Field Trips with Dr. Joseph Furner

Internet Field Trips in Mathematics are exciting. There is a need for technology use in mathematics teaching. This is emphasized in the National Council of Teachers of Mathematics Standards. There is a wealth of websites available for teaching math concepts using the Internet. Dr. Joseph Furner from Florida Atlantic University has participated on the Math team. His role as professor and lesson author has enabled him to produce lessons that can be used by his future teachers. He will present some sample lessons he has written with websites that are available on BEACON at www.beaconlc.org

National Educational Technology Standard-Based Lesson Plans Are Written

The technology enhanced lesson plans for the Fall 2001 Semester are written and can be viewed on the BEACON database. The website for BEACON is www.beaconlc.org Selected lessons will be shown at this session.

Technology In The Classrooms: New Designs for Learning

Dr. Gerald W. Burgess
Educational Technology Training Center
Albany State University
gburgerss@asurams.edu

Abstract: New learning technology implies a "new" way of learning. Yet, the reality is that much of what is taught using technology is being done in the same "old" way. Conventional classroom instruction may require teachers and training developers to rethink their approach to instruction. New millennium teachers and school leaders must have sufficient technology expertise to integrate technology into meaningful learning paradigms. The impact of technology on teaching, instructional delivery and school reform will require knowledge of technology as a cognitive tool which when used skillfully can bring diverse learners to higher levels of academic achievement and significantly change the way learning communities are developed. This paper revisits the instructional design process as a tool for integrating technology into the classroom.

Introduction

New learning technology implies a "new" way of learning. Yet, the reality is that much of what is taught using computers and multimedia is being done in the same "old" way. Making a paradigm shift regarding learning processes is not easy (Kahn, 1993). Conventional classroom instruction may require teachers and training developers to rethink their approach to instruction. Today's educational reform is based on student-centered teaching and learning in an environment not usually supported by the more traditional uses of computer technology (Morrison & Lowther, 2002). The 21st century information technology explosion and increasing demands for accountability for teaching results, are changing the way 1) schools are responding to learners and 2) preservice teachers and school leaders are being prepared for the classroom. New millennium teachers and school leaders must have sufficient technology expertise to integrate technology into meaningful learning paradigms. The impact of technology on teaching, instructional delivery and school reform will require knowledge of technology as a cognitive tool which when used skillfully can bring diverse learners to higher levels of academic achievement and significantly change the way learning communities are developed. Learning, at all ages, should follow a model that more resembles real life (Kahn, 1993). Morrison and Kowthler (2002) state, "Using computers as tools can help teachers create a student-centered learning environment. Students create an understanding of the world that will lead to the development of knowledge." Using technology to expand both teaching and learning broadens the teacher's view as well as the student's view of the world. History may be taught in the context of events that shape the evening's news.

Learners learn by experiences in a real world, problem-oriented approach and it is on that premise that a design for functional learning for staff, faculty, and students should become reality. Schools using technology, especially those teaching technology, should lead the way in their design and implementation as a model for other schools. The design should have more to do with how students learn, and less with hardware.

What is suggested here is that student-centered learning is favored over teacher-directed learning. This does not mean the teacher is excluded from the learning process. "The primary mode of teaching switches from one of lecturing to one of facilitating student investigation. Teachers work as facilitators and tutors to help students understand the material and to provide the necessary scaffolding (Morrison & Kowther, 2002). Further, when students are actively engaged in the learning they are more motivated and remain engaged longer than when in a teacher-directed approach. Establishing activities through the use of technology that allow for the learner to be self-directing and problem-centered increases the likelihood of the effectiveness of the learning.

Issues Confronting Reform Efforts

Teachers report little or no use of computers for instruction. Despite the growing numbers of computers in the classroom and the increase in available training, teachers are still finding it difficult to use the computer as part of their classroom delivery of content. Teachers have found their time to be very valuable and scarce (Mollison, 2001). What time is not spent on lesson planning is spent on grading, and that time not spent grading is other administrative duties. It is small wonder teachers can't find time to develop new or different instructional materials using technology they either don't have access to or don't know.

However, technology as a resource can help teachers cope with a growing paperwork load. Schools, businesses, and organizations have recognized that if they spend less time on record keeping and preparing materials, they can spend more time on productive endeavor (Roblyer, et. Al. 1996). Teachers can become more productive as they are trained in the use of technology and can gain quick access to information to help them and their students by meeting individual needs. Areas such as, word-processing, spreadsheets, databases, grade books, graphics, desktop publishing, online-communication, and test generation and scoring are just some of the few technology-based outcomes used to increase productivity.

Using technology can change the way teachers teach. Students need mentors with whom they can have effective dialogue. Approaches to constructive knowledge are full of alternatives. At any one time an individual may not be aware of all the alternatives. A negotiated discourse can enhance the student's capability to be a divergent thinker and more creative in nature. The teacher can play this role of a mentor and manager of this dialogue. The teacher directs the individualization and metacognitive skills to help the learner through the learning process (Atkins, 1993).

Increased communications is one of the biggest changes technology offers classroom teachers. On-line communication between teacher and student, teacher and parent, teacher and teacher, and teacher and information expands the dialog necessary to be effective. Let us not forget that teaching is still a human activity. Technology can offer considerable data, considerable of bits of information, considerable of interesting ideas, but if that information cannot be shared, discussed and used, it is lost. It is through this human interaction that ideas become creative thought and creative thought becomes a new product or service for humanity.

Helping teachers use technology effectively. Instructional Technology is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication and employing a combination of human and nonhuman resources to bring about more effective instruction. Having said that what contributions has technology made to teaching and learning?

One factor is that *instruction can be more standardized.* One section or one class taught by several teachers can have the same thread of knowledge by using technology.

Because of the various elements of color and motion, learning can be *more interesting.* We can go places with video that would be too costly or too dangerous for our students. Yet, they can have the same vicarious experience as being there.

Though the use of computers *learning becomes interactive.* Students can make choices and respond to those choices.

Learning time can be reduced. Much research has been done in this area. Although there still remains some questions as to specifically why time is reduced, student learn faster when using technology...and perhaps as a result the over all *quality of learning improves.* We find, for example, that teachers take care to develop high quality overhead transparencies and other materials for student use that has been fully integrated into the learning process.

Students have positive attitude toward technology. They simply like using technology. There doesn't seem to be an age restriction on these learners at all levels like using the various types of technology.

Finally, the *role of the instructor changes* from the possessor of knowledge to the facilitator of the learning environment. Teachers are free to develop instruction and to spend time with students in small groups, helping the ones who need help and enriching the ones who can absorb more.

A Conceptual Plan

According to John Hortin (1988), technology should be seen as a convenient instructional and informational delivery system... 'Technology is indefatigable, patient and objective; technology allows for individualization; and it is self-directive and interactive' (p. 217). A teacher's time is more efficiently applied through the use of technology. Technology can address the variability of learners and deliver selective, up-to-date, specialized topics. Technology today has made us reconsider instruction and identified the teacher's new role. One solution toward improving the quality of interactive courseware is to involve teachers in the development process. The solution to the confusion over which strategy to use is to develop courseware that parallels the way teachers teach. Educators need to rethink approaches that have more to do with getting students actively engaged in the learning, like simulations, where the learning grows as the students reasons through and solve each step of the puzzle.

Strategies for Planning Lessons

In planning technology-connected lessons, teachers need to keep in mind that technology is a tool that supports instruction. Teachers should view technology as a cognitive tool, which has the potential of reinforcing instructional concepts and encouraging inquiry-based learning. Technology connected lesson planning must take into account the teacher's teaching style, approach to learning, and goals for instructional outcomes.

The strategies outlined below will help teachers formulate their thinking as they consider developing technology-connected lessons:

1. Teachers should think creatively about the lesson and ways to enhance learning with the use of technology.
2. Teachers should focus on developing the critical thinking skills of students and how technology can stimulate this process.
3. Teachers should encourage students to take ownership and responsibility for their learning and how technology can encourage this independence.
4. Teachers should plan lessons that respond to the variety of ways students learn and use instructional support tools beyond the chalkboard and overhead projector.
5. Teachers should view technology as a rich resource to expand the boundaries of time and place when presenting instruction.
6. Teachers should encourage collaborative and collegial learning and use technology to support out of class interactions among students.
7. Teachers should help students learn how to learn by accessing the vast knowledge base that is accessible through computers.

These new roles require thoughtful reflection on the part of the teacher as to what is taught and how what is taught can be enhanced and supported through technology integration. How many times have you sent your students to the computer to accomplish a task and they end up playing, or becoming involved in the bells and whistles of a computer program instead of focusing on authentic learning?

A good way to overcome this is by planning for technology-connected lessons. This is an overwhelming thought for teachers who have had little experience with technology or who have had little technology training. The place to start is with the curriculum – the teacher's expertise. Technology-connected activities should be based on ideas and concepts that the teacher is teaching, with the activities being of critical importance to what students need to learn. As plans are developed, technology is used as the tool or the vehicle for acquisition, organization, evaluation and application of knowledge.

The use of technology is not an end state but an integration of instructional planning and learning strategies. Teachers should be able to conceptualize the curriculum and the connecting parts including the activities that make up the daily teaching events. This process is a systematic development process around the learning theory or integration model followed by the individual teacher. However, at thecore is the focus on what the student should know and be able to do. As a result of this thinking has come the establishment of technology and teaching standards, which are only part of the story. Reiser and Dempsey (2002) define the instructional development process this way..."The instructional development process encourages teachers to align goals (or objectives), tests, and teaching and to formatively evaluate and revise their test and instructional practices (Reiser & Dempsey, 2002). Teachers are then able to integrate teaching strategies and technology that is a "best fit" for the student.

The Instructional Development Process in Brief

In reviewing an instructional development process, the focus should be on the outcomes from each step. Each outcome provides the teacher with information or a product that directly affects the classroom environment. Teachers are then in a better position to make decision about instructional strategies and the integration of technology.
Analysis - a step to determine what to teach, where to teach, and who is going to be taught. The main purpose is to find out what the learner needs and what skills and knowledges are needed to accomplish that task or assignment. Collection of prior year's test scores or a pre-test may provide this information causing an acceleration or review of course materials.

Design - the way we're going teach in groups or individually. A target population description describes the student in terms of mental and physical requirements necessary or prerequisite skills, knowledges, and attitudes. Such information gives the teacher a collective view of this group of students. Objectives are written that capture what the learner will be able to do upon completion of instruction. Test questions are written during design. To ensure that tests adequately measure the objectives they support, the performance required in the test should match the performance required in the objective.

Development - the curriculum plan and materials to carry out instruction. The development phase is as the title suggests, the point where the instructional materials are written and assembled. The first step is to prepare a syllabus. A syllabus serves as the general plan for conducting instruction in a particular course and ensures standardization of the instruction while controlling the quality of the teaching-learning activity. The syllabus will also list for the student the references, tools and equipment, and the sequence of learning. For the teacher, the syllabus helps organize and sequence the material in a single document where lesson plans, computer technology, including the use of the Internet, and instructional materials are itemized.

Implement – to teach what we say were going to teach in an environment conducive to learning. Implementation involves the actual teaching of a unit, a lesson, or a group of lessons. Although important to the evaluation phase, the actual teaching is evaluated with input back to the design or development phase, whichever is appropriate.

Evaluate - looking at what you did, how you did it, and can you improve it. Collectively each step results in producing a syllabus, lesson plans, student materials, testing materials necessary for instruction. Evaluation is a continuous process that assesses how well course graduates are meeting the established job performance standards. The focus of evaluation is to improve the quality of instruction. It is that opportunity for the teacher to review what he or she did and make improvements for the next session.

Summary

Returning to the original theme, the integration of technology will require instructional development process with clear stated goals and objectives that give the teacher and the student clear direction in the learning. The impact of technology on teaching, instructional delivery and school reform will require knowledge of technology as a cognitive tool which when used skillfully can bring diverse learners to higher levels of academic achievement and significantly change the way learning communities are developed. As teachers apply technology, new ideas will develop and student's use of the technology grows. As students within both traditional and virtual 'classrooms' make greater use of the interactive power of computers (e.g. computer mediated communications and Internet) the boundaries between traditional education and technology-enhanced education are becoming blurred. We can see that technology continues to advance while what we are calling "traditional" instruction has yet to follow. Many classroom presentations are still in the lecture format and have not taken advantage of the available technologies. The gap will be bridged as teachers use the technology to create a student centered learning environment joined by a developmental process that clearly identifies what is to be learned and the outcomes of that learning.

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Floating with the Astronauts: Integrating Curricular Elements Through Partnerships with NASA's Educational Support Systems

Chris Chilelli, NASA, US
Caroline Crawford, UH-Clear Lake, US

Viewing live maps of the Earth from satellites millions of miles above the earth, watching the weather formations move across the United States of America, viewing starscapes and galaxies, talking with astronauts about different missions, looking at different aspects of the planets in our galaxy. So many interesting aspects that can easily be shifted towards opportunities for information within the PreK-12 learning environment. The National Aeronautics and Space Administration (NASA) realized that the data gathering journeys through out the galaxy offered opportunities for real-world educational endeavors to PreK-12 and higher education learners. Educators could easily integrate NASA's information into useful objective-driven tools which would not only offer real-world data structures with which the learners can work, but can also enliven theoretically-driven knowledge environments and make the learner's level of understanding exponentially expand when viewed through the eyes of NASA's elite researchers and scientists. Numerous subjects within the PreK-12 curricular areas of study could be impacted by NASA's educational endeavors, such as science, mathematics, English, and is especially useful when curricular advantages pertain to cross-curricular methods of subject-specific instruction. The educational entity at NASA Johnson Space Center offers opportunities for education-related organizations to work with real-world data structures and to view live, as well as digitally videotaped, educationally relevant sources of interest. The curricular elements that educators desire are designed and developed using the desires and lesson objectives specific to the needs of the learners, with the NASA partnership designed to focus upon higher order thinking skills and real-world impact upon the learners. Examples of NASA's educational support systems and partnerships will be further delineated in the proceedings paper as well as the presentation.

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Educational Technology Learning Plans for Student Scaffolding

Steven Coombs
Assistant Professor
Department of Curriculum Studies & Secondary Education
School of Education
Sonoma State University
1801 East Cotati Avenue
Rohnert Park
Ca. 94928-3609
USA
Tel: 1-707-664-3270 Fax: 1-707-664-2483
Email: steven.coombs@sonoma.edu

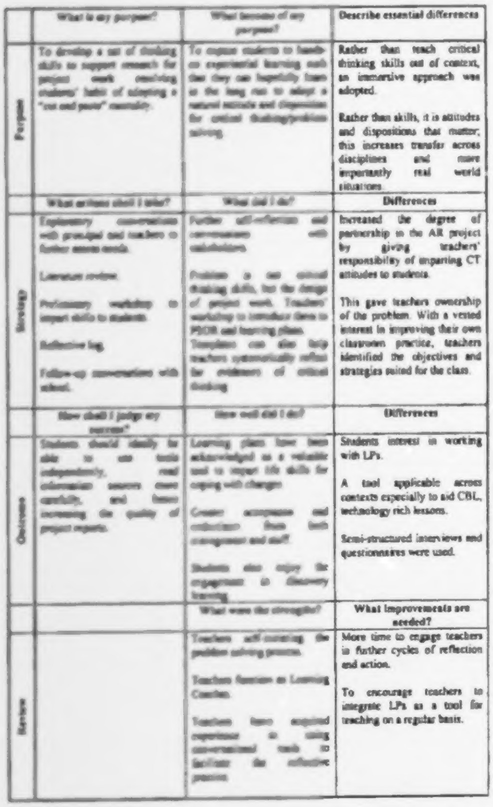
and

Vivien Lee Looi Chng
Lecturer
Temasek Polytechnic
21 Temasek Avenue 1
Singapore 529 757
Tel: 65 - 780 5870 Fax: 65 - 789 7413
Email: looichng@tp.edu.sg

We all know that lesson plans are introduced to initial teachers as an initial management tool for self-scaffolding organizational learning, but little work has been done to identify what defines the critical thinking process underpinning the instructional design of Educational Technology-assisted scaffolds for individualized student learning. Our research project has investigated and developed a pedagogical protocol for the practical classroom implementation of Learning Plans as a personal task-management scaffold for student-centred learning. The teacher's role in enabling self-organized learning for large groups of students can be achieved through the deployment of Technology-based Learning Plans, which converts teacher-centered curriculum management into student-centered learning tasks suitable for application both inside and outside of the classroom. This paper briefly considers the pedagogical practice behind this innovative curriculum reform initiative in the context of a recently completed research project in Singapore.

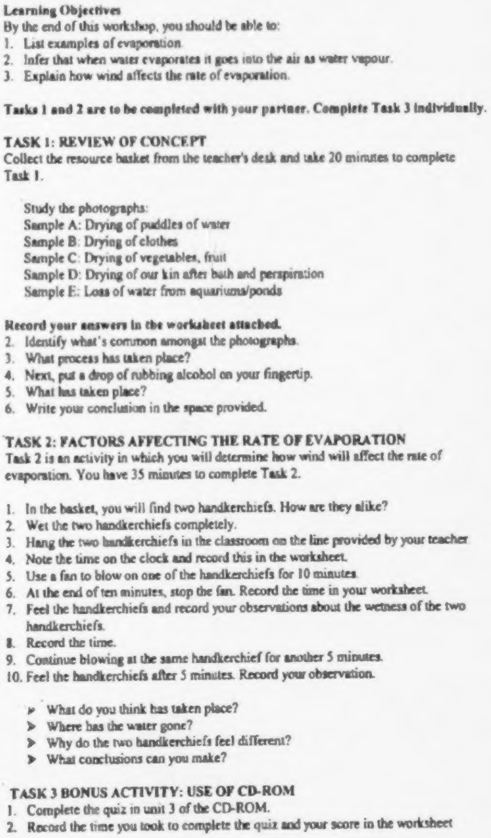
Overview of Learning Plans as Critical Thinking Scaffold Templates

Many countries throughout the world are currently investing heavily into implementing Educational Technology policies across the elementary, high school and tertiary sectors. The general belief is that computer learning resources can be a beneficial method toward implementing a more student-centred curriculum (Coombs & Wong, 2000). Many countries in south-east Asia, including Singapore, have national educational policies for implementing both Information Technology (IT) and critical thinking into the high school curriculum. The Singapore Ministry of Education considers that one way of achieving both these targets is through the curriculum adoption of student-centred project work (Ministry of Education, Singapore, 1999). The pedagogic quality and rationale of IT project-based courseware as a learning resource to support and improve the educational National/State curriculum is thus of considerable importance. It is our contention that project work can be delivered through a critical thinking schema that we call Learning Plans (LPs). These Learning Plans can be combined with a Personal Learning Contract (Coombs & Lee Looi Chng, 2001) and used to deliver a student-centred S-o-L curriculum - see figures 1 & 2.



	What is my purpose?	What becomes of my purpose?	Describe essential differences
Purpose	To develop a set of thinking skills to support research for project work resolving students' habit of adopting a "cut and paste" mentality.	To engage students in hands-on experiential learning such that they can hopefully learn in the long run to adopt a natural attitude and disposition for critical thinking/problem solving.	Rather than teach critical thinking skills out of context, an immersive approach was adopted. Rather than skills, it is attitudes and dispositions that matter; this increases transfer across disciplines and more importantly real world situations.
	What actions shall I take?	What did I do?	Differences
Strategy	Exploratory conversations with principal and teachers to further assess needs. Literature review. Preliminary workshop to impart skills to students. Reflective log. Follow-up conversations with school.	Further self-reflection and conversations with stakeholders. Problem is not critical thinking skills, but the design of project work. Teachers' workshop to introduce them to PSCR and learning plans. Templates can also help teachers systematically reflect for evidences of critical thinking.	Increased the degree of partnership in the AR project by giving teachers' responsibility of imparting CT attitudes to students. This gave teachers ownership of the problem. With a vested interest in improving their own classroom practice, teachers identified the objectives and strategies suited for the class.
	How shall I judge my success?	How well did I do?	Differences
Outcomes	Students should ideally be able to use tools independently, read information sources more carefully, and hence increasing the quality of project reports.	Learning plans have been acknowledged as a valuable tool to impart life skills for coping with changes. Greater acceptance and enthusiasm from both management and staff. Students also enjoy the engagement in discovery learning.	Students interest in working with LPs. A tool applicable across contexts especially to aid CBL, technology rich lessons. Semi-structured interviews and questionnaires were used.
		What were the strengths?	What improvements are needed?
Review		Teachers self-initiating the problem solving process. Teachers function as Learning Coaches. Teachers have acquired experience in using conversational tools to facilitate the reflective process.	More time to engage teachers in further cycles of reflection and action. To encourage teachers to integrate LPs as a tool for teaching on a regular basis.

Figure 1: Personal Learning Contract



Learning Objectives

By the end of this workshop, you should be able to:

1. List examples of evaporation
2. Infer that when water evaporates it goes into the air as water vapour.
3. Explain how wind affects the rate of evaporation.

Tasks 1 and 2 are to be completed with your partner. Complete Task 3 individually.

TASK 1: REVIEW OF CONCEPT

Collect the resource basket from the teacher's desk and take 20 minutes to complete Task 1.

Study the photographs:
Sample A: Drying of puddles of water
Sample B: Drying of clothes
Sample C: Drying of vegetables, fruit
Sample D: Drying of our kin after bath and perspiration
Sample E: Loss of water from aquariums/ponds

Record your answers in the worksheet attached.

2. Identify what's common amongst the photographs.
3. What process has taken place?
4. Next, put a drop of rubbing alcohol on your fingertip.
5. What has taken place?
6. Write your conclusion in the space provided.

TASK 2: FACTORS AFFECTING THE RATE OF EVAPORATION

Task 2 is an activity in which you will determine how wind will affect the rate of evaporation. You have 35 minutes to complete Task 2.

1. In the basket, you will find two handkerchiefs. How are they alike?
2. Wet the two handkerchiefs completely.
3. Hang the two handkerchiefs in the classroom on the line provided by your teacher
4. Note the time on the clock and record this in the worksheet.
5. Use a fan to blow on one of the handkerchiefs for 10 minutes.
6. At the end of ten minutes, stop the fan. Record the time in your worksheet.
7. Feel the handkerchiefs and record your observations about the wetness of the two handkerchiefs.
8. Record the time.
9. Continue blowing at the same handkerchief for another 5 minutes.
10. Feel the handkerchiefs after 5 minutes. Record your observation.

- ➢ What do you think has taken place?
- ➢ Where has the water gone?
- ➢ Why do the two handkerchiefs feel different?
- ➢ What conclusions can you make?

TASK 3 BONUS ACTIVITY: USE OF CD-ROM

1. Complete the quiz in unit 3 of the CD-ROM.
2. Record the time you took to complete the quiz and your score in the worksheet

Figure 2: Learning Plan

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When LPs are combined with an online learning environment that scaffolds learner thinking, we have what Coombs refers to as a "Knowledge Elicitation System (KES)" (Coombs, 1995, 2000 & 2001) and what Jonassen (1996) describes as a "Mindtool". Critical thinking scaffolds are explained by a pedagogical process called conversational constructivism (Coombs & Smith, 1998) and is derived from a conversational pedagogy called Self-organised Learning (S-o-L) (Harri-Augstein & Thomas, 1985 & 1991). A recent action research study (Lee Looi Chng, 2001) was completed in Singapore, which investigated Learning Plans as critical thinking scaffolds (Coombs, 2000) for delivering project work in Primary Schools and concluded that:

> *"As a content-free technology, S-o-L conversational tools are easy to use and findings from the mathematics and science groups do indicate that the conversational tool of the LP is indeed easy to apply across disciplines and cultures. The easy application of S-o-L tools is based on the process of reflective learning ,... [which has] wide appeal, being easily adaptable to the specific needs of each user"* (page 99).

Learning Plans have been designed as a critical thinking scaffold process that can be delivered within Educational Technology supported learning environments. Such Learning Plans are designed as IT-based critical thinking scaffold templates and operate as what Coombs (2000 & 2001) refers to as a reflective learning technology. This paper seeks to explain the process of how Learning Plans operate as critical thinking scaffolds for improved student learning (Lee Looi Chng & Coombs, 2001) and argues that Educational Technology content-free templates assist in that goal. Curriculum examples similar to those exhibited in figures 1 and 2, of both paper-based and online student Learning Plans, will be shared with the conference delegates, along with other conversational tools that operate as a user-friendly reflective technology (Coombs, 2000).

Conclusion

It is from the systems-thinking psychological model of self-organized learning that we can understand how to enable the conversational *fluency* of learner self-interaction through organized schemas of reflection. These reflective schemas can be designed as technology-assisted critical thinking tools (Coombs & Smith, 1999). The So-L instructional design process provides criteria (Coombs, 1995) for implementing knowledge elicitation tools that operate as a reflective learning technology. In practice, this calls for the design and development of an activities-based project work curriculum that recruits online Learning Plans as Educational Technology scaffolding tools, which empowers students with S-o-L skills that ultimately lead to greater personal retention and transfer of knowledge.

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Exploring the Characteristics of Effective ICT Teaching

Tim Denning, Keele University, UK
Tony Fisher, Nottingham University, UK

Abstract

The ICT workshop reported in this paper was funded by the British Educational Communications and Technology Agency (BECTA) and was designed with a particular focus on establishing and disseminating informed guidelines for effective ICT subject teaching. The invited participants were all ICT subject teachers with experience in their field. The event provided an opportunity for subject teachers and researchers to share and explore together successful teaching strategies associated with IT and then to begin the process of identifying the characteristics of good practice.

The workshop incorporated a number of different activities including short presentations, discussion, poster sessions and a plenary. Whilst the general tone was informal, it was hoped that everyone would be able to make an active contribution and benefit from the opportunity to discuss their work with colleagues. Delegates adopted two different roles during the course of the day, acting as either 'researcher' or 'poster presenter' depending on the schedule given to each group.

As 'poster presenters' each delegate was asked to display and answer questions about an activity which they judged to be an example of effective practice in ICT subject teaching. As 'researchers' each delegate gathered data from the poster presenters using, as a starting point, a framework of questions provided by the organisers:

Activity Title:	Witness Name:
Learning outcomes intended	What are the objectives? What knowledge, understanding or skill was developed/extended?
Audience	Who are the learners? What do they know/understand already? Why would they need to do this work?
Rationale	Why was this approach or strategy chosen? Was there a particular view of how learning might take place?
Resources	What materials or resources are used?
Assessment and Evaluation	How did you or could you evaluate the results or assess the learning that has taken place?
Key Processes	What are the important characteristics or features of the activity? What has made it effective?

Invitations were sent to some 35 schools in South Cheshire, North Shropshire and Staffordshire in the English Midlands. Twenty-eight colleagues accepted the offer of a workshop place although four of these later presented apologies either immediately before or on the day of the event.

The workshop support team comprised 2 researchers/teacher educators from higher education and 2 school-based members of staff engaged in IT subject teaching and teacher training partnerships.

This paper is organised around the rationale underpinning the design of the workshop model and presents a representative selection of the outcomes. These comprise a tentative list of 'characteristics' of good practice, annotated extracts of material presented in the poster sessions and the transcribed workshop evaluations.

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The Assessment of Higher-Order Thinking Skills in a Web-Based Distance Learning Project

Pat Donohue
Dakota Science Center
NatureShift! Linking Learning to Life Project

John Hoover
St. Cloud State University
Department of Special Education

Abstract

The Natureshift! (NS) project investigates the impact on learning of its *Exploration* model, a constructivist, project-based learning model that delivers instruction through its web site – www.natureshift.org. The web site supports educators from formal and informal education to develop higher-order thinking skills (HOTS) in their students. In the NS model, web-based adventures serve as a hook to draw students into engagement with social studies and science concepts. Once students have explored one of the web site's five immersive learning worlds (modules) that form the core curriculum of the site, the educator initiates a related real-world experience, forming a nexus between the virtual and phenomenal world. In the final phase of the model, students produce summative projects in which they construct meaning from what they have learned and present or teach their discoveries to others. Kozma (1991) suggests that multimedia helps many students to construct knowledge based on the characteristics of the medium to incorporate symbol systems and processing capabilities understood by the learner. Initial findings reveal that *Natureshift's* web-based instruction appears to engage students in higher-order thinking skills and constructing meaningful learning from their virtual and real-world experiences. A strength cited for the NS modules (Hoover, 2001) was the strength of the links to other web sites and the sheer number of visual images made available for educators and students.

Initial Evaluation

In an initial round of evaluation, it was determined that the web site's modules were well designed visually, interactively, and pedagogically. In addition, connections between the NS model and best practices in conceptual development had been established. Finally, NS personnel had redesigned the modules to reflect expert critiques and the project's goals for perfecting the NS model and its presentation through web-based instruction. The *Exploration* learning model was also adopted as a method for training educators in the model and in the project's learning strategies. Early findings from a partner Institute and a national training Institute reveal the model's effectiveness for teaching others its constructs and theoretical base. Other findings suggest that the instrumentation designed to assess learning was useful, that training activities were successful in developing technology-based skills and pedagogical application of these skills. The latter sets of skill and knowledge components were objectively assessed (Hoover, 2001).

Measuring HOTS

In the presentation, the authors describe efforts to assess higher-order thinking skills featuring (a) objective evaluation of pedagogical skills on the part of adult participants, (b) depth-of pedagogical knowledge components (established via rubrics applied to interview data), and (c) student/end-user outcomes. The innovative feature of end-user evaluation data is that each Natureshift Partner project was assessed individually—yet in a manner that allowed data to be combined, project wide. Outcomes of the assessment data are described, as are challenges in tracking learning at least one stage removed from the project. In addition, use of web-site use and tracking data is described in detail.

Constructivism and HOTS

A number of theories that try to explain the processes associated with learning and with high order thinking have been developed. The web design and the site development of *NatureShift!* are based on principles associated with constructivist learning and with higher order thinking skills (HOTS) more generally. A system for assessing students using the *NatureShift!* application that is consistent with principles of constructivism and with higher order thinking was developed.

Constructivist theories of learning depict concepts as systems of relations among what a learner has already mastered and new information. The degree of association among the learner's knowledge, the new information, and the learner's beliefs about the concepts vary. At times, the new information is consistent with the learner's knowledge and beliefs; at other times, the new information is markedly different from the learner's knowledge and beliefs. In constructivist theories of learning, higher order thinking is the ability to discuss and to apply concepts in a manner that is consistent with experts in the field. Rather than simply measuring the ability to recall facts and data, constructivist assessments attempt to determine not only what a student has learned but also to determine how that learning has occurred.

It is also assumed that learning is heavily based on the establishment of a context for information—the more this learning context resembles the domains where learned skills are to be expressed, the better the instructional sequence is assumed to be. In the present case, the web site(s) and classroom applications serve as frameworks for learning context.

Constructivist and HOTS assessment

Constructivist assessment requires methods for gathering data on what has been learned and also how the new learning is related to previous learning. Previous reviews of the literature (e.g., Jonassen, Beissner, & Yacci, 1993) have identified several approaches for eliciting this information; the most common approach is rating the association between a pair of words.

Developing Instruments

An alternative method was developed for assessing the student gains from the project. In summary, partners were trained at the summer workshop to develop a system for assessment of student learning tied, as closely as possible, to the information and skills reflected in the specific project developed by that partner. The following specific steps were taught to partners:

1. Develop five factual and questions about the information associated with your web-based project.
2. Develop five questions about technology aspects of the project.
3. Develop essays (one each) that elicit information about (a) higher-order thinking skills, and (b) use of technology in learning.

Initial findings are that the NS model (a) successfully results in "deep" forms of pedagogical knowledge in teachers and others trained in the model. (b) It was found that NS partners could clearly, and with a high level of sophistication, explain the connections between discovery and constructive-based theories of learning and the application of technology (including some misgivings that match extant research literature). (c) Natureshift Projects resulted in statistically significant changes in nearly all students' knowledge-level skills and in some students higher-order thinking skills (though these proved difficult to track). (d) The NS model for combining technology and constructivist approaches to HOTS is a useful one that should be easily replicable.

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Essential Instructional Design Competencies for Library Media Specialists

Elizabeth Downs, Georgia Southern University, US
Stephen J. Jenkins, Georgia Southern University, US
Judi Repman, Georgia Southern University, US
Randal Carlson, Georgia Southern University, US

The role of the library media specialist is a dynamic practice that demands versatile skills. The contemporary library media specialist has clearly defined responsibilities as teacher, instructional partner, information specialist, and program administrator (AASL and AECT, 1998). The expectations described for the role of instructional partner include assessing student, identifying content, identifying learning outcomes, designing learning tasks and assessments, and selecting appropriate resources. An analysis of the role of instructional partner and corresponding responsibilities indicates a need for a strong foundation in instructional design.

Although library media specialists describe the role as important, less than 10% indicate that they perform the role to any great extent (Pickard, 1990). Pickard suggests that one explanation for the discrepancy might be the result of differences between the theoretical construct of instructional design and the real-world applications practiced by library media specialists. This difference should influence the approach used for training library media specialists in instructional design. The need to increase meaningful applications of instructional design in the real-world practice of school library media specialists requires feedback from practitioners. The first stage of this project will include surveying regional school library media specialists to assess job-specific applications of various components of the instructional design process. Results of the survey will guide the selection of an instructional design model to match relevant components with the most common or frequently identified applications. Secondly, feedback from the survey will be used to structure the design of course activities. Integrating applications identified by practitioners into the course structure will provide a framework to guide prospective media specialists in the connection between theory and practice. Course activities will draw from feedback provided by practitioners so students will have an opportunity to apply instructional design to a project that reflects meaningful application of systems theory to the role of instructional partner. The school library media specialist must possess skills that form the basis of successful cooperative planning with teachers, often taking the lead in guiding essential decisions in the instructional plan. In order to be successful in the role of instructional partner, prospective school library media specialists must extend beyond mastery of instructional design knowledge.

Competence in this role requires the ability to perform critical assessment of an instructional problem, select appropriate components of instructional design for a given instructional situation, and identify appropriate solutions. The ability to perform these skills might be enhanced if real-world applications drive the selection of an instructional design model and the ensuing course activities.

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Constructivism And Designing Virtual Learning Environments

Begoña Gros
Departament of Theory of Education
University of Barcelona
Barcelona (Spain)
bgros@d5.ub.es

Abstact: The main goal of this paper is to discuss the main contributions and limitations of constructivism in the design of virtual learning environments. Constructivism is currently a label used for many approaches and it is necessary to improve the definition and delimitation of the different theories and models arising from generic principles on learning. The greatest virtue of the constructivist approach is that it provides a complex approach, which may help to improve the education and training necessary for living in the modern world. Nevertheless, there is a lack of integration of the different proposals within the constructivist approach that enables a systemic vision of the design of learning. Designers must have time to reflect on action. In fact, the current design process should itself be a focus for study.

We will place the main problems of designing constructivist environments in four categories: content of the tasks, sequencing of the tasks, transferral and co-operation.

Introduction

One of the most important problems facing education and training today is probably that most instructive approaches do not correspond to the needs of today's children and young people or the type of society in which they live. The separation of knowledge, the communication of information, the one-directional teacher-student model, and the idea of knowledge as something static are set against a much more dynamic and complex vision of knowledge. As Morin (1999) states, today's teaching must become educational teaching; "it is not a question of communicating pure knowledge, but rather a culture that enables the understanding of our condition and helps us to live. The challenge of the whole is also the challenge of complexity (11)". However, we learn to isolate objects, separate disciplines, solve problems but not to relate to each other and integrate. It is difficult, especially for children, to learn to contextualise knowledge. School behaves in the opposite way to current social development – "it is not a place where knowledge is flexible, but rather the place in which some knowledge is transmitted and classified. The place in which knowledge becomes sedentary, gets older and becomes static" (Simone, 2001, 41). However, knowledge is the organisation and the interrelating and placing in context of information and experiences that we acquire with the passing of time.

Human cognition is complex, and is reflected in the ease with which new problems are recognised and creative solutions found to solve them. There is a great deal of discussion concerning the need to centre learning on abilities and not to worry so much about knowledge. However, it is advisable to distinguish between learning abilities and abilities themselves. Abilities are always related to a particular part of knowledge or with a trade. In fact, they are a mixture of complex cognitive strategies, interpersonal abilities and attitudes which enable someone to show themselves to be in a specific field of knowledge or in a profession.

Contrary to what is frequently suggested, we do not believe that the problem of today's society is that it is more complex than in the past. Instead, we are realising the need to start from systemic models that enable us to have an overall view of the way society works. From this point of view, we feel that the constructivist ideas have a common feature, which is that of focussing design on the creation of complex environments permitting multiple representations and which show the completeness and complexity of learning and the construction of knowledge.

In this contribution we intend to maintain that constructivism is currently a label used for many approaches and it is necessary to improve the definition and delimitation of the different theories and models arising from generic principles on learning. The use of technology from the constructivist perspective leads to highly varied metaphors for the learner: The student as a designer, as a reflexive learner, as a member of a learning community. The greatest virtue of the constructivist approach is that it provides a complex approach, which may help to improve the education and training necessary for living in the modern world.

Constructivism: a label for many approaches.

The label *constructivism* is being increasingly used but is being applied to many different approaches. Piaget and Vygotsky are the two most important authors who started research into learning using the constructivist approach in the twentieth century. There has been a great deal of discussion regarding the differences between them, with Piaget's stance on the importance of individual learning as opposed to social learning subject to a great deal of simplification. Personally, I believe that it is an error to compare the two authors (apart from their analyses of the role of language) because their approaches are not opposing but rather complementary, and concentrate on different aspects of the same situation.

Piaget does not deny the role of the social world in the construction of knowledge, but concentrates on analysing the relationship between a person and his/her environment. For Piaget, learning takes place when the new information interacts with prior knowledge by means of an assimilation-accommodation process, the result of which is the modifying of prior patterns of knowledge or the creation of new patterns. For Piaget, learning must be significant, and only significant learning is able to modify a person's patterns. To obtain significant learning it is necessary to favour the connection between prior experiences and knowledge and new knowledge. To this model of subject-medium interaction, Vygotsky adds features that play a very important role in the learning process – the tools that mediate between interactions and the people who "accompany" the subject during the learning process.

According to Vygotsky, man's superior cognitive processes are possible thanks to constant interactions between tools, environment and symbols. In this respect, "the function of the tool is none other than that of a conductor of human influence on the object of the activity, it is externally directed and must cause changes in objects. It is a medium by means of which external human activity aspires to dominate and triumph over nature. On the other hand, the symbol changes absolutely nothing in the object of a psychological operation. It is therefore a means of internal activity that aspires to dominate itself; the symbol, is therefore internally directed. These activities differ so much from each other and that the nature of the media they use can never be the same in both cases."

The concept of appropriation is a move from a biological metaphor to a socio-historical one. Appropriation is therefore a key concept from the Vygotskian perspective inasmuch as it is used to postulate that through immersion in culturally organised activities, the child appropriates tools, instruments and symbols belonging to each society. The appropriation of socially constituted interpersonal functional systems leads to cognitive representations that the subject includes in his mental structure. The computer, taken to be a tool in the sense used by Vygotsky, introduces another totally new form of interaction with information, knowledge and with other people, different from other media so far used.

The theories of Piaget and Vygotsky have led to different approaches and uses of technology that provide us with significant advances in the field of instructive design, as can be seen in Figure 1.

Many designs have been developed, based on Piaget's point of view, taking the student as a designer as the model's starting point, and emphasising the importance of learning by discovery. Meanwhile, from the Vygotskian perspective, the student is seen as a researcher, with a great deal of importance placed on learning in context and on co-operation within the learning community.

	PIAGETIAN APPROACHES	VYGOTSKIAN APPROACHES
Metaphor for the learner	The student as a designer	The student as a researcher The student as a member of a community
Didactical approach	Learning by discovery	Learning in context Learning in co-operation
Use of technology	Microworlds Cognitive tools	Learners' articulation and expression Communication tools Shared learning
Working approaches	Constructionism: S. Papert, I. Harel, M. Resnick (Media-Lab)	Learning based on problem-solving, cases, projects Distributed cognition Situated leaning (learning communities) Collaborative learning
Teaching methods	Simulation, role-playing, games, case studies, Socratic method, guided learning, scaffolding, learning by teaching, co-operative learning, collaborative learning, learning by designing.	

Figure 1: Constructivism approaches.

Designing learning environments

In the constructivist framework, the emphasis is not on teaching, but rather on contexts or learning environments. In traditional approaches to teaching, it is the designers that take the decisions regarding what students have to learn, in what contexts they should learn, what strategies they should use to attain this knowledge and how this acquisition should be evaluated. The constructivists substitute these conceptions for a more flexible concept of learning, in which the learning process is not so pre-specified. Design is an iterative problem-solving process that should be modified according to the results obtained.

Constructivist learning environments can be defined as "a place where students can work together, helping each other, using a variety of informative instruments and resources that enable them to search for the learning objectives and activities for solving problems." (Wilson, 1995, 27). The design of multimedia materials and use of the Internet can facilitate student-centred work. Figure 2, based on the ideas of Oliver and Hannafin (2000), presents a taxonomy of constructivist tasks and the requirements of web-based tools that can help in their development.

Constructivist Tasks	Tools to support Active Student Processing of Web-Based Resources
Plan appropriate tactics, establish personal or group goals	Action of goal manager: web-based project planning
Discuss or debate internal conceptions and receive feedback	e-mail, listservs, bulletin boards, videoconferencing
Seek and collect external information	Bookmarking, digital drop boxes, Globe Web, etc
Organise external information into internally coherent framework	Software to construct t ables, charts, diagrams, timelines, concept maps, etc
Generate new information	HTML text editors, web page generators, collaborative web editing, word processors, etc
Manipulate external information and variables to test and revise internal hypotheses or models	Simulations, microworlds.

Figure 2. Taxonomy of constructivist tasks

The design of a learning environment goes far beyond the computer material itself as the entire organisation must adopt this type of approach for it to be really effective. This is clearly shown in Jonassen's conceptual model (1999: 195).

Real life situations which help to put problem solving into practice and their subsequent transferral to other real situations are significant contexts for constructivists. For this reason, they oppose the lineal presentation of information in education, as this stresses memorisation and the acquisition of knowledge and abilities in an isolated manner, which is often out of context. The constructivist alternative to memorisation and activities out of context is to place greater emphasis on learning contexts that enable knowledge to be constructed, organising the contexts with activities that are closer to the real world and which normally involve discussion groups.

Limitations and possibilities of constructivist learning environments

We can place the main problems of designing constructivist environments in four categories: content of the tasks, sequencing of the tasks, transferral and co-operation.

Content of the tasks.

As has been mentioned throughout this article, the constructivist approaches emphasise the idea that knowledge is not something that can be written in a book and transmitted to students, but rather that knowledge is something complex that must be constructed by learners, and learning based on tasks or solving important problems may be a way to reach this type of learning. However, we believe that learning environments defined as environments in which the student works on a relatively complex task provide better opportunities for learning and transferring what has been learnt to other situations. The problem, however, lies in the origin of the learning tasks. What is an authentic task? When is a task motivating? Normally, as van Merrienboer points out very clearly, constructivists substitute tasks based on the world of knowledge for those based on the world of experience or work (in the case of university teaching or in-company training).

This substitution of the contents of knowledge for the contents of experience or work causes some problems. In schools, students' learning can be highly diverse according to the particular circumstances of each group. This aspect is positive but is also dangerous in terms of the lack of overall and integrated vision that is generated. Moreover, authentic tasks in childhood are always mediated by the teacher, meaning that the limits between the children's real interests and what was previously agreed upon by the educators are unclear. From the point of view of the learning medium, it is not easy to anticipate all the tools that the learning environment will have to provide the student with so that he/she can carry out the task or solve the problem. To solve or create problems, it is necessary to have a good command of content. At times, the constructivist perspective seems to underestimate or neglect this aspect.

Sequencing of the tasks.

Another complex aspect is the design of sequences of cases or tasks. As Collins, Brown and Newman point out (1987) "the ability to produce a coherent and appropriate sequence of case studies and problems (i.e., learning tasks) is a key feature in the design of constructivist learning environments". In many cases it seems necessary to go from the simple to the complex, and on the other hand, we can find many examples where there is evidence that the exact opposite is necessary. J. Merrienboer (1999) gives a very good example of this with the case of training students in instructive design. A student cannot start by moving from the simple to the complex without reviewing and evaluating previously produced material, for example.

Transfer.

ll the constructivist theories seems to be convinced that learning in context with authentic tasks improves transferral, makes it possible to apply what has been learned in a school environment outside school, and vice versa. However, this is not an easy statement to prove and in fact we do not think it has been proved in the research into the consequences for learning of the design of multimedia and web materials. This is an extremely important aspect but one which without a doubt needs a systemic research approach that has not been used to date. In our opinion, this is still the greatest challenge of research in this field where the analytical approach is still very much used, although I consider it unsuitable for research into the effects of this type of environment. According to Reeves, research shows that students learn both with and from technologies, but "we know very little about the most effective ways to implement interactive learning. In fact, the need for long-term, intensive research and evaluation studies focused on the mission of improving teaching and learning through interactive learning technology has never been greater" (Reeves, 1999).

Co-operation.

"Collaboration" refers to the fact that a group of people work together on a task. However, much has been written about how best to define "collaborative learning". A frequent point of departure is to draw a distinction between two terms that are often used interchangeably: "collaborative" and "co-operative" learning. The main difference between these terms concerns the nature of the task being carried out and the role of the group members in achieving the task. In a collaborative learning process, two or more people are required to learn something together; what has to be learned can only be accomplished if the group works in collaboration. Therefore, the group needs to decide how to achieve the task, which procedures they will adopt, how they will go about dividing up the roles, etc. Communication and negotiation are fundamental in a collaborative learning process. In contrast, co-operative learning requires a division of tasks among group members. For instance, the teacher proposes a problem that the group needs to solve and indicates who will be responsible for obtaining references from the library, who will conduct a web search, who will report back on the findings, etc. Dillenbourg's definition is clear on the matter: "a situation is termed 'collaborative' if peers are (i) more or less at the same level and can perform the same action, (ii) have a common goal, and (iii) work together" (Dillenbourg 1999, p.9).

While classical CBL (Computer Based Learning) and most of the current multimedia are designed to support an individual process of learning, in recent years an increasing number of systems that support group learning has been produced: programs that encourage learning in collaboration, videogames to be played in a group (without any element of competition), systems that facilitate communication and negotiation, the production of materials that involve written collaboration, and so on. In a computer mediated collaborative learning situation, the level of interaction is very important. As M. Barker (1999) points out, in order to achieve real learning, grounding and appropriation have to take place.

Grounding is the name given to the interactive processes by which common ground or mutual understanding between individuals are constructed and maintained. Grounding can take place on pragmatic and semantic levels. Interacting participants need to understand each other, learn to collaborate and/or have a common understanding, common domain of the task, meaning, etc. however, reaching this level of relationship is not easy in practice.

To sum up, we feel that although the greatest virtue of the constructivist approaches is that of providing a complex approach that can help to improve the education and training necessary fo living in today's society, a greater degree of integration of the different ideas which enable a systemic vision of learning environment design is preparation for a do-it-yourself theory is necessary.

We give the name of a do-it-yourself theory to the systemisation of the principles of instructive design, which are able to explain the most suitable type of designs based on different educational and training needs. Designers must have time to reflect on action. In fact, the current design process should itself be a focus for study.

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ENHANCEMENT OF SELF STUDYOF TEACHING PRACTICE VIA CREATION OF VIDEO ETHNOGRAPHIES

R. Carl Harris
David O. McKay School of Education
Brigham Young University, Provo, Utah
Carl_harris@byu.edu

Abstract: Documentation of benefits of self-study on teacher education practices has gradually emerged during the past decade. Concurrently, the development and exploration of video cases or video ethnographies has also emerged and research on their impact on teaching and learning is likewise underway. However, little attention has been given to the combination of self-study and video ethnography methodology and pedagogy. This symposium will highlight five individuals who share the common attribute of having each created a video ethnography. They will each report self-study data on their respective video ethnography CD-ROMs of how the exploration of their own and someone else's teaching using video ethnography methodology has drawn attention to and elicited questions about their own professional journey.

Perspective: Documentation of benefits of self-study on teacher education practices has gradually emerged during the past decade (e.g., Connelly & Clandinin, 1999; Whitehead, 2000; Hamilton & Pinnegar, 1998; Cole & Knowles, 1998). Concurrently, the development and exploration of video cases or video ethnographies has also emerged and research on their impact on teaching and learning is likewise underway (e.g., Harris, Pinnegar, & Chan, P. 2000; Pinnegar, Harris, & Chan, 2000; Pinnegar & Harris, 1999; Harris, 1999; Harris, 1998); Harris & Harris, 1998; Harris, 1996; Harris, 1996; Harris, 1995; Harris, 1994). However, little attention has been given to the combination of self-study and video ethnography methodology and pedagogy. This symposium will highlight five individuals who share the common attribute of having each created a video ethnography. They will each report self-study data of how the exploration of someone else's teaching using video ethnography methodology has drawn attention to and elicited questions about their own professional journey.

Video Ethnographies Defined: Video ethnographies are cases of true and actual practice. The teachers studied are not actors and neither are their students. There is no effort to sanitize the challenges of teaching nor understate the effort teaching for active learning requires. The complex performances of teaching and learning can be positioned for deep and insightful analysis. When live teaching is observed there is much that goes unnoticed because so many things are happening at once. However, with video ethnographies pre-service and in-service teachers are invited to make multiple observations and interpretations of single episode.

The platform for each case is a CD-ROM or Internet interface which allows pre-service and in-service teachers to explore and build studies of practice. The "study explorer" provides for inquiry into four studies, 36 video probes and 144 commentaries. The "study builder" enables the pre-service or in-service teacher to create an infinite number of original studies of teaching practice with commentaries from self, professional literature and other teachers. Portions of a case can be studied from the perspective of the teacher, the student, another more advanced teacher, the professional literature, etc. and their own perspective.

Teachers and students who submit to having their teaching and learning documented and analyzed have a strong voice in deciding what will be most helpful to share with other teachers and learners who want to implement active learning.

Using Video Ethnographies: Use of this technology engages users in an inquiry driven experience in studying teaching practice which will lead them to use in inquiry driven approach in their own practice. Pre-service and in-service teachers metaphorically climb inside another teacher's classroom: viewing not only the way the teacher constructs the practice but also the thinking of the teacher, students, and other professionals about practice. Using this technology requires the use of a new pedagogy of practice, since it demands that pre-service teachers are required from the beginning of their teacher education experience to grapple with their own theories and beliefs about teaching practice through inquiry into the practice of others.

Creating Video Ethnographies: Creating a video ethnography includes choosing a master teacher, acquiring media releases, filming in the classroom, negotiating with the teacher and specialists which attributes of the classroom to study in depth, conducting interpretive interviews with the teacher, other teachers, administrators, scholars, students, parents, etc. editing the video capture, identifying relevant quotes from the professional literature, and then assembling video, audio, and text files together so they will run on either the CD-ROM or Internet platforms.

Self Study During Video Ethnography Creation: During the process of developing the video ethnographies, numerous opportunities confront the educator/producer of the video ethnography to question and reflect on his or her own professional development. The five educators featured in this symposium have installed their reflections about their own teaching in the perspectives contained in each case as they have gone through the numerous stages of creating video ethnographies of their own teaching.

Featured Educators: The five video ethnography self-study teachers and their respective video ethnography products are: 1. A Teacher Educator and Literacy Specialist (The Canda Mortenson Case: A Video Ethnography of Balanced Literacy in the First Grade); 2. A Pre-Service Teacher in an Educational Psychology Class; 3. A Teacher Educator and Physical Education Specialist (The Robyn Bretzing Case: A Video Ethnography of High School Volley Ball); 4. A Doctoral Student in Instructional Psychology and Technology (The Traits of Thinking Case: A Video Ethnography of Mandrin in Senior High School); 5. An Undergraduate Student in Elementary Education (The Mom, Dad, and Me Case: A Video Ethnography of a Pre-Service Teacher's Study of Her Parents' Teaching).

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Hand-Me-Downs: Reusing Online Courses and Building Courses for Reuse

Susan Hines, Eduprise, Inc., US

Colleges and universities invest heavily in the production of online courses for their virtual universities and online extensions. However, a growing number of institutions may be jeopardizing their up-front investments unwittingly. That is, in the rush to put degree programs online, too many courses are developed in haste--often by inexperienced or over-committed instructors--or developed in such a highly personal or idiosyncratic fashion that courses can be of little use to future instructors who might inherit such courses or teaching assignments.

At the very heart of a flexible and cost-effective online education system is the inheritability and reusability of course content. Yet colleges and universities with online programs have demonstrated little regard for what makes an online course inheritable and reusable. While many statewide systems, schools and universities have turned to course management systems, such as WebCT and Blackboard, in order to establish some semblance of order and consistency, what they have gained is arguably that—*some semblance*.

This presentation will position the course management system as a *means* not a *method*, and will illustrate the kinds of the problems and restrictions instructors may face when they inherit online courses. It will also address the undermining potential of such problems and restrictions: the time/labor costs involved in necessary course revisions and the ethical dilemmas of authorship and academic freedom. The proposal fits into a number of SITE topic categories, including PT3, Concepts and Procedures, Distance Education, Faculty Development, Instructional Design, and Special Needs.

Teacher Education from an Instructional Design Perspective

Esther Javetz
Elgin Community College/
National Louis University
United States
Teaching43@aol.com

Abstract: This paper is a report on the findings of the first part of a study conducted in teacher education classes and related activities. Situations and materials were recorded with audio equipment or with notes taken by the researcher. Qualitative techniques were used on the data to determine teaching methods and performance level of preservice teachers. Findings indicate that teachers see themselves mostly as affective leaders or non-specific cognitive leaders. They also do not exhibit all the skills needed to teach. Instructional design theories and procedures are suggested to enhance teacher education.

Introduction

Instructional Design and Teacher Education

The March 1994 issue of *Educational Technology* was dedicated to the relationship of instructional design and teachers' planning (Branch 1994, Driscoll et al. 1994, Earle 1994a, Earle 1994b, Garbosky 1994, Kennedy 1994, Martin 1994 and Reiser 1994). The type of instructional design described in these articles was a systematic approach (the ISD concept), but behavioral in nature.

However, the field of instructional design changed in the 1980s to adopt a cognitive learning theory and later a constructivist theory (Driscoll 1994, Ellis et al. 1993, Gagne' 1985, and Reigeluth 1983). We should investigate to see whether newer learning theories and instructional design procedures are currently taught in teacher education programs, and whether they are applied by new teachers in schools. The onset of calendar year 2002 reminds us that we are at the beginning of a new century, which is a natural point in which to pause and evaluate our profession.

The Importance of a Learning Theory and a Notion of Subject Matter Structure

Teacher planning has been traditionally focused around the concept of "activity" or "routine"(Yinger 1979). The use of activities has the advantages of providing tasks for individuals, groups, or a whole class. Behaviors are controlled and motivation and enjoyment are observed. Every lesson requires more activities, but are they tied to the learning level needed (concept learning, problem solving, etc.)? Do teachers have a strong sense of subject matter and curriculum in order to select key concepts and rules? In short, are activities "chained" to make both "learning sense" and "subject matter sense"?

People who envision a new system of education for this century (Reigeluth & Garfinkle 1992) see a different type of teacher, ("more a guide on the side than a sage on the stage" p.17). But the teaching environment is not that different from what we perceive today:

> It might be [a] traditional, discipline-oriented area such as biology, a cross-disciplinary, thematic area such as pollution or cities, an intellectual area such as philosophy, or a technical area such as automobile maintenance and repair.
>
> In all cases ...the cluster guide will be responsible for helping the student put together a program of study that represents a good progression of higher-order skills instruction. (Reigeluth & Garfinkle 1992, p. 19)

It is assumed that producing a higher-order skill level requires a preexisting stock of meaningful amounts of structures such as discipline-specific structures or other types of structures.

Becoming Teachers

Typically, certain coursework, professors, and practicing teachers are all involved in developing a person to become a teacher. Specifically, towards the end of their bachelor degree program, students take general education courses and specialized methods courses (dedicated to a subject matter). They are also assigned to schools, where a cooperating teacher provides support, and where they teach their first lessons. Supervising teachers visit these schools to evaluate these first lessons. In addition, groups of teachers -to-be get together in seminars to share these experiences.

Sometimes, throughout these different components, a theory of learning/instruction is being presented and becomes the pillar of the program (Gleason 1991).

The Study

A pilot study is currently under way at a multi-branch university that has provided a teacher education program for many years. The principal investigator is following a group of 14 preservice teachers with an audio recording machine. Four avenues of learning are being recorded and analyzed: 1) lessons given by teacher educators, 2) discussions and sharing by the prospective teachers as they help each other, 3) presentations of final projects (a three lesson unit) and 4) lessons taught by the group members in area elementary schools.

The principal investigator is looking at *relevant concepts and theories* presented to the teachers-to-be, the *type of presentation* (verbal information, practiced concepts and rules, or encouragement for transfer), and the *application of the theories* into their first lessons/presentations. Clearly, this study is focused on the cognitive aspects of learning and teaching, keeping in perspective that there are also other elements needed in an elementary school teacher's "tool box."

Once all the data is collected and analyzed, strengths and weaknesses of the teacher education program will be identified. Later, this pilot model will be expanded to additional branches, and then to other institutions.

Findings

At this stage of the study, the analysis of the Science-Methods course has been completed. The data consists of audio recordings of lessons, the principal investigator's notes, recordings of final presentations, and a recording of a relaxed interview session in a restaurant.

(Tab. 1) reveals the achievements of the preservice teachers in their final project presentation. It seems that they are still missing important tools, and therefore, their lessons sound like a list of materials and activities where there is no sequence, no strong relationship to the subject matter, and sometimes no notion of developing knowledge in the children's minds.

Strengths	Need Improvement
Materials/Technology	Lesson planning: objectives
Hands-on activity	Lesson planning: sequence
Independent activity	Unit planning
Subject matter Ideas	Subject matter structure awareness
Connection to other subject areas	Assessment
	Learning theory
	Method awareness

Table 1: Evaluating Final Projects in a Science Methods Course

(Fig. 1) presents the data analysis from when preservice teachers each answered the question: "what is teaching?" When the answer was categorized as affective, it was typically similar to the following: "I think teaching is to prepare students for the adult life, being a role model for them, teaching them how to make choices, not just academically, but in every area of their life." When the answer was categorized as cognitive non-specific, it was typically similar to the following: "I believe teaching is giving or helping students attain strategies for being lifelong learners, so they can attain anything that they want to do " When the answer was categorized as cognitive-specific it was typically similar to the following: "For me, teaching is the ability to give children the ability to find knowledge on their own. You teach them many facts, you transfer much of your knowledge to them, but what they need after school is the ability to acquire knowledge on their own and being able to continue on."

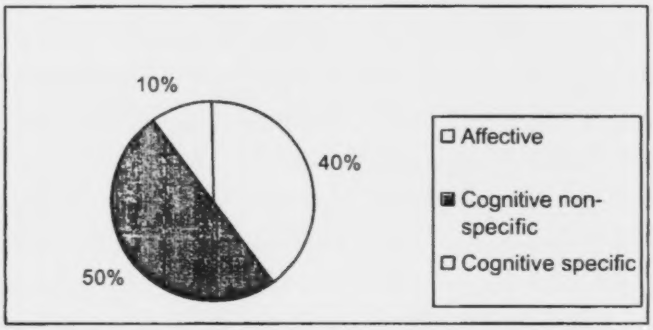

Figure 1: Preservice teachers' types of responses to "What is teaching?"

As shown from these responses, most of this group of preservice teachers does not have a theory for specific cognitive intervention.

One way to explain this level of performance by the preservice teachers is to examine the input phase. (Tab. 2) shows that the theoretical portion of the course was cut short. The instructor preferred statements (Activity 6) to well developed theories (Activity 4). The bulk of the learning was achieved via the verbal information type (Gagne', 1985). See Activity 4 and Activity 10. The feedback from the instructor signified acceptance rather than an evaluation of the level of performance (Activity 14).

The instructor's assumption was that the preservice teachers were afraid of science, so they needed "easy" assignments and direct talk about that fear (Activity 9).

One of the best activities in the Science-Methods class was Activity 12. It provided many examples of topics and supporting materials. However, examples might not be as easy to follow when concepts and principles are not provided.

Activity	Duration
1) Group experimentation and later sharing w whole class to find independent and dependent variables	long
2) Collecting a large sample of botanic items, including definition without any prior instruction	long
3) Comparison between science lab in different grade levels	short
4) Each group read about another method and presented to the class: Constructivism, expository, free discovery, guided inquiry, conceptual change, equilibrium and disequilibria	Short for each element
5) Teacher discusses and gives examples about student prior beliefs in science matters	long
6) Teacher recommends that "curriculum should be tied together" w many examples	long
7) Students were brainstorming about alternatives to the botanical project	long
8) Teacher's statement: it's the quality of the understanding rather than the quantity of information presented	short
9) Many teacher statements like: I want to expel your fears…	Short but repetitive
10) Students paraphrasing articles from sciece teaching magazines	long
11) Students work w different assessment examples	short
12) Teacher teaches the concept science-technology-society-issue through discussion and Internet browsing	long
13) Discussions about the students' field experiences	long
14) Teacher's feedback: Good job. That's wonderful. Very good	N/A

Table 2: Teaching methods in the Science-Methods class

Conclusions

The principal investigator will continue to follow the group of preservice teachers as they complete the 4th and last year of the teacher preparation program. However, even from the early data (consisting of just the Science-Methods class), it can be seen that this type of learning is not strong enough to foster a full understanding of science, to understand the learning process, to provide the professionals we need in the new century to bring children to a problem solving level, or to foster teaching for transfer (Perkins & Salomon, 1988).

The preservice teachers exhibited difficulty in coming up with an assessment piece for their units. They saw several examples during the course, but could not find one matching their situation. If provided with instructional design knowledge (e.g., concept learning, rule learning, etc.), they could have easily written objectives, come up with a method/treatment, created an assessment, looked at prior achievements and planned further teaching. A theory is required in order to drive the many elements needed for effective teaching.

The program is also theoretically mixed. The preservice teachers were briefly trained to write behavioral objectives, but the examples of assessment were of different, unrelated types. For instance, they were exposed to the method of journaling. What type of objective does this assess?

The two major elements necessary in a program are a learning/teaching theory and a subject matter understanding. These two should have been covered before the Science-Methods class (through prior coursework), as well as during this class. Thus, there should be a 'whole program' focus rather than a system of dealing with one course at a time.

Institutions can use studies such as this one not only for program evaluation, but also for quick improvement. I have already begun working with the Science-Methods teacher to improve the subject matter component in the next semester.

Teacher education may improve significantly when seriously incorporating instructional design theories and procedures. We should keep in mind that teachers are expected to perform better in the new century.

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Using Pedagogic Scenarios to Optimize Pluri-Media Resources: The Contribution of the *Scenistic Approach* to Designing Skills-Based Learning Tasks

Sylvie Leleu-Merviel, Nicolas Vieville and Michel Labour
Laboratoire des Sciences de la Communication
Université de Valenciennes et du Hainaut Cambrésis, France
michel.labour@univ-valenciennes.fr

1. Introduction

Faced with a fast changing society, the need to develop versatile instructional materials to update the professional skills of experienced practitioners, be they those of teachers or sales assistants, has become a major necessity. Long gone are the days when the creation of such training[1] material happened within the hallowed halls of specialized educational institutions. Instead, a more client-driven approach to professional training has led many educationalists to look at how the reality of the work place (office, factory floor, classroom) and available resources, notably information technology (IT), can contribute to the learning process. It is in this context that we will outline the framework of how a series of instructional fragments for a Digital Versatile Disc (DVD)-video, *Voilà Madame*, was created by systematically harnessing the resources of pedagogues, learners and management.

The value of this project for teacher trainers and instructional material-makers lies in the possibility of transferring the operational framework of this project to other contexts where a premium is put on helping professionals in the field (e.g. classroom teachers) to be more aware of their verbal and non-verbal behaviors. This is of particular interest to those working in the fields associated with communication sciences (e.g. face-to-face interaction, verbal & nonverbal communication) and the linguistic field of pragmatics[2], for example in the teaching of English/French/etc. as a professional language.

First, in Section 2, we describe the framework for analyzing the needs of the training context and its practical implications. This is followed in Section 3, by an explanation of the five-step *Scenistic Approach* with its *diagesis, scenario, scenation, scenic* and *setting up the situation* phases in terms of the overall structure of a training DVD-video, called *Voilà Madame*, and its role vis-à-vis other teaching tools, like those of IT. Finally, in Section 4, we present a discussion of the pedagogic implications of our approach.

2. Analysis of the instructional needs

In this particular context, the analysis of the instructional needs can be summarized in three basic questions: (1) Who are the immediate stakeholders[3]? (2) What are their expressed needs and wants? and (3) What are the desired outcomes? The answers to these questions provide a basis for establishing the parameters of the instructional context and the ensuing "pedagogic scenario".

2.1 Who were the immediate stakeholders? The principal direct stakeholder was a regional human resources director in charge of supervising and distributing new instructional materials to all the managers of one of France's major chain stores in the region of *Nord/Pas de Calais*. Other significant stakeholders were: the managers of each of the different chain stores of this northern region of France on the border of Belgium; the company's trainers and; the sales assistants as the end-users of the instructional material.

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[1] Definition: "Training" in this context implies a "planned process to modify attitude, knowledge, or skill behaviour through learning experience to achieve effective performance in an activity or range of activities. Its purpose, in the work situation, is to develop the abilities of the individual and to satisfy the current and future needs of the organisation" (Manpower Services Commission, UK, 1981) Lesson 11, *B.A (Hons.) Business Studies*. Bolton Institute, UK cf. http://www.bolton.ac.uk/campus/business/babus/humanresource/restricted/hrm_lesson11/hrm_lesson11.html(Retrieved9.12.2001. The Welsh concept of *hyfforddi* (to train) offers the complementary notion of "making the way flexible" for the learner, as opposed to *addysgu* (to educate, to instruct) based on the Latin notion of *scala*, (ladder, "a climbing device").

[2] Definition: By linguistic *pragmatics* is meant the study of meaning and language use that is dependent on the interrelationships of the speaker, the addressee, and other features of the context of utterance that influence both the means of expression and the interpretation made of an utterance cf. http://www.ling.gu.se/~biljana/st1-97/pragmalect1.html (retrieved 7.12.2001).

[3] Definition: A *stakeholder* represents groups of people or individuals that can have an influence, in this case, on the training needs. Researchers R. Oudman, A.M. Vos, and J. Biesboer review various methods of "Stakeholder Analysis" at http://panoramix.univ-paris1.fr/CRINFO/dmrg/MEE98/misop001/ (retrieved 27.10.2001).

2.2 What were the stakeholders' expressed needs and wants? The issue to be addressed was the upgrading of sales assistants' professional skills by regular and varied in-house training sessions. This meant that new instructional material had to be versatile, so that it could be used both in a traditional, face-to-face instruction, as well as for personal self-study. Furthermore, the technology to be used had to be that which already existed in the work place i.e. VHS videotapes, paper-based documents and email. Interactive multimedia resources, like the DVD-ROM, were excluded because it meant buying new equipment (e.g. multimedia computers) that would exceed the training budget.

2.3 What were the desired outcomes? The essential objective was to show sales assistants how to adapt their verbal and non-verbal behavior to the needs of customers. This was to be done by helping the employees to better understand company policy in dealing with customers. In this context, the instructional material had to help learners become more efficient in their sales techniques by focusing on practical problems that customers encounter at the stores.

3. Scenistic Approach

The principle of the *Scenistic Approach* (Leleu-Merviel 1996) is to provide a framework of scripting a series of "events" in a way that it ensures overall coherence and transparency in the design process. The technique has five major steps: (1) the diagesis, (2) the scenario, (3) the scenation, (4) the scenic, and (5) the setting up of the situation.

3.1 Diagesis: This involves everything that belongs to the imagined/proposed setting of the document as expressed through the (lesson) content. This includes taking stock of, for example, the different educational paradigms and approaches (cf. LABOUR *et al.* 2001) that could be used to achieve the objectives identified in the analysis of the instructional context.

In this case, it was decided to use a self-monitoring approach to problem-based learning, centered on skills-reinforcing tasks. This meant that learners would be systematically encouraged to first identify possible dysfunctions in the scenes presented to them, followed by choosing the appropriate solution to remedy the situation. In this way, learners, some of whom have up to 25 years experience in their job, would be called upon to use their existing knowledge to critically reflect on familiar professional situations. It was hoped that by using such a constructivist inspired approach (cf. Jonassen *et al.* 1999) new knowledge would graft itself onto existing knowledge structures.

One of the practical consequences of reflecting on the diagesis, led to one of the pedagogue-designers of the production team to go on a three-day training course with one of the company's sales teams. This permitted the team to have a more direct understanding of learners' pedagogic needs.

3.2 Scenario: The scenario represents a deliberately thought-out text that has a storyline (closely associated to a series of meaningful events), details of the author's intention, a projected target audience, and a message. In so doing, it constructs the narrative and represents the « story » as it unfolds. In this way, the scenario provides a guide to subsequent choices concerning the production of the document.

The 23-page scenario of the project, called "*Voilà Madame*[4]", was based on notes taken during the three-day training course, and from interviews with sales assistants, heads of departments and management of the company. This led to some major modifications in what the client wanted, notably not to limit the training to VHS videotapes but to also use the DVD-video[5], which was not too expensive and offered, for example, more "interactivity[6]" than videotapes. For the sake of economy, we cannot present the original scenario in any detail, except to say that it has 18 specially written scenes with a playing time of 22 minutes. (A more complete picture of the details of such a pluri-media scenario can be found in a recent paper presented by Labour & Benoit 2001).

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[4] According to Scene 10 of the scenario, the term *voilà Madame* ("Here you are Madam") said as a farewell phrase to a client is to be avoided. When concluding a conversation with a client, one must say *Au revoir, Madame* (Goodbye, Madam) and not, as in this scene, *voila Madame*, a term used to indicate the handing over of a requested object to someone.

[5] The DVD-video, made available in the USA in 1997, can store over two hours of video on one layer of the disc. Compared to a VHS videotape, the DVD-video can make seamless skips from one scene to the next in the sequence chosen by the viewer without waiting while the tape goes backwards or forwards. Commentaries, subtitles, alternate endings and additional language tracks can also be added onto a DVD, which offers a high quality picture and sound quality and can scan, pause and chapter access, and as a laser reads the DVD there is no wear and tear, or loss of fidelity over time.

[6] Definition: By *interactivity* is meant the possibility of action-reaction choices that the system gives to users (cf. LABOUR 2001, p33, 37-44).

In broad terms, after learners have viewed an appropriate narrative fiction recorded on the DVD-video, a series of face-to-face skills-based training tasks can be done on a particular point, for example, in weekly workshops. In this context the observation sheet for Scene 1 (Figure 2), translated from French, shows the pedagogic approach provided for by the scenario. After observing the scene on the DVD-video as many times as necessary, the learner is asked to identify recommended behavior ("Positive points") from dysfunctional behaviors ("Negative Points", "Problems related to manners or behavior"). Finally, some "points of reflection and development" are suggested for further discussion on-line (e.g. by e-mail) or off-line, or for self-study.

The DVD-video is thus only one aspect of a pluri-media learning package (Figure 1).

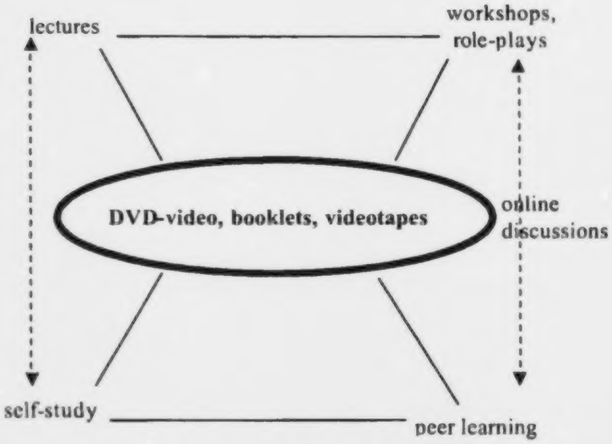

Figure 1: A skills based training scheme

Scene 1: Prologue and answering the telephone
Length: 1 minute 30
Start mark: 1mn20. Stop mark 2mn53
Staff concerned: all

☺ **Positive points**

PQ1	The person picks up the telephone after the 4th ring (or after the 3rd ring).
PG3	The person is not chewing gum.
PQ6	The waiting time is less than 30 seconds.

⊗ **Negative points**

PQ2	The person does not mention the company's name.
PG2	The person does not mention the name of the store where s/he works.
PQ2,7	The person does not say "Good morning".
PQ2,7	The person does not present him/herself with his/her first name.
PQ7	The person does not indicate in which department s/he works.
PQ3	The person replies in a muffled voice without articulating.
PQ4	The person does not reply to the client's question.
PQ4	The person does not connect the person to the correct department.
PQ8	The person replies in a disagreeable way, making it clear to the client that s/he is tedious.
PQ5,9	The person does not say "Goodbye Madam" at the end of conversation.
PQ5,9	The person does not add a friendly word, nor a polite one at the end of the conversation.

✍ **Problems related to manners or behavior**

- The person interrupts the client while s/he is speaking.
- The person asks the client to call back later.
- The person hangs up on the client.

☞ **To go further, points of reflection and development**

- The person justifies him/herself by mentioning the problems in the store: "I am alone". How could the person have avoided this situation?
- The person gives a negative image: "I don't know". What should the person have said?
- One should never ask a client to call back. What should one do?

Figure 2: An observation sheet for *Voilà Madame*

3.3 Scenation: The scenation is the text that organizes the events or states, taken from the scenario, as *operationally* interacting elements. It can be equated as the routes that learners could take. The scenation is comparable to the text of a play "on paper" but it is not the theatrical performance itself.

To make maximum use of the video document the objective was to provide a set of meaningful units that would facilitate an intuitive navigation of the document for learners and trainers. But, the essentially linear format of the video documents provides a limited amount of interactivity, so users of the DVD-video could only access the scenes via a *Menu of themes*, or an *Index of scenes* (figure 3). The *Menu of themes* contains a series of sub-themes/contexts of everyday situations (e.g. in the parking lot) and is aimed more at learners. Whereas, the *Index of scenes* is directed more at instructors who wish to present a teaching sequence around certain objects (e.g. household appliances).

3.4 Scenic: The scenic transposes the scenation into concrete, hands on reality. It is at this stage that one makes aesthetic and logistic choices within the limits of the practical and financial constraints, conditions of usage, etc. (see Section 2 above). This includes the choice of the medium for a given fragment taken from the structure of the scenation (*e.g*. text, sound, or both together) in order to facilitate the acquisition of knowledge.

In this case, the colors of the company were chosen as the guiding color scheme to present the interactive pages of the DVD-video. Blue, pink, yellow, green and orange hues were added to identify the five different themes in order to facilitate user-navigation and to make the document more attractive.

The choice was confirmed to use the DVD-video in order to maximize the use of the pedagogic material, even if ideally a DVD-ROM, with greater potential for interactivity, would have been preferable.

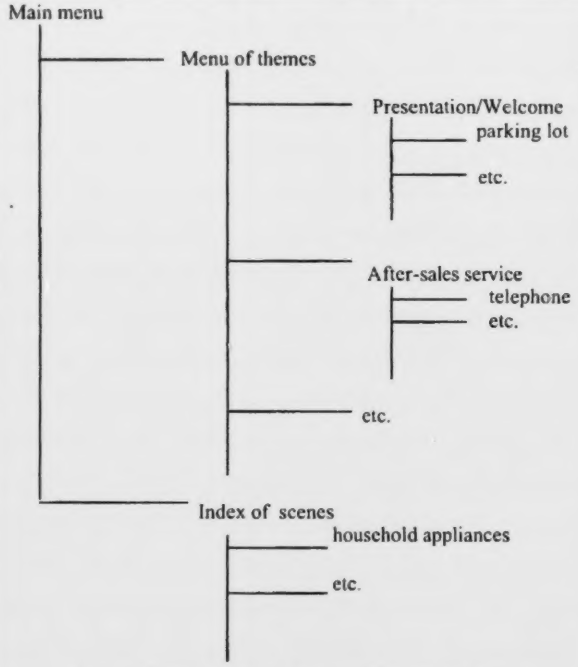

Figure 3: Navigation schema of *Voilà Madame*

3.5 Setting up the situation: This final phase defines the practical ways that the user can in fact access the (video) fragments of the document via user-functions. On a computer, this could be a button, an icon, a joystick, and/or a mouse-click.

In the case of a DVD-video one of the main user-functions is the *remote control box*. Unlike, for example, the "mouse" of a DVD-ROM, the remote control box does not provide an on-screen pointer to facilitate non-sequential navigation in the document. The challenge of the DVD-video and its remote control box is then the danger of potentially laborious linear and sequential navigation.

Taking into account the factor of limited navigation possibilities, 15 icons were created to help learners go through the document efficiently. In this way, the relatively few interactive possibilities of the DVD-video format could be put to profitable use.

In order to get maximum use of the specially written scenes, a 25-page booklet was also made for learners, and a separate one for trainers to help them use the material pedagogically. This was linked to more general guidelines concerning the different skill-based learning tasks possible that could be done online and offline with the DVD-video (Figure 1).

4. Discussion

Without taking the details of his observations too literally, Treicher (1967) reminds us in his book, *Are you Missing the Boat in Training Aids? Audio-Visual Communications*, that most people "learn" (retain) 10% of what they read, 20% of what they hear, 30% of what they see, 50% of what they both see and hear, 70% of what they discuss with people whose opinions they value, 80% of what they personally experience, and 90% of what they teach other people. In short, a training program should go beyond providing teaching aids that learners can both "see and hear". The pedagogic scenario of instructional materials needs also to focus on the human interactional elements of learning to include meaningful "discussions", transforming inputs into "personal (pedagogic) experiences", and "teaching" other people (e.g. peer learning). In this light, the video/film format offers some specific advantages, as highlights the film historian Turner.

> ... (with) the abandonment of the idea that there was a core of meaning in a film which the audience had to discover. Meanings are seen as the products of an audience's reading rather than as an essential properly of the film text itself. Audiences make films mean: they don't merely recognize the meanings already secreted in them (Turner 1988:121).

A training scenario should then, for example, get learners to discuss how they saw a scene and how this relates to their personal experience and its future implications for them. It is in such domains that network-based technology like the Internet (with its discussion forums, chats, emails, etc.) can facilitate learning by communicating with different people. That said IT, like Internet, is not in itself pedagogic. What makes these tools so, is the appropriateness of what is put in them (content) and how this is done, hence the need for operational frameworks such as the *Scenistic Approach* and other related ones (e.g. Laubin 2002) aimed at making optimal use of the content.

5. Conclusion

In this paper we hope to have taken a step towards reconciling the design process with the need for accountability and transparency in presenting the *Scenistic Approach* as a working framework for designing teaching resources. The flexibility of this approach makes it transposable to other teaching contexts in schools and universities seeking to prepare learners for real-life situations.

The originality of this work and its relevance to IT-based training lays in its attempt to optimize the use of a single visual and audio recording in adopting a pluri-media approach to instruction. A lack of space has not permitted us to present fully the scenario, save to say that such a scenario can be complex and needs careful and systematic planning and team work, hence the need for a transparent operational framework like the *Scenistic Approach*.

Finally, it is our contention that the *Scenistic Approach* can allow an economy of scale, and of time and effort in optimizing available resources for maximum efficiency. This is a crucial factor, as it is our working hypothesis that the more teachers see how their IT-based creations can be optimized, the more they are likely to use IT in their everyday practice.

Abstract

One of the challenges of lifelong education is creating instructional materials to encourage adults to renew what they feel they already know. This is especially true, in the field of professional training, with experienced practitioners and where information technology often plays an important role. Using a *Scenistic Approach* to plan a series of teacher-led and self-access "lessons", specially written video sequences were reused in various ways so as to optimize the time and effort of material makers. This included making access to the content matter more attractive and more varied so that learners can acquire knowledge in their own way. To do this a series of hybrid pedagogic techniques was used, which included traditional lectures, role-plays, a self-study video, a DVD-video and learning *via* an electronic network.

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INFUSING TECHNOLOGY INTO THE CLASSROOM: A CASE STUDY IN INTERDISCIPLINARY COLLABORATION

Philip Lewis, M.S. and John Hildreth, M.A.
Radford University, McConnell Library, MultiMedia Center, USA
October 18, 2001
plewis@radford.edu

Abstract:

Effectively incorporating technology into the classroom is paramount at many K-12 and university institutions. Both administrators and faculty have seen pronounced increased in effective learning through the use of multimedia technology when presenting any subject. However, not all teachers can be expected to learn the complex applications that enable effective instruction to their students. New forms of interdisciplinary collaboration need to be invented and investigated. These new forms should incorporate technology more readily and effectively while having a low impact on the already over-burdened schedules of faculty and teachers. Following are the results from a case study of a unique form of support developed through Radford University library's MultiMedia Center and Music Department.

Introduction:

The course, entitled Introduction to Film Music (MUSC 373, Computer Music Composition), incorporates an historic survey of film music media including literature, recordings and film as well as composition assignments. In the assignments, students are required to learn the parameters of different eras' film music and technology (including the limitations) and then create their own soundtracks to "audio blanked" film clips. The assignments were edited on a computer and presented in VHS or CD format to the class. The course's curriculum is based traditional collegiate education themes combined with technology via a collaborative, co-instruction effort between a university music professor and multimedia technologist.

Technologies and composition practices of each medium and time period are presented chronologically and are studied, discussed and experienced through assignments. From Radio to modern film, each era (compositionally and technologically) is delivered.

Results:

The collaboration of the two professionals is mutually educational. Issues arising regarding the intense areas of traditional music and contemporary technology were discussed and resolved by information from both sets of expertise. The findings from this experimental case study offered profound results:

1. Instructors do not bear the burden of 'learning it all' before they incorporate technology into the classroom. In this case study, both professionals concentrated on their expertise and were able to offer students a higher level of scholarship because they were not required to focus on or fumble through unfamiliar subject matter.

2. Instructors are involved in faculty development as they simultaneously impart and absorb expertise in their relationship with the co-teacher. Traditional faculty development in technology requires faculty to attend application-training seminars, often with mixed results. A faculty member may be required to learn an application for up to 100 hours before developing the multimedia materials, which necessitates further time investment. Further, the success rate and information retention is variable at best.

The collaboration offered each instructor an opportunity to learn key features of the other's discipline. Teacher and student alike learned from the classroom presentation of materials offered by each instructor as well as through the preparation of each lecture. This form of faculty development offers a timely and efficient manner of technology training. Further, a higher success rate of information retention was achieved.

3. The student benefits from the interdisciplinary delivery and application of course materials, part of which include the dual perspectives and expertise of the faculty. Moreover, students enjoy a fresh approach and are better informed as a result. By having two professors from different disciplines, the students are able to pose questions to each instructor and draw interdisciplinary parallels between the two professions.

Conclusion:

This course represents an intuitive utilization of resources, and the student reaction makes it an exceptional experience for all persons involved. At its core, this case study evidences a situation of one faculty member actively seeking another for technological and educational insight. Logically, the scholarship of both instructors increases as a result of the collaborative sharing and dissemination of applied knowledge both inside and outside the classroom. The outcome is an interactive, cross-disciplinary study that yields highly successful faculty development while also creating a new and exciting environment for student learning.

As technology is further incorporated into the classroom, it is important that instructors and administrators look for non-traditional ways to create better learning environments through multimedia. Traditional paradigms regarding faculty development-style 'tech training' cannot account for all the learning that is needed in the ever-changing instructional technology field. The case study presented here is simply one way of accomplishing this end.

Film:

A 25-minute documentary film was produced from in-class footage of interviews and discussions, as well as instructor interviews, commentary and samples of student work. This film reveals in detail the efforts made by the instructors, outcomes of the assignments by the students and a candid discussion on issues of teaching collaboratively. The film offers further insight into the results of the experiment and is available from the authors. Contact plewis@radford.edu to order your copy.

University Faculty Needs and Desires:
Support Model During Web-Basing and Web-Enhancing Courses

Caroline M. Crawford
University of Houston-Clear Lake
United States of America
crawford@cl.uh.edu

Kat Ley
University of Houston-Clear Lake
United States of America
ley@cl.uh.edu

Abstract: University faculty consistently weigh the expectations associated with teaching, research and service. Through the faculty desires to support the success of the learners, numerous faculty have waded into the murky waters of Web-basing and Web-enhancing their coursework. The experience, knowledge and interest associated with designing superior Web-based and Web-enhanced coursework must be shared with university faculty venturing into this new arena.

Introduction

University faculty have numerous expectations placed upon them through out their professional career. The teaching, research and service expectations can, at times, exceed the capacity of even the brightest and most focused of professionals. Adding the time and effort that is required to follow the instructional design process for Web-basing and Web-enhancing coursework, the faculty have nary enough time to complete their duties. Therein lies the crux of the situation; the best and brightest faculty are immersed in the teaching, research and service expectations of their careers, yet they are the ones with the experience, knowledge and interest in designing superior Web-based and Web-enhanced coursework for the learners.

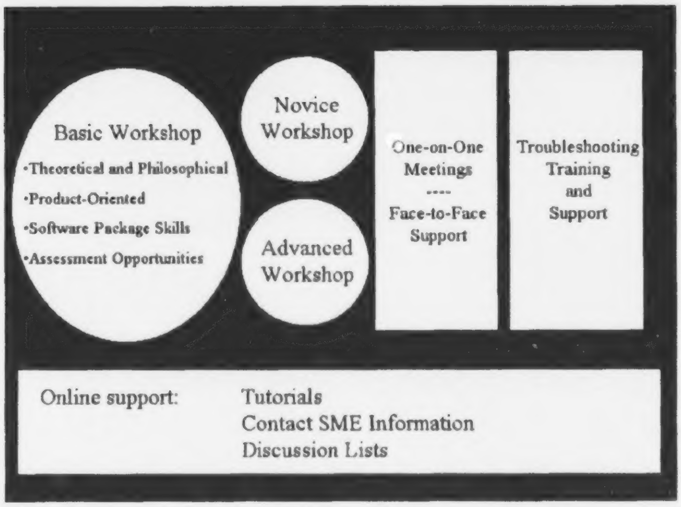
So as to take some of the pressure off of the faculty, it is imperative to design a support model for faculty endeavors that will encourage the brightest, best and busiest faculty to seriously consider Web-basing their coursework. Support models take numerous directions, with all-inclusive support models not necessarily being the most appropriate for the university under consideration. The progression of a smaller university through the Web-basing and Web-enhancing of upper-level undergraduate and graduate coursework has developed and revised support models that have worked well, worked with some successes, as well as barely supported faculty with the desire to Web-base and Web-enhance their specialization area coursework. Such support models that address university faculty needs and desires, pertaining to Web-basing and Web-enhancing coursework, are of utmost importance.

Professional Development Opportunity Model

The initial consideration when planning to develop professional development opportunities for university faculty must be the time allocation asked of the faculty. All-day events are not realistic goals; due not only to the time allocation but also to the amount of information dispersed during the professional development opportunity. Once this understanding has been realized, then the next step is to consider the process towards successfully meeting the objectives of the professional development opportunities. An initial, large-group environment is appropriate, but then the university faculty should be offered the opportunity to either re-take the initial subject matter experience in a small-group setting or choose to further their level of experience within that subject matter realm by self-selecting towards the more advanced level small group experience.

After this professional development opportunity has been realized, the opportunity for one-on-one, face-to-face support is a component of importance. Enabling university faculty to work within their familiar surroundings offers a level of comfort and support that is desired whenever a new learning experience occurs. As well, World Wide Web-based support components should be available to support the learning that was achieved within the large group and small group professional development experiences. A just-in-time model of knowledge dispersal is appropriate, as well as specific materials associated with the sessions.

Finally, listservs and bulletin board interactive activities should be available so as to either disperse information to interested members of the university faculty. This telecommunicative level of support offers numerous possibilities for important technical and theoretical support and discussions upon the training activities, as well as modeling and practice for university faculty so that they can integrate these telecommunicative activities into their Web-based and/or Web-enabled coursework after they have obtained a comfort level with the communication tools. Following is a graphic representation of the professional development opportunity model described above.


Basic Workshop
•Theoretical and Philosophical
•Product-Oriented
•Software Package Skills
•Assessment Opportunities
Novice Workshop
Advanced Workshop
One-on-One Meetings

Face-to-Face Support
Troubleshooting Training and Support
Online support:
Tutorials
Contact SME Information
Discussion Lists

Topics of Importance to University Faculty

Defining the scope and sequence of the professional development opportunities is an initial element of importance towards the success of the stated objectives. The initial phase was focused upon three distinct professional development opportunity sessions that would emphasize the basic creation of a Web-enabled syllabus for the university faculty who participated. The three sessions are described as follows:

Session One:
Objective: Support faculty in developing a Web support site for one of the courses they are currently teaching during Spring 2001. We will offer faculty an instructional template, show them how to manipulate the HTML using Netscape Composer 4.7, hyperlinks (internal navigation links and external)
Reward to Faculty: 5 megs of server space for each faculty member who attends the session, using UHCL server resource allocation

Session Two:
Objective: Support faculty in making Adobe PDF documents, and using file transfer protocol (FTP) to publish Web site
Reward to Faculty: 5 megs more (total of 10 megs) of server space for each faculty member who attends the session, using UHCL server resource allocation
At the end of the Session Two session, faculty will receive a disposable camera to record graphic images to place on their Web site, a coupon to have the film rendered to a CD-ROM for free

Session Three:
Objective: Support faculty to manipulate, integrate and upload digital graphic images into their Web site as well as FTP to the Web server
Reward to Faculty: 5 megs more (total of 15 megs) of server space for each faculty member who attends the session, using UHCL server resource allocation

Each of the professional development opportunity sessions noted above offer the university faculty a distinct reward, so that the level of motivation is maintained through out the faculty participation. As well, each session offers distinct objectives that can be met within a three-hour block of time.

Conclusion

The objective of the Web-basing and Web-enhancing professional development opportunities described within this manuscript enable all UHCL faculty, SoE and other college faculty, to supplement or replace f2f lectures and activities with Web resources and activities. By the end of the three professional development opportunity sessions, the goal is for each faculty member will have an instructional Web site for at least one of his or her courses.

Web, Web-Enhanced or 80/20: Choosing the Instructional Model that Makes Sense

Kathryn Ley
University of Houston-Clear Lake
United States of America
ley@cl.uh.edu

Caroline M. Crawford
University of Houston-Clear Lake
United States of America
crawford@cl.uh.edu

Abstract: The focus upon distance education over the previous decade has offered numerous hardware and software shifts that can support distinctly stand-alone Web-based and Web-enhanced learning environments. Now the question asked is how to make the learning environments more effective.

Introduction

Distance education has been a reality since radio and telephone have been viable options for teaching at a distance. Yet many suggest that the World Wide Web, with a stable Internet structure stimulating its rapid growth, has introduced significant new possibilities for learning environments. Perhaps the delineation between Web-based and face-to-face courses have reached the point wherein appropriate models that integrate Web-based and face-to-face learning environments must be considered.

Web-based and Web-enhanced learning environments have become viable options for educational programs. Educators have moved beyond the mere integration of the Web as knowledge-level support systems, towards the introduction of higher order thinking skills integration and a focus upon learning communities within a Web environment. Perhaps the aspects deemed innovative are merely appropriate instructional strategies that are being labeled as ground-breaking due to the novel learning environment labeled the World Wide Web. As the Web ages and experience accumulates there is a growth in the number of models of distance education. Evidence and logic suggests that combining web with f2f may indeed have distinct advantages over complete web based learning or all f2f.

Pareto Principle

The 80/20 ratio first proposed by the Italian economist, Pareto, in the early twentieth century (Hafner, 2001) to explain an economic phenomena in a human economic system, such as in Italy in 1906, wherein 20 percent of the people owned 80 percent of the country's wealth. "Over time and through application in a variety of environments, this analytic has come to be called Pareto's Principle, the 80-20 Rule, and the "Vital Few and Trivial Many Rule." Called by whatever name, this mix of 80%-20% reminds us that the relationship between input and output is not balanced" (Hafner, 2001, paragraph 1). This is an appropriate framework towards considering the economic and educational phenomena that is under creation within the Web-based learning environments available for today's learners.

20% of Students Can Take 80% of Instructor's Attention

As the economic phenomena stated within the Pareto Principle is appropriate, this same consideration towards focusing efforts upon the "vital few" students refocusing 80 percent of the instructor's attention upon themselves is a concern within all learning environments, but especially within a Web-based or Web-enhanced learning environment wherein the instructor's time is spent communicating with the learners who vie for valuable instructor time and attention.

Concerns Based Assessment Model (CBAM)

To address this significant issue, implications towards the learner and faculty practices that support the 80/20 rule must be considered. One model that supports is the Concerns Based Assessment Model (CBAM) that offers the following stages of concern: (1) Awareness; (2) Informational; (3) Personal; (4) Management; (5) Consequence; (6) Collaboration; and, (7) Refocusing (National Academy of Sciences, 2002, paragraph 6). Through the CBAM stages of concern, consideration towards different appropriate and successful practices that would enable all learners to obtain the desired level of interactive activities is possible.

Distance Education

Within distance education, more specifically Web-based distance education, the interactive activities available to the subject matter may not always be sufficient for all learners. Therefore, the faculty member focuses an inordinate amount of time ensuring that the learners receive an appropriate and successful level of information and communication. The learner's personality and level of self regulation has a significant level of interplay within this environment which, in turn, may effect the learning environment and the level of assistance required of the instructor. For these reasons, the Pareto Principle must be considered when focusing upon the learning experiences within distance education.

Pareto Principle Applied to Distance Education Courses

Learners have distinct needs that must be met within a learning environment. Whether this learning environment takes the shape of a face-to-face course, a Web-based course, or a Web-enhanced course, the learner's needs are of utmost importance. The reality of the successful learning environment must be addressed. Further, the institutional, faculty and community needs are concentrated upon within the Pareto Principle realm; introducing the Web-based learning environment for up to 80 percent of the learner's needs and then meeting in an optional face-to-face learning environment at least 20 percent within the course timeframe would offer an 80/20 solution that would: meet student needs; increase institutional effectiveness; meet faculty needs; and, meet community needs.

Developing a situation wherein the learners, the institution, the faculty and the community needs are met is not only appropriate, but must be an expectation of the successful learning environment.

Conclusions

Each subject area that delves into the world of distance education must consider the instructional design of the course delivery mode so as to ensure the successful knowledge acquisition of the learners. Within some subject areas, a Web-based environment may be appropriate; however, there are subject areas that not only suggest but actually demand a level of face-to-face interaction so as to ensure the achievement of the learning objectives. Web-based, Web-enhanced and face-to-face of instruction are each appropriate models towards the delivery of instruction, yet the subject matter should drive the instructional design and delivery mode of the course. Each of these distinctly separate yet appropriate learning environment models have strengths as well as weaknesses, yet the subject matter, learning objectives, assessment modules, learners, instructional opportunities and real-world educational environments must remain the center of the decision-making process in order to design superior instruction and learning environments.

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Web, Web-Enhanced or 80/20:
Choosing the Instructional Model that Makes Sense

Kathryn Ley, Instructional Technology, University of Houston Clear Lake, US, *ley@cl.uh.edu*

Caroline Crawford, Instructional Technology, University of Houston Clear Lake, US,*crawford@cl.uh.edu*

Abstract: This paper suggests that the processes of change are moving web educators toward new ways to consider web education and that the change process is ready to refocus the current implicit assumption of web education: a web course is delivered exclusively by web interface. One way to refocus is to apply the Pareto Principle (PP) to web education. The PP suggests guidelines for combining web with f2f within a single course that is consistent with the evolution of change while lowering the barriers to teacher education on the web.

The focus upon distance education over the previous decade has offered numerous hardware and software shifts that can support distinctly stand-alone web-based instruction. Many teacher education programs have been among the first to embrace web education and benefits such as learner access and convenience to sustain considerable demand. Some teacher education programs have rushed to the web while others have lagged behind with doubts. This paper briefly reviews the processes of change that are moving web educators toward new ways to consider web education and that the change process is refocusing the current implicit assumption of web education: a web course is delivered exclusively by web interface. The Pareto Principle (PP) when applied to web instruction provides a rationale for integrating web and face-to-face (f2f) activities. The ratio refocuses the innovation toward integrating web and f2f activities. The PP suggests a way to distribute instructional delivery according to the efficiency of each media. The PP suggests guideline for combining web with f2f within a single course that is both consistent with the evolution of change and removes barriers to teacher education on the web.

> a small number of causes is responsible for a large percentage of the effect, in a ratio of about 20:80. Expressed in a management context, 20% of a person's effort generates 80% of the person's results. The corollary to this is that 20% of one's results absorb 80% of one's resources or efforts. For the effective use of resources, the manager's challenge is to distinguish the right 20% from the trivial many (Hafner, 2001).

The Pareto Principle Explains The Advantage of Integrating Web with f2f

This means that the web instructor spends 20% of his or her effort putting 80% of the course content and activities to the web; conversely the remaining 20% will take 80% of the effort. Once the course is offered, the PP indicates that the instructor will spend 80% of his/her effort on 20% of the student interactions. Conversely, the PP indicates that a web learner spends 20% of his or her effort learning 80% of the course content and 80% of his or her effort learning on the remaining 20% of the course. If this is the case, presenting an alternative delivery mode for the effortful 20% delivered by web may benefit both the faculty and students if the effortful outcomes are similar for both.

The PP, a standard, empirically supported effort to results ratio, could guide the ratio of web activities and content to f2f sessions. This is a guideline suggested by the amount of effort required to engage in a web course. The principle suggests using a different delivery medium for the roughly 20% of the results that requires 80% of the effort. The 20% of the effortful but low yield activities would be conducted f2f. The principle may not be useful in all cases. There will always be some courses far better suited to one medium than another. For example, courses with expensive laboratory equipment are suited to f2f delivery for economic and logistic reasons.

On the other hand for many web courses, the 80% that requires the least effort to deliver on the web would complement 20% of the more effortful activities delivered f2f. The remaining 20% that requires 80% of the instructor's and students' effort to conduct on the web would be delivered through f2f sessions. These could include interactions between the faculty and students that arise from questions requesting more information about assignments, the content, course logistics, etc., than is accessed through the web. F2f sessions may be one way to address needs of high demand students for whom immediate interaction assuages their concerns; the instructor benefits as well by answering two or three related questions simultaneously in a f2f session. Other activities such as social interaction to quickly establish personal relationships among class members may also be better suited to f2f sessions. Experience and research will continue to define which activities belong on the web but the fundamental principle is that allowing faculty to offer courses that combine activities from both web and f2f in a ratio from 20/80 to 80/20 should lead to more efficient use of both media and better outcomes for preservice teachers, inservice teachers in graduate programs, and faculty than a single-medium course. The positive outcomes for faculty and inservice teachers are among a few other reasons to consider the Pareto Principle for structuring courses integrating two media. The PP presents an opportunity to address the concerns of web educators who have been active participants in web education for some time.

Early-Adopter Web Educators Following Change Theory

The evolution of faculty adopting web instruction is rapidly approaching a stage when the early adopters are turning their concerns toward improving upon the ways to use the innovation. In the early stages of innovation adoption, faculty who supported, promoted, and participated in web instruction, were early adopters of an innovation (Rogers, 1995). Because they were early adopters who embraced the innovation, they quickly began participating in web instruction well before most their peers did.

Consequently they were part of the driving force that shaped distance education at the advent of the second millennium. They were among the first to create the demand for the commercial interests that shaped the distance education market.

This pioneering group was the first to move through the sequential stages described in the Concerns Based Assessment Model (CBAM; Hord, William, Huling-Austin, & Hall, 1987) that was developed for use with teachers to identify their training requirements. The CBAM classification scheme identifies an individual's stage of change by the individual's concerns about the change. Typically, the person adopting the change will first be concerned about personal and management issues related to the change before he or she considers outcome issues such as student learning. The CBAM proposes that an individual adopting an innovation progresses through stages of concerns that correspond to their level of use with the innovation (Hall, George, & Rutherford, 1977). While the stages may vary by individual, most individuals progress through the stages relatively in order from personal concerns to outcomes concerns. Early-adopter web educators would be concerned about how to manage an innovation before they would begin to ask questions about its affect on student learning. In the later stages of change most educators begin to collaborate about the uses of the innovation. Those concerned about ways to improve upon the use of the innovation have concerns expressed in the last stage of change. Those in the final stage of change explore how the innovation can be used even more effectively than originally intended. Most faculty in the United States are past the first stages of awareness and information seeking and many more have personal concerns about how the innovation will affect them.

If the literature about the web is any indication, by the late 1990s early web education adopters had moved to concerns about how to manage distance education. Reflecting the management concern, the literature includes several guidebooks with prescriptions for creating and managing web-based instruction (Ellis, Wagner, & Longmire, 1999; Hall, 1997; Khan, 1997; Palloff & Pratt, 2001). These books are very useful for producing web-based instruction. Just as the publishing surrounding web course innovation offered solutions to managing web instruction so, too, has the commercial sector offered management solutions. Commercial interests in the form of "corporate entities specializing in total solutions . . . offering complete course and distance learning program management tools to institutions" are shaping the most dramatic online change in the recent past (Palloff & Pratt, p. xiii). Both the commercial and the educational sectors have often presented web courses as the alternative to f2f courses. The artificial dichotomy inhibits the adoption and integration of web with f2f for course delivery that has the benefits of both. On the other hand, the PP applied to web instruction can facilitate adoption and integration.

Transcending the Web-f2f Dichotomy

The discussion in web education literature often is polarized around web versus face-to-face delivery and the advantage of one extolled over the advantage of the other. On the other hand media comparison studies have long been ill advised. Much of the literature and research about and with web-based courses juxtaposes web with f2fcourses (e. g., Gilmore & Fritsch, 2001) although media comparison studies are not recommended. Even while eschewing "simple comparisons of Web-based courses to those employing any other format," one extensive review focused on the salient predictors of web student success (Anderson, 2001, p. 47). To examine what leads to web student success is to implicitly assume that web courses can and will be restricted to web delivery. This perspective assumes that the web is an alternative to f2f not a complementary media although even researchers have investigated web courses that included f2f activities.

Because researchers do not define web instruction the same, their conclusions about web instruction may not be comparable. One study with teacher education students operationalized web instruction to include f2f encounters although the abstract and conclusions do not refer to the inclusion (Daugherty & Funke, 1998). The researchers concluded that the students' reactions to web course interactions deviated from the literature: they were more positive and enthusiastic about web communications. Could the f2f interactions have accounted for the greater satisfaction with the web course communications? In this study teacher education students indicated that the primary advantage to web instruction was convenience in working a course into busy schedules. This is a benefit which students still valued strongly although they had f2f interactions included in the course. When combined, web and f2f activities and content offer unique advantages of each through a complementary instructional delivery mode.

Another recent article contrasting web to f2f instruction described two different commercial training courses, one delivered by completely web and one by f2f (Johnson & Buchanan, 2001). They concluded that the f2f course had more faculty and student discussions and the web course had more reading and drill and practice. In the f2f, faculty discussions took about 20% of the activity time and about 70% of the activities in the web were reading and drill and practice. The differing use of activities by course in one or the other medium suggests that it may be easier to include these types of activities in the respective medium each dominates. Therefore incorporating f2f with web may be useful for providing different types of activities more efficiently. Furthermore, applying the PP to the distribution of web to f2f activities can also yield positive institutional, environmental, and community welfare outcomes.

Pareto Principle Applied To f2f Courses

In the larger environment of the university, web courses with complementary f2f sessions can have positive outcomes for the community at large. Both quality of life factors such as traffic congestion and air pollution would be relieved be replacing even a few sessions with virtual activities or content at an urban commuter institution. For example, for every 5000 students who replace three f2f sessions a semester with web activities and content, there would be 15,000 fewer auto trips a semester; that is 60,000 fewer trips over a year to and from the congested urban streets surrounding the university. There would be a commensurate reduction in auto emissions and road congestion two serious urban problems. Replacing or supplementing f2f activities, such as lectures at an urban commuter university, with web-based information or virtual activities should ease environmental impact of the university on the region. Two f2f courses that replaced at least half of the f2f sessions with web activities could be scheduled in the same classroom space over a semester by alternating sessions. Students in web-supplemented courses will have the benefit of increased access to course materials and content and increased convenience created when f2f sessions are replaced with web. Benefits of placing up to 80% of the activities and content of a course most suited to the web on the web should yield benefits of both web and f2f courses.

Conversely incorporating some web into f2f courses should yield the benefits of both although perhaps in different ratios. Faculty and administration may stimulate further adoption among faculty be promoting limited web integration. Late adopters and those most resistant to change would have a less dramatic and a less effortful change required to offer f2f courses that incorporate some web activities and content than to begin with a total web course. A partial adoption model for combining web and f2f courses will enable faculty who might hesitate to launch a 100% web course should find a web enhanced course much less daunting. They would be able to use f2f sessions, a more familiar mode, for feedback and discussion with students. Encouraging instructors to offer courses combining web and f2f sessions allows for a wider range of adoption possibilities to facilitate faculty adoption. Faculty might choose a predominantly f2f course with the web as a repository and distribution center for course syllabus, assignments and other materials. Some would also use it as a conduit for submitting assignments. Those who want to begin integrating the web can replace one or two sessions with web activities or content can do so. The combination approach is suited to gradual, incremental change that later adopters of an innovation require.

Administrators may realize the advantages of being able to schedule more classes in the same space. By enlisting more faculty to offer web courses and to supplement f2f courses with web activities and content, administrators should be able to schedule two or more courses within the same classroom. For example a web course with three f2f sessions could be in the same space, at the same hour for three of fifteen sessions shared with a f2f course replacing at least three f2f sessions with web activities. Administrators in teacher education programs should be especially interested since those programs often seek to innovate and to model best practice. Students stand to gain the most since they will have the advantages of both media and be able to engage in whichever of the two media are most appropriate for the instructional activity. They will have the convenience of web activities and content combined with the efficiency of real-time, f2f interactions for activities such as clarifying or explaining web content or written feedback.

Conclusions

This paper suggests several reasons to consider integrating web and f2f activities within a course that may be more compelling than the reasons to use one medium over the other. There are potential faculty, student, administrative, community, and quality of life outcomes addressed through integrating web with f2f activities. The PP provides a guideline for one approach to integrating the two. Faculty and students can benefit from planned f2f activities designed improve the efficiency of the most effortful activities conducted in web courses. Administrators who support faculty efforts to replace f2f sessions with web activities encourage change among late adopters and may find new classroom space when f2f faculty replace sessions with enough web activities to schedule two courses in the same fifteen-week semester space. The community and environment may also benefit from reduced traffic congestion and pollution in urban universities that offer f2f courses complemented by web activities to replace the commute to f2f sessions. Finally applying the PP will facilitate the final stage of change among those web educators who are eager to devise new ways to use the innovation. The opportunity awaits those who want to move beyond managing a web course to redefining how the web should be integrated into a course.

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The Inquiry Learning Forum: Online Professional Development with a Community Orientation

Julie Moore, Indiana University, US

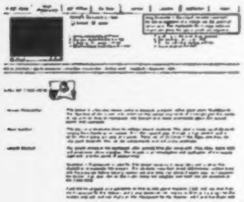
What is the Inquiry Learning Forum?

The Inquiry Learning Forum (ILF) is a NSF funded research and development project seeking to support an online community of K-12 math and science educators working together to share, improve, reflect, and create learner-centered classrooms. While developed primarily for Indiana math and science teachers, the ILF is open to all teachers, school administrators, university faculty, and pre-service education students interested in inquiry-based teaching and learning, free of charge.

The ILF is designed around a school metaphor. When members enter the ILF they have the option of visiting several "rooms" that are typical of a school building. Within these spaces members can obtain or share lesson plans, view video examples of fellow teachers, engage in online discussions, and work online with groups focused around a particular topic or idea.

The goal is not to present a practice to emulate, but rather to provide a vehicle for discussing teaching practice and advancing community and individual reflection and understanding. Through observation, discussion, and reflection, each participant can find his or her own path to continued professional growth and development.

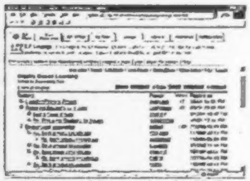
Classrooms



When we asked teachers what they would like to do for their own professional development, their response often was to see someone else teach. While that's difficult to do during the school day, the Internet makes it possible for teachers to "visit" other teachers' classrooms at a time when it is convenient for them.

In the ILF Classrooms videos of actual lessons act as anchor points for these virtual "visits." Each Classroom also includes teacher reflections on the lesson, discussions, links to various standards, lesson plans, examples of student work, and resources.

Lounge



Not only do ILF members get to virtually visit other teachers' classrooms, they also participate in discussions about practice with other professionals. The Lounge has a series of discussion forums focused on specific topics related to inquiry based teaching in it.

It is through these dialogues that teachers reflect on their own teaching and begin the process of exploring alternative teaching practices that they can apply in their own classrooms.

Inquiry Lab

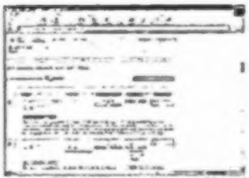
What is Inquiry?
ILF Professional Development Labs

The professional development activities found here can be utilized in a variety of settings, whether by individuals or groups. They are designed to fit the needs of teachers starting inquiry for the first time, or looking to enrich their teaching with more innovative applications of inquiry-based teaching.

BEST COPY AVAILABLE

The ILF Professional Development Labs are based on the Concerns-Based Adoption Model, commonly referred to as "CBAM" (Hall, 1979). This model of teacher change suggests that teachers go through various stages of change characterized by different concerns they have regarding the change or innovation. Our Professional Development Labs are organized around these stages and the types of concerns teachers have at each stage.

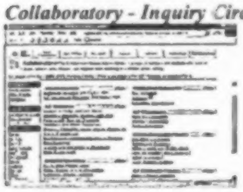
Library



The Library is a collection of lesson ideas and web links suggested by teachers for teachers. While viewing an item in the Library you can read how teachers have used the resource in their own classrooms. The Library has two collections:

- Lessons, Activities and Unit Ideas: materials and lessons developed by teachers for use in their own classrooms for you to download
- Web links and Other Resources: Links to materials, lessons and resources published in print or on the World Wide Web

Collaboratory - Inquiry Circles

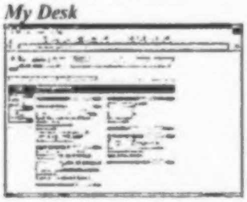


An Inquiry Circle is a collaborative group space in the ILF Collaboratory. It's a place where groups or teams can share resources, ideas, and experiences! These collaborations can center around:

- Curricular Topics (i.e. water quality, astronomy, etc...)
- Professional Development Opportunities
- College or university courses

Each Inquiry Circle has a facilitator who serves as the central contact person, provides new members with access to the Circle, and answers any questions. For example, a university pre-service instructor may want to create an Inquiry Circle for her students to work with teachers in the field.

My Desk



The My Desk space is a personal portal to the ILF. Through My Desk, users can:

- View and update their personal profile
- Leave notes in their personal journal
- Keep track of their ILF activities, classrooms and discussions
- Store bookmarks to both ILF and external resources
-

The ILF Office

The ILF Office is the administrative portion of the site. At the office members can find out more about upcoming ILF events, make a suggestion for improving the ILF, learn how they can be videotaped for future ILF classrooms, and meet other ILF members by viewing their online profiles.

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Beyond Times Roman

Gillian Mothersill, Ryerson Polytechnic University, CA

Since the advent of electronic publishing in 1985, typography has ceased to be the exclusive domain of the craft-based typographer or graphic designer. In a short span of time, more type designs have been introduced into the marketplace than in the entire period of printing history prior to 1985. The widespread use of computer systems has placed layout and design decisions into the hands of many who are interested, but largely unqualified to make them.

The overabundance of typefaces, combined with the lack of understanding of the craft of typography, has consistently led to some egregiously awful examples of typographic design in published material, resulting in viewers ignoring or not receiving the intended messages, in part because they cannot read them.

This workshop seeks to look beyond Times Roman, the typeface that is the de facto standard on many current computer systems. Through a series of presentations, hands-on exercises, and typographic "scavenger hunts", the workshop participant will develop a practical understanding of:

- Typefaces, families and fonts
    - Size, slant, weight and width
    - Typographic measurement systems
    - Monospaced and proportionally spaced fonts
    - Serif and sans serif typefaces
- Readability and legibility
- Type sizes
    - How to select the appropriate size for your audience
    - How to select the appropriate size for your document
- Measure
    - Identifying the optimal column width
- Letter spacing
- Word spacing
- Leading or line spacing
- Alignment and justification
- Type colour, and "colour"
    - When to add colour, and when to avoid it
    - Colour and the effect of contrast with the substrate
- Special Effects
    - Stretching, bending, masking, adding blends and photographic imagery

Throughout the sessions, participants will learn to identify common errors in typeface selection and use, by investigating everyday items such as magazines, packages, and newspapers for problems.

In addition, participants with learn simple tips regarding mixing and matching typefaces in documents that they are designing.

The workshop will pay particular attention to the needs of the participants and their use and questions about typeface use, whether it is on the World Wide Web, or on materials printed on a laser printer.

Participants will gain insight into the basic technical considerations of selecting Truetype and Postscript typefaces for their documents.

Workshop participants will be provided with:

- A workbook for their session
- A list of typeface vendors and foundries
- An annotated list of resources for obtaining additional information about typography

Realization of a Decision-Making Support System within a Whole Class.

Hiroshi Nakayama*, Rouji Shibata*, Hiroyuki Yaguti*, Siniti Shiwa* ,Syoji Yamaguti*, Osamu Hosomura*
*Information and arts department
Tokyo Denki University
Japan
nhiroshi@hucom.tp.titech.ac.jp

Abstract: In this study, we will lighten the instructor's burden of a decision – making and develop a decision – making support system to support making an effective decision. The mechanism of decision in this system totals the data of a real class situation collected with LAN and the predicted data of a class situation that is determined by the instructor in the stage of instructional plan according to their point of view in the system. It also makes a guideline that becomes the interim data. This system applies the interim data to the rule of decision making and shows the advice that is needed for the instructor. This system has three mode. In an explanation mode, the system searches for a point that confuses students and advises them. In a questioning mode, the system analyses achievement situation of a whole class and shows advice.

1. Introduction

This paper describes the development of a decision-making support system within a whole class. This support system can help the instructor make an effective decision quickly and reduce the burden on the instructor, because it presents digestible information to the instructor in response to the information coming from the students in the class. This decision-making support system is based on Matsuda's (see[2]) instructional activity model.

2. Design of the system

2. 1. Connection of the instructional activity model and the test support system

Activities that are used for the test support system are underlined.

- Before the class, the instructor makes an instructional plan.
- When using a question as the communication method, input questions from the screen to make test questions for the test support system.
- In class, the instructor explains and gives directions using the Web, a black board, or by oral expression according to the instructional plan.
- S In addition, presenting the test using the Web.
- Students study the lesson contents and answer the test question.
- Students send test answers on the Web ,ask questions, and are free to express their feelings.
- The test support system gathers and summarizes the test scores in real time, and displays the result to the instructor.
- The instructor views the students' test results and estimates the degree of their understanding by way of their movements, facial expressions, and questions.

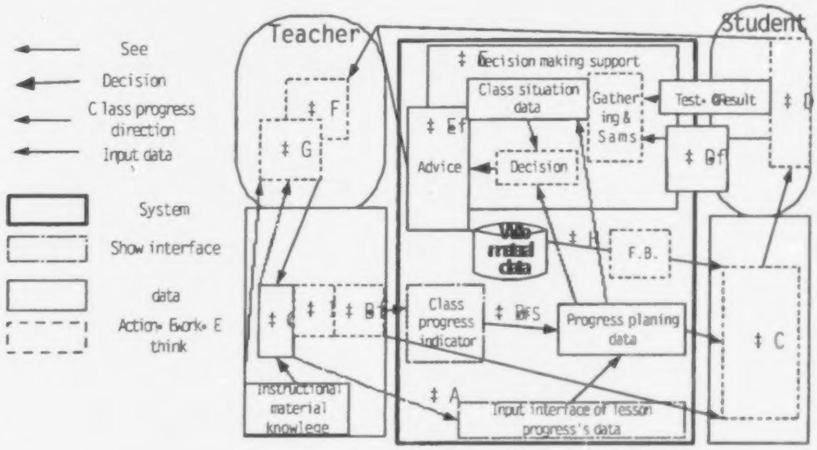
. Show the response of ., compare the test results to the predicted results.

. Using the results of . and ., carry out feedback.

. If there is no significant difference, continue with the instructional plan. If there is a significant difference, modify the lesson contents or the communication method accordingly to the teaching materials and the instructional aim.

2.2 Improvements to develop a decision-making support system

Explaining the detailed improvements with figure numbers of Figure 1. A decision of human is based on the gap between the predicted class situation and the real class situation. In order to support this system, the system needs to have information about the instructional plan including the prediction of the class situation. Then, in stage .,which is the making of test questions, set up an input interface consisting of the class's progress and input data of the class's progress consisting of four elements{the predicted data of the class situation, the data of the instructional aims, the data of the lesson content, and the data of the communication methods.} The predicted data of the class situation tries to find the cause of the test's mistakes and uses it to provide the instructor with advice by gathering the responses from the learners in the presentation. The presented teaching materials from . plus .' are constructed and can gather subjective evaluations of the class from the learner. This system needs to compare the predicted data of the class situation at . and the data of the class situation at . simultaneously by way of .'. In addition, the system of . plus .' acknowledges the gap and advises an appropriate response to it.


See
Decision
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data
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Teacher
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‡ F
‡ G
‡ E Decision making support
Class situation data
Gathering & Sams
Test• @Result
‡ D
‡ Ef
Advice
Decision
‡ Bf
‡ H
F.B.
Class progress indicator
‡ BFS
Progress planing data
‡ C
‡ A
Input interface of lesson progress's data
Instructional material knowlege

Figure 1 : Instructional activity of a decision-making support system

3. Conclusion

The purpose of this research is to build a decision-making support system that can help the instructor make an effective decision quickly and reduce the burden on the instructor. As a result, of this system being employed and evaluated in the experiment class, we know that a teacher accepts the advices from the system as an index of the judgment for the class progress support and confirm that this research purpose was attained.

4. References

[1] Hiroshi NAKAYAMA, "Development and effectiveness of test support system for an improvement of lesson", Japanese Society for information and Systems in Education, Vol.16 No.1 P25-33.1999.

[2] Toshiki MATUDA, Kentaro TAGO and Takashi SAKAMOTO, "An Instructional activity model for developing a computer simulation system", Nippon Educational Technology Committee, Vol.15 No.4 P183-195 (1992)

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Instructional Development for Knowledge Creation in Large-scale Class

NISHINOSONO, Haruo
Bukkyo University
Kyoto, Japan
Nisinohr@bukkyo-u.ac.jp

Large lecture rooms in universities have been designed to accommodate a large number of students to disseminate the most recent academic and/or professional knowledge produced in the higher education. The recent development of information technologies facilitates the knowledge dissemination through TV, Web sites and other technological media. The role of higher education is expected to change form knowledge dissemination to knowledge creation. Seminars and small group discussions are most widely adopted to meet this requirement. In spite of such expectation, large-scale lessons are indispensable in higher education due to financial reasons and social needs. The large-scale lessons in new style other than lectures are needed to develop for universal higher education in large diversities of audiences.

To develop such instruction in large-scale class, 6llowing principles and models are developed;

- Five principles for learning
  - ACCRR model (Autonomy, Collaboration, Contribution, Responsibility and Respect)
- Six components for learning plans and material development
  - MACETO model for instructional design(Meaning, Activities, Contents, Environment, Tools and Outcome).

This method was applied for the development of lesson plan in teacher training course at Bukkyo University in Kyoto. It is very difficult for students to start from the description of instructional objectives to develop lesson plans. They start to express their images and models and describe them in form of graphic representation to express their primitive concepts of school education; Students have their experiences as learners in elementary and secondary school already, feel hard to start from reflection on teaching and have their images on school life, teachings and teachers. Starting from this assumption, students work in team and create instructional modules for their lesson.

Building scenario-driven, real-world online courses

CJ O'Connor, Arizona State University, US
Paul Skiera, Arizona State University, US

In this session, the ASU e-Learning team will share their experiences in developing an online Information Technology Fundamentals curriculum. The team will demonstrate how they use "real-world scenarios" to develop the course content. The use of a "Reusable Learning Objects" strategy will be demonstrated. The team will demonstrate how they created "virtual labs" to simulate the use of "real-world" objects, such as computer parts.

Interactive, Multimedia Online Courses: Meeting Administrative, Development, and Dissemination Challenges

CJ O'Connor
Technology Based Learning and Research
Arizona State University
United States
cj@asu.edu

Abstract: This paper describes the challenges encountered during a 4-year grant to develop and disseminate online courses in technology. These challenges are administrative, developmental, and dissemination and includes: staffing, planning, evaluation, partnerships, intellectual property, interactive multimedia, learner involvement, accessibility, portability, and publicity, among others.

Project Description

The United States currently needs 350,000 computer networking professionals and an additional 1.3 million by the year 2005. Many adults, including displaced military personnel, recent GED recipients, and those with disabilities or special needs, want to begin or advance careers in networking. However, most of these adults do not have adequate access to training due to high cost and limited availability. In order to meet this need, Arizona State University (ASU), Cisco Systems, and Pearson are developing online networking and information technology curricula materials that include graphics, video, hands-on virtual labs, and simulations. The Fund for the Improvement of Postsecondary Education (FIPSE) grant has funded a nationwide integrated training program, the e-Learning Network, to provide 100,000 adult learners low cost, anytime, anywhere quality networking instruction and preparing adult learners for two existing industry certification examinations: the Cisco Certified Networking Associate (CCNA) and the Cisco Certified Networking Professional (CCNP). As of October 2001, the online CCNA and CCNP curricula have been completed and disseminated through the Cisco Networking Academies in high schools, community colleges, and other vendors. Cisco Press has published textbooks and lab companions for both of these curricula. Additionally, ASU has completed several lessons in the online Information Technology Fundamentals (ITF) curriculum, which are available through the ASU e-Learning Network web site. The ITF curriculum is intended to prepare learners for the CCNA courses as well as provide computer literacy for a wider population. Formative and summative evaluation of the networking courses is being conducted by outside evaluators in conjunction with 10 pilot sites around the country.

Challenges

Over the course of a 4-year, multi-curricula, multi-partner, and multi-million dollar project, one can expect that there will be challenges. Indeed, there has been more than enough to keep life interesting. That the project has continued on a successful path is a tribute to government support, project leadership, conflict resolution, positive thinking, staff shuffling, crisis management, talent recruitment, sheer will and determination, and an abundance of dedicated teamwork. This paper will briefly address administrative, developmental, and dissemination challenges likely to occur in a project of this nature.

Administrative Challenges

Administrative challenges include partnership issues, staffing, turnover, timelines, and costs.

Partnership issues

Probably the most critical administrative issue in a project like ours is the choice and formation of a partnership at the beginning of the project planning stage. Many government-funded grant programs require at least one partner who will contribute matching funds of at least 100% of the grant award. Initiating partnerships is a relatively easy process; maintaining them over a period of four years, however, can be extremely challenging. It is particularly difficult for partners who have never worked together before. Invariably, while partners may share common global visions and goals, when it gets down to the operational level, they may find themselves very quickly at a fork in the road, forced to go separate ways. Additional troubles can emerge in the form of battles over the rights to intellectual property. The result is a recipe for a shaky partnership that needs significant and constant attention to keep it together. Better to have resolved these issues prior to beginning the partnership. Further complications arise when one partner "volunteers" the involvement of another partner, who then bails out of the project. Is the first partner responsible for the actions of the second partner? An economic downturn can force a partner to withdraw from financial commitments that were made in better times. For grant awarded projects, a loss of a partner can mean the collapse of the project, especially if matching funds depend on a single partner. In our project, a battle over intellectual property rights threatened to bring the project to a halt. We lost our publications partner (Pearson) after the first year, leaving the project temporarily without essential pilot sites, student scholarships, and funds for site coordinators. Nonetheless, critical partner support has continued, compromises have been struck, and the objectives of the project continue to be met. For long-term projects, partner recruitment never ends and time must be allocated to this important endeavor.

Staffing

Our project required experienced staff with skills in curriculum development, instructional design, technical writing and editing, web technology, multimedia development and tools, programming, graphics design, video production, networking and information technology subject matter, quality control, project management, presentations, research and evaluation techniques, and grants management. To turn a phrase, it took a village to deliver the goods. Hundreds of employees and contract staff worked for Cisco Systems on the development, production, and language translation of the CCNA and CCNP curricula. At ASU, 45 people (part-time and fulltime, employees and students) contributed their skills to the development of the ITF curriculum.

Turnover

Attracting and weeding talent is an ongoing, critical challenge. At the end of the first year of the project, the entire technical staff and project manager left ASU to join our primary partner at the time, Cisco Systems. A new project manager was hired to reconstitute a development team. Over the course of the second year, the team was rebuilt, but the loss of networking subject matter experts was never overcome. As a result, a great deal of time that was intended for production had to be diverted to researching content. In addition, the allocation of all staffing resources in the first year to product development meant that many project management tasks never got done until the second year. In the process of shuffling staff and reassigning tasks, we found some of our best talent within the student body at ASU, especially foreign students. Our best supervisors were professionals with practical graphics, video, and courseware production experience.

Timelines

A significant challenge involves keeping the project on target and producing the deliverables at the appointed hour. A significant amount of time was spent planning the curriculum, with input from pilot sites (students, administrators, and instructors) and subject matter experts. Course maps and course objectives were developed and reviewed. Web interfaces were drafted and tested, and usability studies conducted. Accessibility issues were researched and solutions tested. Production supervisors juggled priorities to handle this project along with several other large curriculum production projects. The word "deadline" seemed to appear in the daily dialogue as often as the word "hello." Yet, the project moved along, with Cisco taking over the CCNA and CCNP curricula and ASU focusing on the ITF. Project participants maintained focus, motivation, humor, and teamwork throughout all the challenges. The team was committed to quality, excellence, and innovation.

Costs

Developmental projects come with high price tags, which is why grant-supported projects are important, especially in the field of education. Our FIPSE grant award is for $2 million over a four-year period, matched with matching funds from our partner, Cisco Systems. To meet the challenge of cost containment, we employed a strategy to streamline the developmental process. This strategy involved the creation of "reusable objects" which include media objects (pictures, animations, video) and lessons or portions of lessons that can be used in several parts of a curriculum. Design templates and programming code also provide economies of scale.

Development Challenges

Since this project is a "development" project, you might expect there to be a number of developmental challenges. In developing a learning product, as with any marketable product, it is essential to assess the target audience and tailor the development to meet their needs. Feedback from students using early versions of the CCNA online courses indicated the need for improvements to the web interface and structure of the program, calling for: non-scrolling, limited text per page; more interactive exercises and less reading; printable pages; more consistency in terminology throughout the course; and better navigation to indexes, glossaries, and lessons. We took these into account in developing the ITF web interface and modules and added innovative features to make the learning experience more interactive and robust.

Content

For the Cisco Networking courses, content was developed to reflect the knowledge and skills required for Cisco technicians. With a great deal of experience in the field, it was relatively easy for Cisco developers to define the course objectives and content. They also had a previous version of the CCNA course to build on. When it came to the Information Technology Fundamentals (ITF) curriculum, it was a different story. The ITF was intended to be both preparatory to the CCNA curriculum and to widespread computer literacy programs. The ITF would hopefully be used to encourage adults new to technology to prepare for a career in technology. To meet these goals, several groups were contacted for input and several debates were held to determine the scope and sequence of the content for the ITF curriculum. The development team selected ten modules, developed course maps, and wrote course objectives. Some modules (the Number Systems and the Electricity modules) were difficult to write, especially since subject matter experts were scarce. Other topics (like networking and computer components) were much easier. One particularly challenging task was to solicit input from networking and A+ Certification instructors at the pilot sites. While we did receive input on the types of modules and subject areas that the instructors thought were essential, we pulled most of our material from other sources for subject matter.

Quality vs. Quantity

One of the biggest challenges in developing online courses is balancing the "quantity" of course content with the "quality" of the learning experience. The CCNA and the CCNP emphasize quantity of content, with dozens of chapters of material in each course, mirroring much of what can be found in the Cisco textbooks, but supplemented with animations and lab activities for students to carry out in the classroom. The ITF modules were constructed to incorporate Pareto's Law; i.e., we addressed only the 20% of the content of A+ and Net+ curricula that would account for 80% of the common knowledge and everyday scenarios that a computer user or new technician would encounter. Then we took this concentrated core and "made it come alive" as a media-rich learning experience, using multimedia such as animations, video, simulations, photos, charts, interactive exercises, crossword puzzles, and more.

Web Interface

The web interface for the CCNA and CCNP curricula was designed by Cisco to be delivered in many countries and many languages. As such, it incorporates the "Cisco" look and a consistent navigation throughout. The act of standardizing an interface creates a new challenge: dealing with the inherent limitations in the degree of creativity and variety that can be produced within it. With the ITF curricula, a great deal more flexibility was planned into it, while also maintaining a consistent style and navigation. The use of *Macromedia Flash* provided us with a large degree of flexibility in terms of creativity, but has also produced challenges in terms of accessibility issues. In the coming months, we will be creating printable and accessible versions of our ITF modules and will have an opportunity to see how our interactive lessons and web interface translate to handle accessibility issues.

Another challenge we faced was how to "personalize" or "customize" the ITF learning experience, which we felt was important as a way to save people time and provide customer service. We set out to answer some customer service questions. Firstly, why should users have to wade through content they already know? Secondly, when a user quits a course and returns to it another day, why should they have to remember what they already reviewed and how well they did on their assessments. Thirdly, wouldn't it be nice if users could take notes while going through a lesson and store them online, to retrieve them another day? In order to provide the tools to address these questions, the technology of personalizing a web site involves databases, tracking scripts, and dynamic delivery methods. All this requires developmental time, logistics, programming, database maintenance, and login procedures. It also requires the commitment of the user to log in and out correctly. The personalized module enhancements we developed are provided only to Pilot Sites. The general public gets the "plain vanilla" version of the ITF curriculum, which is an excellent program, just not personalized.

Interactivity

During the planning process, we took the position that it was critical to incorporate as many real-world scenarios, activities, and simulations that would provide a rich learning experience and ample opportunities to practice skills in a virtual environment. To this end, we hired students with programming skills to develop a number of simulations and tools including the following: partitioning and formatting a hard drive; editing the BIOS settings; setting up a workstation on a network; a Dynamic Notepad for taking notes while working through the modules; and a messaging feature to send feedback to the developers or to send questions and comments to an instructor. One of the challenges we faced involved the duplication of reality. For our simulations, every screen and activity must look as close as possible to what a learner might encounter in real life. To achieve this goal, real life activities had to be videotaped or repeated several times to record all the text, actions, and visuals. involved in the process. These were translated into graphics and programming scripts, which were then orchestrated into lessons containing information as well as instructions on how to carry out the steps. As can be imagined, it took months, a great deal of patience, and attention to detail to produce the simulations and integrated lessons. To be cost-effective, we had to be selective in what we would simulate. One important criterion we used was to choose specific processes that learners would most likely need to do as a technician but which would be difficult for them to practice at home or in classrooms.

In addition to simulations, we created other devices to involve the learner, including: knowledge checks, crossword puzzles, animations, drag-and-drop activities, math calculations, "show-me" opportunities, pre-and post-assessments, tours, glossaries, and references. Each of these devices presented challenges in their creation and implementation. The ultimate challenge we face now has to wait for months (until we get sufficient users and feedback) to determine if any of our design strategies is making a difference to learners or instructors. This determination will be the task of our evaluators.

Evaluation

An independent valuation of products is essential in a development project. We need to get feedback from instructors and students to determine if the courses are making a difference in their lives. In order to acquire meaningful information, our external evaluator, Rockman Et. Al. has had to gather baseline data such as demographics, student achievement levels, and student satisfaction from the pilot sites. This was no small task. Another round of data gathering will need to be conducted from the same sources after the ITF modules have been distributed and tested. Hopefully, the challenges will be met and we will be able to gauge the effectiveness of our learning products.

Dissemination Challenges

The third area of project challenges is one that we are just beginning to encounter and have another 18 months to fully experience. As we move to complete the developmental stage and begin to move into the dissemination stage, our challenges include: product delivery, marketing and publicity, and web maintenance.

Product Delivery

With the involvement of Cisco Systems, the dissemination of the CCNA and CCNP curricula (online and in print) has been done through their widely dispersed Cisco Networking Academies, which are administered by Cisco and delivered primarily through high schools and community colleges. The population they serve exceeds 100,000, so there is a large audience for the courses. Through their assessment system, Cisco is able to obtain valuable information on student achievement and needed course improvements. The Cisco Networking Academies also allow networking instructors to contribute lesson materials, which expands and enhances the curricula. The ITF modules are being released (published on our web site) at an average rate of one per month, with two versions available (a public version and an enhanced version for research purposes and available only to participating Pilot Sites). Ou r strategy involves the release of the public version first, followed by the research version. There are 4-5 lessons in each module, with an average completion time of 2 to 3 hours to complete each module. As the modules are released, emails are sent to the Pilot Sites informing them of new additions. A distribution list of additional potential users is in development and will be used extensively in 2002.

Marketing and Publicity

Getting the word out and encouraging use of the courses is a challenge common to most developers. Cisco's course distribution system, the Cisco Networking Academies, provides an excellent marketing and publicity venue. It is our hope that, in addition to the CCNA and CCNP curricula, Cisco will also promote the ITF modules to the

Academics. We expect to make the rounds again in person to the Pilot Sites to encourage their participation in the use of the ITF modules. In addition, the forward plan is to develop a certification course to be offered at ASU once all the ITF modules are completed. We have begun to show the learning products at conferences and offer project papers on our web site.

Web Maintenance

Cisco maintains an assessment server for the CCNA and CCNP courses and the participating schools in the Cisco Networking Academies maintain content servers. ASU maintains the web server for the ITF modules. There are many challenges for both avenues: bandwidth issues, maintaining user databases and confidential test scores, updating content and maintaining links, tracking usage and analyzing web logs, and keeping servers running through various outages and maintenance routines. Staffing these activities and sustaining them past the grant award period is a critical challenge. During the early stages, when usage is low and demand is reasonable, project managers can be lulled into thinking all is well. Then, there comes a day when things go wrong or demand explodes, and customer service is compromised. We use the web logs to stay alert and prepare for the future.

Summary

The e-Learning Network, as a FIPSE LAAP grant project, is progressing with online courses to prepare adults for networking careers. In its path, many challenges have loomed and been met; many more remain. Administrative, developmental, and dissemination challenges have been the subject of this paper. More information is available on our web site and listed below.

Web Links

The e-Learning Network http://elearning.asu.edu
- LAAP Poster Presentation (Nov. 2001)
- Original Grant Proposal
- Grant Abstract
- Year Two Annual Report
- Article published in Centerpoint Journal

Information Technology Fundamentals Curriculum http://elearning.asu.edu/itf/

CCNA & CCNP Curriculum http://www.cisco.com/warp/public/779/edu/academy/overview/curriculum/

Technology Based Learning & Research (TBLR) http://tblr.ed.asu.edu

DOE / FIPSE Program http://www.ed.gov/offices/OPE/FIPSE/

Cisco Networking Academy http://cisco.netacad.net

Cisco E-Learning http://www.cisco.com/warp/public/10/wwtraining/elearning/

Cisco Press http://www.ciscopress.com/

Cisco Systems http://www.cisco.com

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Teacher as Instructional Designer Approach to Integrating Technology Into Preservice Teacher Training

Glenn Shepherd
Educational Technology
Jim McGlinn and Sandra Byrd
Education Professors
University of North Carolina at Asheville
United States
shepherd@bulldog.unca.edu

Abstract: This poster/demo will provide information on a PTTT sponsored project in process at the University of NC at Asheville. This project is part of a PTTT collaboration between UNC-Asheville, Appalachian State University, Western Carolina University, and Warren-Wilson College. The emphasis of this project is to improve the opportunities for preservice teachers to integrate technology into their student teaching field experiences. Preservice teachers, cooperating teachers, and university supervising teachers were brought together last summer in order to design and develop a thematic unit based on the North Carolina state standard course of study and the integration of information and technology skills. The thematic unit during the summer 2001 institute was archeology. Several teams of teachers participated in this project during the summer to develop unit plans that were then implemented during student teaching in the Fall 2001 semester. Teams used instructional systems design methodology in helping them to decide when and why to use technology as resources to match the selected instructional strategies. Teacher creativity in designing interesting and motivational learning environments is the key to this approach. Further projects of getting teams to work together before the student teaching semester are being developed at UNC-Asheville based on the success of this summer project.

Introduction

The University of North Carolina at Asheville (UNCA) is involved in the continuous process of improving the preparation of today's teachers. The integration of technology and information skills into the regular classroom is a goal of the UNCA teacher education program and the Impact program in North Carolina.

> "Media and technology programs should focus on student achievement and involve the entire staff in planning instructional programs that are enriched by high-quality resources and state-of-the-art technology. A learner-centered approach to instruction focuses attention on media and technology programs as vital instructional forces that expand, support, and complement classroom learning." Impact, Teaching and Learning. North Carolina Department of Public Instruction.
> http://www.ncwiseowl.org/Impact/Teaching_learning.htm

The information explosion and the technological advances have caused educators to re-examine what and how we teach and how we prepare others to teach. The effort to change the vision of education to include a dynamic, integrated, student-centered approach will take collaboration between everyone involved in the educational system. "Collaboration, like communication, is essential in today's world. Working with other organizations to promote a common goal has a greater chance of success. Collaboration involves the communication of one's vision in such a way as to generate support for one's program." (North Carolina Educational Technology Plan 2001-2005, http://tps.dpi.state.nc.us/techplan2000)

The NC Impact program goes on to further explain that "Collaborating to achieve instructional goals means:

- Ensuring that instruction takes place in a student-centered, project-based environment.
- Planning projects and activities with teachers that are relevant to real-life problems and supporting the development of critical thinking and problem-solving skills in students.
- Creating small group activities with heterogeneous groupings to accomplish curriculum goals and objectives." Impact, Teaching and Learning. North Carolina Department of Public Instruction. http://www.ncwiseowl.org/Impact/Teaching_learning.htm

Project

UNC-Asheville, in collaboration with Appalachian State University, Western Carolina University, and Warren Wilson College, received a PTTT grant in 2000-01 for three years. The overall purpose of our grant is to help us improve opportunities for our student teachers to use and integrate technology into their student teaching field experiences.

This presentation will highlight the Teacher As Instructional Designer approach that UNC-Asheville is presently using to help preservice and inservice teachers integrate technology into their classrooms. The main thrust of this approach is to tap in on the creativity of teachers as designers of the instructional environment. Creative teachers can design interesting and motivational learning activities to engage students in real-world, challenging instructional experiences. This approach was used last summer during a collaborative week-long workshop between the four colleges.

The theme of this summer project was archeology. We had 12 teams of cooperating teachers, student teachers, and supervising teachers who participated in this project. The beginning of the project included an overview of archeology and information about an archeological dig taking place at Warren Wilson campus. We then provided an overview of the Teacher As Instructional Designer approach. This approach, which uses the five major steps in the instructional systems design (ISD) method, was used to show teachers how they can select the instructional methods and materials most appropriate for their stated objectives. All teams worked on specific unit plans that could be used the next semester by the student teachers. Teams went down to the local archeological site and dug for archeological evidence. Then they spent the rest of the week on the Internet and created their unit plans and web sites to support their plans.

At UNCA, we are also incorporating the Teacher As Instructional Designer approach into our education classes and into workshops for cooperating teachers. Emphasis is placed on the use of student-centered instructional strategies, particularly strategies involving inquiry-based learning and real-world, problem-based learning. Teachers are asked to develop thematic units that integrate information skills and technology skills as suggested by the Impact program in North Carolina.

One of the methods for integrating technology with a thematic unit is WebQuest. WebQuest web sites provide students with information from which to begin their investigation into the topic of study. "Information is the basic ingredient in the active, authentic learning required of today's student." (AASL and AECT 1998, 83). Two examples of integrating technology with thematic units are included in this poster/demo session. The first example is the creation of a WebQuest web site focused on the theme of archeology. The second example is a web site and discussion forum focused on using primary sources to study the impact of specific wars on the development of the United States.

We hope that this presentation will give others ideas on how to use the ISD process to promote the creativity of teachers in designing exciting and innovative learning environments for higher-level thinking skills and human growth and development.

"Wiring the schools and populating them with computers is necessary but insufficient to ensure equal opportunity to share in the digital revolution. Children need . . . motivation to learn. They need a redesigned education system and teachers who have been retrained and reoriented. Innovative technologies cannot make up for educational professionals who lack innovative methods and merely replicate learning models that don't work." (Tapscott 1998, 262)

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Using web-based situated learning as a design strategy in teaching elementary economic concepts

Hsin-Yih Cindy Shyu
Department of Educational Technology
Tamkang University, Taiwan
hyshyu@mail.tku.edu.tw

Abstract

Background of This Study

While we are now living in the knowledge-based economy era, economic education becomes essentials for all citizens. However, there are obviously lacks of the present teaching materials and instruction in our schools, especially for elementary teachers and students in Taiwan. Based on the above needs ,the author would like to develop a web course, entitled *ECONLAND*, for teaching basic economic concepts for elementary students.

The web is a powerful medium with many unique attributes for learning. The web technology afford opportunities for multimedia presentation, communictaion, collaboration and knoweledge construction. In addition, there are several theoretical foundations to guide instructional design for this web-based learning environment, such as constructivist principles, scenario-based, authentic activities, multiple roles and perspectives, collaborative construction of knowledge. These principles described as situated learning strategy are illustrated in elsewhere in details (Cognition and Technology Group at Vanderbilt, 1993; Oliver & Herrington, 2000). The value of situated learning has also been demonstrated in classroom settings through many empriical studies (CTGV, 1993; Shyu, 1999, 2000).

Purposes

Therefore, the purpose of this study were to analyze and synthesize the economic concepts suitable for 3-4th grade elementary students; design and develop web-based teaching material; design and develop the teachers' guide for the web course; and to conduct a formative evaluation . The basic economic concepts were taught, such as scarcity, decision-making, opportunity cost, production, money and interdependence. By integrating the instructional strategy of scenario-based situated learning into design, five pieces of story were presented. Students have to solve the challenges presented from the end of each story and thereby acquire the knowledge of those economic concepts. Finally, based on the results of the formative evaluation, suggestions of revisions and the directions for further investigation were also included in the end of paper.

Significance of this Study

This study was significant because it provides an example of how and what to teach economic concepts on the web for kids, and it also demonstrates an instructional model using situated learning strategy for developing and implementing web-enhanced learning activities for teaching economic concepts.
The web site is located at http://econland.et.tku.edu.tw.

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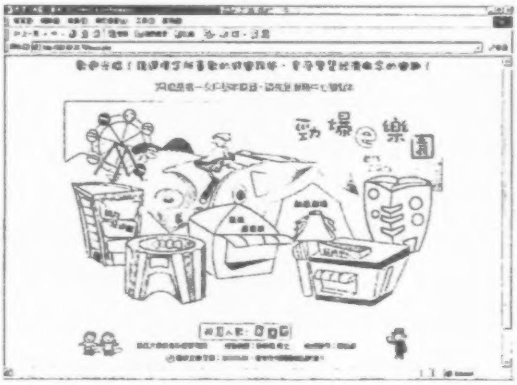
a Sample from the Screen:



Key words: Economic education, Elementary social studies, Web-Based Instruction, Instructional Design, Situated learning

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Adult Learning Styles and Distributed Learning: A List of Preferences

Denise M. Smith, Ed.D.,CCC-SLP
Fidel M.Salinas Jr., Ed.D.

This research study examines adult learning styles and preferences in enrollment in distributed learning courses. Initially, a questionnaire (Yes/No and narrative format) was developed which provided definitions about learning styles, such as visual, auditory, kinesthetic, or varied combinations of these styles. The learning styles and definitions were based on the research of Howard Gardner, Judith Warren Little, and University of New South Wales, Faculty of the Built Environment. Quantitative and Qualitative results were obtained and implications for further research were also cited. Fifty post-graduate students in business and/or education participated in this study. All respondents were voluntary and information was received anonymously. Participants also completed a demographic survey identifying age, gender, and ethnic background.
The underlying questions of this investigation included:

1) Is there a certain type of adult learner who is more (or least likely) likely to enroll in distributed learning courses?
2) What information regarding online learning course formats (animation, video, audio (text/ voice/music)?

For example: are adults who identified themselves as a combination of visual and kinesthetic more likely to register for online courses than adult learners who identified their learning style as solely auditory or visual?

As more undergraduate and graduate university programs offer courses online, it would appear to be both cost effective and pedagogically appropriate to examine the learning styles of their students and align course design accordingly. The intended audience for this presentation includes university faculty, students (undergraduate and graduate), and administration interested in developing enhancing distributed learning course work across academic disciplines.

Part of the Online Teacher's Curriculum:

Designing for Collaboration and Participation in Distributed Netbased Learning

Elsebeth Korsgaard Sorensen
Dept. of Communication
Aalborg University
Denmark
eks@hum.auc.dk

Abstract: This paper addresses, in particular, the core challenges of stimulating participation and true motivation in learners to engage in interactive collaboration and knowledge building dialogue in netbased learning. The paper reports on an experiment, which suggests a twofold foundation for design: 1) the learning theoretical concept of Etienne Wenger (1998), and 2) an orientation towards student experiences and competencies, in order to design for collaborative knowledge building online.

Introduction

Design of distributed collaborative learning processes online seems a complex challenge (Collis, 1997; Bates, 1999; Harasim, 1999). To design collaborative processes, which truly integrate and draw upon individual competencies and interests of the adult student appears an even more challenging activity (Sorensen, 2001). It calls for an alternative pedagogical thinking, also in the education of teachers, producing new and pedagogically innovative instructional designs. For years, in particular within the area of continuing education, it has been part of the underlying set of pedagogical intentions to design online courses utilizing the individual student perspectives and knowledge and engaging students in interactive collaboration and shared knowledge building. This ambition has not been realized.

The reason for this is ambiguous. On the one hand, it may be rooted in a lack of awareness of the specific asynchronous virtual conditions for the unfolding of human interaction (Sorensen, 1997b). On the other hand, the lack of encouraging results is related to a weak foundation in learning theoretical frameworks. While the problem of designing for quality in netbased knowledge building dialogues is of a general nature, the need for stimulating motivation, engagement, and interactive processes seems especially outspoken in the context of continuing education (Sorensen, 2000). In this context, there is a need for pedagogical designs that in innovative ways attempt to match the communicative virtues of the online environment with alternative, theoretically based, pedagogical implementations of student experiences. There is a need for student experiences and competencies to become operationalized in the virtual environment in such ways that they inspire and form collaborative knowledge building (KB) processes in what has been called "online communities of practice" (Wenger, 1998).

This paper addresses such challenge of instructional design as part of an innovative teacher education curriculum. As a background, section 2 gives an account of some of the experienced problems related to establishing online interaction. Section 3 outlines some of the basic concepts in the learning theoretical framework of Etienne Wenger and introduces a model, based on his concepts, for designing for participation (Wenger, 1998; Sorensen, 2001). Section 4 describes the research design of the conducted experiment as well as its assumptions, hypothesis, implementation and results.. While section 5 contains the concluding comments, section 6 forms the forum of future perspectives.

Distributed Collaborative Knowledge Building Online : State of the Art

Any pedagogical design, including designs of netbased distributed collaborative learning, implies a latent – and sometimes unconscious - theoretical perspective on what learning is and what it ought to be. Such perspectives always form the context for the choice of pedagogical elements characterizing the learning process (Sorensen, 1997a; Fjuk & Sorensen, 1997). Therefore, it seems essential not only to become conscious of these underlying perspectives, but also to base designs on clear and conscious theoretical understandings, in order to be able to choose corresponding pedagogical-didactic features that are likely to promote the learning perspective and goals in question.

One of the most prevailing problems encountered in netbased distributed collaborative learning concerns the widespread lack of clarity of pedagogical design and practice in terms of stimulating a qualified interaction and collaborative KB dialogue. This includes the familiar experience of virtual learning spaces marked by silence and lack of "social presence", and it includes the lack of motivation and commitment between learners to collaborate. In particular, the problems of identification and distribution of teacher-learner roles in virtual learning processes seem to form the key factors in this complex of problems.

Quite a few learning designs of netbased distributed collaborative learning mirror a rationalistic and authoritarian perception of learning as something "delivered from above" by experts down to the "empty" students. In such cases it is not surprising that collaborative KB processes are absent. More thought provoking, however, seems the fact that in many cases where collaborative KB has actually been a main part of the design perspective, it very often does not materialize (Stahl, 1999 & 2000; Sorensen 2000). A clear understanding of why student collaboration so often is absent, regardless of these ambitions, remains to be identified. Unfortunately, the technology used often gets the blame for this – perhaps often unjustified (Sorensen, 2000).

The gained experiences with implementation of distributed, netbased processes evidently has had mixed success. From a perspective on learning as a collaborative phenomenon the significant problem of establishing a qualified collaborative leaning

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dialogue working for KB seems to be, not only a very serious problem to address and resolve, but also the most complex challenge to deal with.

Collaborative Learning Through Online Communities of Practice

The problem of establishing a motivated, qualified interaction working for collaborative KB in a continuing educational context may be addressed through the theoretical framework, presented by Wenger (Wenger, 1998). The two aspects of interaction and motivation are among the central concepts treated in his learning theory, in which learning is viewed as processes taking place in what he calls "communities of practice" (Wenger, 1998).

Participation and Mutual Engagement in Negotiation of Meaning

To establish a collaborative KB dialogue (to ensure a KB process online) corresponds to his notion of creating "participation" in a community of practice. To ensure student initiative to participate in a collaborative KB dialogue points to Wenger's notion of creating "mutual engagement" (Wenger, 1998).

The theory emphasizes the role of experiences and practices of the individual students as means to support the development of group identity. About this complexity in relation to the learning process, Wenger states:

> Learning (...) takes place through our engagement in actions and interactions, but it embeds this engagement in culture and history. Through these local actions and interactions, learning reproduces and transforms the social structure in which it takes place (...). Learning is the vehicle for the evolution of practices and the inclusion of newcomers while also (and through the same process) the vehicle for the development and transformation of identities.
>
> (Wenger, 1998, pp. 13)

Wenger's theory incorporates "participation" and "mutual engagement" as central concepts in the learning process. About the concept "participation" Wenger states:

> Participation refers to a process of taking part and also to the relations with others that reflects this process. It suggests both action and connection. (...). Participation in this sense is both personal and social. (...). But when we engage in a conversation, we somehow recognize in each other something of ourselves which we address. What we recognize has to do with our mutual ability to negotiate meaning. (...) In this experience of mutuality, participation is a source of identity.
>
> (Wenger, 1998, pp. 55-56)

He characterizes "mutual engagement" as involving not only individual, but also collaborative competencies (Wenger, 1998 p. 76)

Social presence online, the fundamental element for creation of a collaborative KB process through what Wenger calls "negotiation of meaning" (Wenger, 1998), is threatened by lack of both "participation" (interaction) and "engagement" (Gunawardena, 1995; Rourke et al., 1999). Creation of an online presence in netbased distributed collaborative learning processes based on participation and mutual engagement in order to ensure the negotiation of meaning is a complex pedagogical challenge (Cornell, 1997; Sorensen, 1997a).

PANEL: A Design Model

On the basis of some of Wenger's concepts, PANEL (a model for instructional design of collaborative knowledge building processes on the net) was developed (Sorensen, 2002). PANEL denotes a learning process centered on collaborative KB and qualified by participants. The figure below is intended to illustrate the main ideas of PANEL (figure 1).

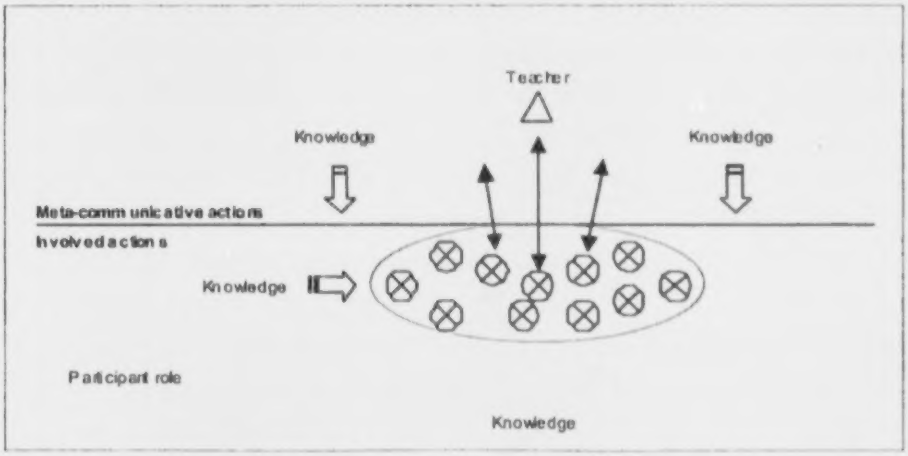

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Figure 1: "PANEL": Pedagogical Approach for Net-Based Distributed Collaborative Learning

It shows a student-centered, open process in which knowledge resources enter dynamically from all sides via the participants as well as the teacher(s), in a process driven and motivated by participants. It illustrates the dynamic interchange between teacher and learner roles. It also provides a rough indication of how much of the teacher contribution evolves at a meta-communicative level. In sum, the PANEL model possess the followingcharacteristics:

- It stimulates "participation" and "engagement"
- It is process oriented
- It denotes an open concept
- It is participant oriented
- It draws on student experiences
- It operationalizes student experiences
- It creates participant "ownership"
- It equals out teacher and learner roles
- It is, in principle, a lifelong model
- It invites to process assessment

Research Design and Implementation

At Aalborg University, Denmark, POPP (Problem-Oriented Project Pedagogy Approach) is the fundamental pedagogical approach used in design of distributed netbased education (Fjuk & Dirckinck-Holmfeld, 1997). POPP is a student-centred approach to learning and instruction which, in principle, rests on collaborative group work and truly integrates the perspectives of the individual students and allows them to take "ownership" in relation to all aspects of the learning process.

POPP is also the fundamental pedagogical approach in the design of our Danish cross-institutional, educational initiative, the MS in ICT and Learning(MIL). MIL provides continuing education for people engaged in educational planning and integration of ICT in learning processes at schools and all types of educational institutions as well as employees with educational responsibilities in different types of organizations. The administration of MIL takes place at Aalborg University, but the curriculum is developed and offered in joint collaboration between five Danish universities (Aalborg University, Aarhus University, Copenhagen Business School, the Danish Pedagogical University, and Roskilde University). A large part of the 40 MIL students are highly qualified teachers at the high school level with extensive university education and high competence within their individual work areas.

Assumptions and Hypothesis

In this paper I make the basic assumption that online participation and engagement in collaborative knowledge-building activities (as I have defined them) among students produces learning. Based on this assumption I make and test the following hypothesis:

An online learning environment that

(1) is built on the learning theoretical concepts of Etienne Wenger (Wenger, 1998) and
(2) provides mechanisms for students to fully use their experiences and competencies

will enhance learning.

Method and Model

With the goal of creating online presence, an experiment was conducted in the context of the first course module on MIL. To address the two problems of insufficient interaction and motivation, the course was designed according to the principles of PANEL (Sorensen, 2002).

The course module lasted 5 weeks. It was divided into a period of reading and preparation (two weeks) and a succeeding period of debate (3 weeks). According to the assignment given, the students, in the two-week preparation period, had to read the literature individually. The literature was distributed in three themes within the course content: Design of netbased learning processes. (The themes corresponded to the names of the three discussion fora in the succeeding period of discussion). The students were asked to distribute a set of roles among the members of their online group (on average consisting of 4 students). The roles were supposed to form and support their later discussion. Some were presenters, others were moderators, etc. The description of the roles was clarified in the assignment. Over the three weeks of debate both teacher and students agreed on attending the virtual learning space for a minimum of five times a week. In the debate period the groups each presented a commonly agreed problem, related to the literature, and initiate, conduct and wrap up an online discussion with all the peers. In parallel with the discussions, the students and the teacher engaged into meta-reflections and meta-communication in a specially created meta-forum, to reflect and discuss the experiences and processes of the students, as they evolved. The student were graded on the basis of a mixture of minimum requirements in terms of both quantity and quality that we viewed to be essential to enhance a collaborative KB process (Stahl, 1999; Sorensen & Takle, 2001a & 2001b).

Results

The 3 weeks debate period generated an enormous amount of engaged participation in collaborative KB (532 contributions, some of which were of the size of half a webpage). Assuming that online participation and engagement in collaborative KB activities among students produces learning, it is fair to say that my experiment has proved itself to be relevant. It was quite an exciting and, indeed, a very interesting activity to follow and participate in the KB process of the students. Viewed from a teacher perspective, the discussions turned out to be of very good quality (for a set of criteria, se Sorensen & Takle, 2001b). However, the activity did not exactly reduce the amount of work of the teacher. On the contrary, while it was very interesting to follow the discussions, it was quite a demanding job to read, relate to and comment on so many reflective and often very long comments. The discussions were truly student-centered and student-governed in that they produced an enormous amount of relevant collaboratively developed student initiatives, student perspectives and student experiences. The motivation of the students was very high and demonstrated an engagement in the discussions far beyond the minimum requirements in terms of both quantity and quality. The teacher occupied a role in the discussions equal to the students. Only in the meta-forum the teacher shifted between the role as a participant and the role as "the one who knows better".

Conclusions

This paper has been dealing with the overall question of how teachers and instructional designers - in particular within the area of continuing education – should approach the challenge of design of distributed, collaborative learning processes online. Assuming that participation and engagement in online collaborative knowledge building activities produces learning, and that online learning designs are enhanced through teachers and designers consciously basingtheir instructional designs on learning theory (through the use of PANEL), the results from this experiment are overall positive. It provides strong indication that by basing design on the learning theoretical concepts (participation and engagement) of Etienne Wenger (1998) and by operationalizing student experiences and competencies, collaborative knowledge building online (participation) increases measurably - through the stimulation of student ownership, relevance, and motivation (engagement). The two main intentions to create participation (interaction and online presence) and engagement (motivation through the operationalization of the participants' experiences) seemed to have been more than fulfilled.

Future perspectives

When aiming at enhancing quality in netbased distributed collaborative learning, it is necessary to for learners as well as teachers to navigate within a different pedagogical paradigm than a traditional face-to-face setting.

The changes in design, necessary to enhance quality, may be radical. Instead of navigating in a predictable pedagogical virtual universe where teacher roles, teacher guidance, and fixed resources are decided upon in advance, we are moving towards a virtual pedagogical paradigm marked by an instructional need to act, interact, and collaborate on a more equal basis. We are facing a new stage of learning on which fixed entities become dynamic and unpredictable, and in which new instructional competencies, like e.g. comfort in relation to communicatively improvising in chaos, are essential. The new paradigm needs a broader pedagogical perspective of the teacher. Even though the core competence is of pedagogical nature, it is necessary for both teacher and designer to obtain and utilize a wider and more holistic set of qualifications on which to base pedagogical considerations, actions and design decisions.

Acknowledgment

A special thanks to the Danish course participants, who started in the fall of year 2000 on the MS in ICT and Learning, for their positive and engaged attitude in terms of providing their "learning process" for the pedagogical-didactic experiment of this paper. I also thank my colleague, Professor Eugene S. Takle, for his insightful comments to the paper.

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Short paper: A Web approach to develop and deploy an effective course

By Dr Armand St-Pierre
Royal Military College
Kingston (ON), Canada

Townsend (1997) confirmed that Intranet and Extranet platforms offer an opportunity to store and provide learning materials and services in an easy and engaging manner. The author of this short paper experimented use the Web platform to organize course materials and to post Web pages. A powerful teaching and learning model could be built on these platforms for communicating, sharing knowledge, and producing interactive learning prototypes in a cost-effective manner for schools and colleges (St-Pierre, 2000).

The goal of this short paper is to describe the reasons why the Web should be used to develop and deliver courses on site and at a distance in an educational setting. The author will examine the characteristics that an effective web-based course should present.

The World Wide Web is a good platform for delivering instruction (Barnard, 1997; Starr and Milhein, 1996). Professors can create maps to guide the learners through their learning paths. The Web class can be well designed so that the learner can construct from the environment. Critical thinking could be introduced in a Web technology-based class when the students are asked to create Web contents or to search the Internet for different points of view on a controversial subject such as the Space program (Thoms & Junaid, 1997).

Faculty and students of the author's college have begun to realize the full potential o f the Internet as a teaching and learning tool. Students are beginning to perceive strong learning outcomes from on-line materials and Web-based contents. The instructional designer should use sound system design principles while developing web-based educational systems (St-Pierre, Bettin, Dillinger, and Ferraro, July-Sept. 1999). In his research, the author show that schools and colleges needed a theoretical and practical framework to develop in an adequate manner an open virtual course on the web (St-Pierre, June 2000).

On-line delivery is a means of fully augmenting or replacing other methods of teaching and learning. Mediated forms of delivery using the Web made it easy to update dynamic, constantly changing information. A well-designed Web-based instruction provides an efficient delivery medium for the instructor and an attractive content for the students in the classroom. Some instructors in various schools and colleges are using a Web package authoring tool to build a Web class format (Bent, 1997).

Web-based instruction could be defined as the application of a repertoire of cognitively oriented instructional strategies implemented with a constructivist and collaborative learning environment using the attributes and resources of the World Wide Web (Perkins, 1991). Research studies in education suggest that a constructivist-learning environment could be used to build virtual classes and provide an opportunity to explore a rich-hypertext content for the learner. This facilitates multiple linkages among content elements.

Several studies pointed to a paradigm shift that transforms the professor from simply a deliverer of knowledge to a mentor and a guide in the student learning process (Terrell, 1996). The students build Web pages incorporating numerous links to sites containing knowledge repositories. This enables the student to explore multiple avenues through contents of similar or divergent views, thereby reinforcing cognitive construction.

An effective web-based learning environment well designed with the help of educators should present the following characteristics: enhances student-to-student and faculty-to-student communication students share perspectives, students experience a sense of equality, instructors are more accessible; enables student-centered teaching approaches, accommodates varied learning styles, provides opportunities for exploration and discovery, provides 24/7 accessibility to course materials, continual access to materials, removes reliance on physical attendance, provides just-in-time methods to assess and evaluate student progress, and adds pedagogical benefits (St-Pierre, 1999).

Schools and colleges have to be innovative in introducing technological media in the teaching process. Training and professional development programs should exist to give the opportunity to experiment with web technologies before they use them in their teaching process. Teachers have to take ownership while developing effective web-based course with sound teaching media (St-Pierre, July 1999).

In conclusion, web-based courses are developed on a day-to-day basis without proper instructional design and experimentation with the learners. In some cases, the response time and the learning outcomes are neglected in the development process. Instructional designers, web-based technologists, and teachers have to work in synergy to prepare effective and sound open learning environments that will enhance learning outcomes. Assessment tools should be developed and used to measure learners'outcomes and satisfaction. The author of this paper will describe further pros and cons of developing and teaching with web-based courses at the conference.

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The Discipline-Appropriate Use of Computers in the Classroom: Two Case Studies

Bart Thurber
Professor of English
University of San Diego, United States
email: thurber@sandiego.edu

Jack Pope
Director of Academic Computing
University of San Diego, United States
Email: pope@sandiego.edu

Abstract: The authors present two case studies in the use of computers in the classroom, one involving an introductory computer science class, the other an upper division literature class. After describing each case, the differences are discussed, showing that pedagogical models developed for one discipline may not transfer to another, and that the discipline itself, beyond instructor's preferences or institutional policies, may determine what works and what doesn't.

Introduction

Our goal in this paper is twofold. First, we'll indicate that the successful use of information technology in the classroom depends more on the synergy between teacher, student and the learning context than on the technology itself. The use of technology — as the primary vehicle for teaching (distance learning) or as an adjunct to the more traditional classroom — is effective only insofar as it addresses this synergy. Second, we will maintain that one under-appreciated factor influencing teachers, students and learning contexts is the discipline itself, in a way that goes beyond simply paying appropriate attention to learning (or teaching) styles. We offer two case studies, one drawn from an introductory computer science course, the other from an upper division literature course, in support of these claims. Enthusiasm for online learning is of course high for students who live in areas not easily served by the traditional classroom, and courses accessible anytime and anyplace can provide valuable learning experiences for mature students who work full time and take courses when schedules permit. But the use of online learning tools *within* traditional campus-based course delivery structures has become popular as well (Wiring the Ivory Tower; Kathleen Morris; *Business Week*, August 9, 1999). James Duderstadt, President Emeritus and Professor of Science and Engineering at the University of Michigan, suggests that universities must themselves take a leadership role in remodeling the universities of the 21st century, and that new information and communication technology tools will play a key role in that mission, suggesting that universities will continue to have a physical existence, whatever their virtual roles may become (Duderstadt; *Chronicle of Higher Education*; February 4, 2000). This is not a completely uncontroversial claim; in a November 17, 1999 New York Times article, John Chambers, then Chief Executive Officer for Cisco Systems, asserts that "the next big killer application for the Internet is going to be education. Education over the Internet is going to be so big it is going to make e-mail usage look like a rounding error." (Thomas Friedman, Next: "It's Education"; November 17, 1999; *New York Times*)

As the situation as developed, however, and as other researchers have begun to look at what now seem to be inflated claims, online education has emerged as one aspect of a larger picture. Prosser and Trigwell, in "Understanding Learning and Teaching," argue that both teachers and students benefit from an increased awareness of their own personal experiences, approaches and perceptions of the learning process and that this awareness facilitates positive learning outcomes. (*Understanding Learning and Teaching*; Prosser, Michael And Trigwell, Keith; 1999) In particular, they emphasize that "good teaching involves an awareness of students' perceptions of teaching technologies (including information technology) used in teaching" and that these perceptions can significantly impact the learning experience either positively or negatively. (Prosser & Trigwell, page 169) Given their results, the successful use of information

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technology in the classroom is clearly more dependent on interactions between teachers, students and learning contexts than on the technology; it may even indicate that there are some things technology cannot appropriately do, a point to which we shall return.

On the other hand, learning opportunities newly available through the use of technology can support desired learning outcomes—provided (our second claim) those outcomes, as defined not simply by the instructor or the institution but by the discipline *itself*, are congruent with what the technology can provide.

Astin's comprehensive study of student development characteristics in various higher institutional settings points out that active engagement of students in interdisciplinary courses, course with discussions, debates, and class presentations strongly correlates with critical thinking skills (*What Matters in College, Four Critical Years Revisited*, Astin, A. W., 1993). To the extent that technology can facilitate (or at least create the opportunity to provide) such active learning strategies, the effort will not only increase student involvement in the course, but also increase understanding of course concepts by relating them to independent inquiry and debate.

The question is whether available technology can do that too.

Case Studies and Examples

Our first case study involves an introductory computer science class. Pope's goal in implementing web-based tools the course was to increase opportunities for communication and participation. The class was small (approximately 25), but there was a considerable amount of material to cover and the topics that dominate the headlines – Microsoft Antitrust litigation, Privacy in Cyberspace – provide fertile ground for discussion. He began using WebCT as a tool both for distributing informational materials and for on-line testing. In doing this, he relied on the students to read on their own time; his discussion/lecture now addresses related but different concepts in supplementing the text. Making the quizzes available online provided more opportunity for group and class discussion.

Students were positive; they could find their grades, course syllabus, assignments and topic notes in one central location.

In designing this kind of structure Pope was of course not alone. The University of Central Florida, for example, adopted a similar approach to improve its course in America National Government. There, the goals of the restructuring were practical as well as mission-oriented. The course enrolled over 2000 students in sections of 80-100 students. Classroom space was in critical short supply; increasing the number of sections was not a viable option. But the course also had a retention problem and surveys indicated that partially web-based sections had somewhat higher retention rates. Building on this, the department designed a web-based asynchronous learning environment based on web-based modules to encourage student participation. Class meeting time was reduced by two thirds. Bruce Wilson reports "students are, by necessity, more actively involved in the learning process. And instructional technology can also enhance students' critical thinking skills. ... The use of the Internet in teaching Political Science gives instructors more opportunities to design activities that involve students' direct participation and to follow clearly set instructional goals."("Best of Both Worlds? Web-Enhanced or Traditional Instruction in American National Government."; Bruce Wilson, Phillip Pollock, Kerstin Harmann, *Political Chronicle*, v. 12, no. 2, Fall 2000)

Pope himself also viewed the electronic interface as an opportunity to evaluate his own teaching. In any implementation of electronic technology in the classroom, a major evaluation of course objectives and teaching strategy is required, and he found this to be a welcome necessity. Drawbacks were a lengthy development and the availability of trained support staff.

Thurber, teaching an upper division class in English literature, had a different experience. It was not obvious to him that the standard distance education model was appropriate, given both the mission of the university and his actual task, which was to investigate, in this case, the work of the English poet William Blake. He does not give quizzes as such, although short exercises related to that moment's discussion do take place; there is no "lecture" and therefore no lecture notes. The course itself, in addition, was already as "interactive" as he (and his 24 students) could stand. Instead, the goal was to use the Web to investigate the nature of hypermedia, particularly as the poet in question, Blake, had done an 18th century version of the same thing. His goals, therefore, were far more specific to the actual material—more contingent, more dependent on the actual poetry than on any idea about how to teach poetry.

He created, therefore, a course website (www.sandiego.edu/~thurber/CyberBlake) and asked the students to create their *own* hypermedia websites in lieu of the traditional paper—the rationale being, once again, not so much that hypermedia may be worth investigating on its own, which it is, but that, given this poet's practice, hypermedia are an appropriate, perhaps the most appropriate, response. The student's response was positive, in each case suggesting that the course be given again. Typical remarks included "It's about time English Departments did this," "an English course that is actually practical," and "I feel like I'm a writer too, doing something a little bit like Blake."

The course model that evolved, however, has almost nothing in common with Pope's. There was a course discussion board; very few students used it, feeling that opportunities for interaction were already sufficient; a few found it intimidating, while others viewed it as just another course assignment. (Participation in the discussion board was optional. Thurber wanted to see what would happen if it was not required.) There were electronic office hours; no one ever showed up, as students uniformly felt either that they already had sufficient access to the instructor, or that personal interaction was preferable. The emphasis was on the student's ownership and exploration of an electronic medium, the Web, rather than on using the Web to enhance communication or provide additional course materials.

Observations and Conclusions

It is about the differences between these two course structures that we would like now to reflect. Crucial to Pope's model was the use of the Web in the transferal of information from the instructor to the student. Indeed, he viewed, as is common, class sessions as adjuncts or supplements to information provided online.

But this is already not a model that transfers readily to an upper division literature class. Advocates of distance learning have traditionally emphasized that the use of electronic communications present opportunities for teacher-student interaction that effectively shift the educational focus from "teacher-centered" to "student-centered," away from the traditional lecture format and towards distance learning. But is the "transmission" of information, by itself, what college courses are for? If so, never mind the traditional lecture; colleges have been masquerading as libraries or, now that the technology is available, web sites. As far as the humanities are concerned the "transmission" of information is only one function college courses serve, and in some respects the least important.

While we acknowledge that modern educational philosophy mandates the critical importance of engaging the student in interactions that will impact his or her mastery of the subject matter, it does not then follow that the hallmark of student-centered learning is the use of computers in the classroom. Particularly if, as at our university, classes are small and instructors, on the whole, couldn't lecture if they wanted to. Is the give and take in small, discussion-centered, quasi-seminar situations comparable to what we can do in online discussion groups, even with real-time audio and video? If it isn't, what are the differences, and what is the educational impact of those differences? In the absence of hard answers to those questions, we wonder what's really at stake. What is being transmitted, pre-eminently in literature classes but in the humanities generally, is not the "information" we possess about, for example, Shakespeare, which is trivial, but the nature and kind of conversations we have and have had about his work. Knowledge in the humanities is both a process (not a result) and always contingent, socially constructed and crucially dependent on the context in which it is acquired. (The French Revolution in the eyes of post-1848 Europe was one thing; to Woodrow Wilson it was another; to ourselves it is yet something different.) From this perspective the transmission of information via the web is a non-sequitur. It isn't the Web that's the problem; it's the word "transmission."

Using computers according to the first model, therefore, at least interferes with and may even negate the goals and methods of the humanities—not because humanities instructors are Luddites (some are), but because the pedagogical model such approaches embody originated in one discipline, or set of disciplines, and don't readily transfer to another. Using computers according to Pope's model would deny Thurber and his students the chance to do what they want to do, which is both to learn what a writer actually did and to forge a response, together, to what she actually did. Here is where the under-appreciated difference between disciplines-- world views, at some point-- comes into play. There is no, and there had better not be, any such thing as socially constructed knowledge in the sciences. (Actually this is a matter of current debate. What physicists thought about the significance of Maxwell's equations in 1890 was a different than what Einstein thought fifteen years later.) In the humanities, on the other hand, and particularly in literature, there is no knowledge *except* what has been socially constructed – beginning with the fact that literature is made of language, the most social of all constructions, and including the fact that no writer, no matter how august, is a writer unless someone, somewhere, chooses to read her. The artist has an intent, to be sure, but that intent is only one of many variables connected to our mutual investigation of what a work actually is. Reader-response theory, as a matter of fact, would have us believe, in general, that readers are actually as responsible for what a work does as the author is – maybe more so, in some constructions. Whether that is true or not, none of us reads or could read Shakespeare as Shakespeare did; but we still read Shakespeare! What's that, then? Shakespeare is Shakespeare but he's also us reading Shakespeare, in ways that he could not have foreseen but which are, still, what Shakespeare "is." For now. Meanings change; there are no "laws" in the sense that there are for the hard sciences.

Thus when Pope says, for example, that it's a good thing that online discussions can happen any time, that it frees people from the constraints of time and space so that they can say anything from anywhere, Thurber's response is – why is that good? It would depend on the crucial insight that online discussion is the same as or better than the kinds of discussions his students and he have in real time, with their real bodies and their real minds in a real place, zoned into a writer they want to try to understand. Is virtual discussion discussion? (We know, for example, that people write and talk differently, and that they behave differently on- or off-camera. What are the differences, are they significant, and are virtual discussions better than, the same as, or worse than virtual discussions? And for what ends? There has been surprisingly little research in these areas, particularly as different disciplines are involved.)

Even, Thurber notices, Britain's Open University, one of the oldest and most successful implementations of computer-based instruction (http://www.open.ac.uk), supplements online material with local study centers (and tutors) at learning centers around the world. On this model, the discussion, always specific, always local, and always the joint product of the persons present on that occasion, is preserved, together with ancillary electronic material and the opportunity, which he welcomes for his classes, for students to write back at the sea of electronic media they are surrounded by, owning the web by helping, in a small way, to create it.

Our conclusion: we assume each of us is still *en route* to a full understanding of the implications of electronic technologies for higher education. We would emphasize, however, that our different disciplines seem to require different choices, different ways of using those technologies: one size does not fit all!

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User-Centered Web Site Design in the Instructional Technology Curriculum

Stephen P. Victor
College of Education
University of Houston
Houston, Texas, USA
Email: steve@svictor.com

Introduction

This paper discusses the place of information design in the Instructional Technology (IT) curriculum at the graduate level. The discipline of information architecture has evolved to meet the challenge of organizing and using information to provide meaningful communication. Information architecture may be defined as the process of developing effective written or visual communication. While good information design stresses the importance of communication that clearly communicates an intended meaning, *user-centered* information design places primary emphasis on addressing the cognitive needs of the intended audience (Victor, 1999). This paper examines the IT curriculum and suggests course offerings to prepare instructional technologists to use the Web to its full potential.

The Instructional Technology Curriculum

A review of the IT literature reveals that little has been published specifically on the subject of the IT curriculum. There is of course a great deal of literature on such facets of IT as learning theories and instructional design and development issues, but it is striking how little of this literature deals with how best to teach these topics or how to combine them in an integrated curriculum. As would be expected, the literature that does exist calls for a mixture of theory and practice (Heinich, 1984; Winn, 1997).

Winn (1997) notes that most university IT programs emphasize practical skills over theory; it is "concerned with the applica*tion* of knowledge, not just its generation" (Winn, 1997, p. 35, italics in original). This emphasis has led instructional technologists to seek prescriptive models of instructional design. However, such factors as individual differences and the impossibility of accounting for all variables in an instructional setting teach us that a truly prescriptive model of instructional design is not possible. Rather than apply rigid rules to the design of instruction, the designer brings reason and experience to instructional decision-making (Winn, 1997, p. 37). Knowledge of theory is a resource the designer can draw on in designing instructional strategies for varying situations and needs. Instructional technologists should be grounded in theory related to perception, in cognitive theories of learning, and in theories of the influence of culture and environment on action (Winn, 1997, p. 38).

Toward a Web Design and Development Curriculum

Although the Internet has been in existence for over 20 years, the World Wide Web has only recently gained popular acceptance, and Web-based instruction is still in its infancy. What role does Web design and development play in the instructional technology curriculum? An informal assessment of the types of Web design and development courses offered by instructional technology programs (as evidenced by programs with course descriptions on the Web) reveals a limited number of such courses. Courses typically include basic HTML instruction and Web page construction, computer-mediated communication technologies, and distance learning development. Perhaps within the context of a comprehensive curriculum of educational psychology, learning theory, instructional design theory and practice, and software applications, such course offerings might suffice. However, as the Web is increasingly used as a communication and research tool, Internet technologies will become an indispensable part of the instructional technologist's repertoire. It seems reasonable to expect Web design and development courses to play a greater role in the curriculum.

An Internet Studies Curriculum

Maule (1998) proposes Internet content studies as an academic field of study. He presents a framework that draws on two existing academic disciplines: instructional science and information studies. Instructional science is the study of learning theory, cognition, and interactive learning systems. Information science is the study of information access, retrieval, processing, and distribution (Maule, 1998, p. 177). His proposed Internet Studies curriculum contains foundation courses in both instructional science and information science:

- Cognitive science and learning theory
- Artificial intelligence
- Information representation
- Human-machine interactive process
- Distributed and virtual knowledge
- Information presentation
- Information and societal factors

Can we imagine an IT curriculum that addresses the unique needs of preparing instructional technologists to use the Web in curricular and instructional development?

Web Design and the IT Curriculum

As the Web takes on increasing importance, it is reasonable to expect IT programs to increase their offerings in Web-related courses. Skilled designers of any sort draw on a variety of skills that are difficult to describe. Design takes place through what Schön (1983) describes as "reflection-in-action": the reflective activity that characterizes the special knowledge of the skilled practitioner. Tripp (1994) notes the complex, ill-structured nature of design activities and the consequent difficulty of teaching design. He suggests that instructional design be taught in a manner similar to the way in which art and architecture are taught. Just as students of these disciplines learn by examining and discussing examples of great art and architecture, students of instructional design should study examples of great instructional design. Students could also learn instructional design in studio courses, in which students, professors, and design experts collaboratively design and critique instructional projects. This model could effectively be used to train students in Web design skills. In keeping with the mix of theory and practical skills suggested above, I propose the following areas of study be included in IT program course offerings:

- Web design methodologies
- Web design and presentation technologies
- Project management skills: planning, scheduling, and tracking of resources; communication skills; team building
- Web design theory: information theory and information design, cognition and perception, hypertext/hypermedia theory, the social construction of knowledge
- Critical pedagogy (Shor & Freire, 1987) and the analysis of Web content: Teach students a critical stance toward content. Whose interests are represented on the Web? Whose knowledge is presented in Web-based instruction? How can Web design be a liberatory experience for both learner and teacher?

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Note: This paper summarizes a more detailed discussion. For the complete paper, refer to http://www.svictor.com/itcurr.pdf.

An Instructional Design for Elementary Science-
A Product of Current Education Reform in Taiwan

Mei-Fun Wang
Department of Science Education
Taipei Municipal Teachers College
1, Ai-kuo W. Rd., Taipei, Taiwan 100
E-Mail: meme@mail1.tmtc.edu.tw

In Taiwan, a brand new national curriculum standard entitled "Grades 1-9 Curriculum Guideline Framework" was published in 1998 by the Ministry of Education, which has features of integrated, school-based curriculum, emphasis on information and technology. The framework proposes the educational goals with 10 key competencies and claimed that new education standard has been executed in schools from grade 1 to 9 by 2001. It did stir up the primary and junior high school teachers and publishers as well. The current education reform is somewhat a revolutionary event among science education community because it brought complex and compact changes of curriculum development as well as various teaching and learning styles and strategies.

The author leads a team of elementary inservice science teachers to work on the new standard and to develop standard-based teaching materials that been try-out taught. The purpose of this report is to present an instructional design of "The Moon" and "Stars" for grade school, which developed and based on the goals of ten competencies and the features of new standard. This report is an example of our product of the past working year and sharing for international understanding. These resources will be linked in WWW for inservice teachers to offer professional growth (temporary home page: www.scitec.ntptc.edu.tw).

The Modules of "the Moon":

Lesson I: Folktales and Celebrations

Objectives: (1) Be able to collect various folktales and the way of their celebrations of the festivals about the moon through web or books in the library. (2)To know Chinese lunar calendar and festivals.

Descriptions: (1) Pre-request the students to use internet (or library) to collect legends about the moon. (2)Ask students to share their stories collected, particularly Chinese folktales. (3) Students look up the lunar calendar and record all the festivals based on the calendar. (4)Invite students to draw a picture of the moon's surface. (5) Invite students to write a story after viewing the surface of the moon, and share their own stories.

Lesson II: Let's travel to the Moon.

Objectives: (1) To know the America's Apollo project. (2) To know physical condition of the moon. (3) To know how spacesuit, spaceship and astronaut works.

(5) To learn the skills of solve problems. (6) To learn social skills.

Descriptions: (1) Ask students to present (a) the Apollo Project. (b) Who is the first astronaut who stepped on the moon? (c) What Armstrong said when he stepped out of the spaceship? (2) Discuss what did astronaut find or not find on the surface of the moon. (3)Lead group work on following items to see how they work: (a)Spacesuit (b) spaceship (c) Rocket (d) astronaut (e) Astronaut's living in spaceship. (4) Design a colony on the moon, try to solve the following problems: (a) How to keep people alive without air? (b) How to protect them from space rays, extreme cold and hot? (c) How to supply food without agricultural? (e) How to travel and communicate? (5) Draw a picture of community on the moon.

Lesson III: A Hound Bites the Moon?

Objectives: (a) To change misconception about lunar phases or eclipses. (b)To recognize the sequence of lunar phases. (c)To predict the lunar date according to lunar phases.

Descriptions: (1) Telling the Chinese folktale of "a hound bites the moon." And students judge the possibilities of it. (2) Showing a table of lunar date vs lunar eclipse, allow students to be aware that eclipse occurs when it is full moon. (4) Having 3 students to play roles of the earth circling the sun (light) and the moon evolving the earth. (5) Students will find out that the earth's shadow will cover the moon. This is the cause of eclipse. (insert a picture) (6) Teacher draw pictures of lunar eclipse, and students demonstrate the lunar eclipse using paper model. (7) Having 4 students act as 4 positions of the moon orbiting the earth all facing toward the sun. One additional student plays the role of the earth at the center. The students will realize the cause of lunar phase. (insert a photo picture of students' role-playing)

Lesson IV: Lunar Tides

Objectives: (1) To know the cause of the tide. (2) To predict the high or low tide hour at certain coast around Taiwan. (3) To recognize the high and low tide match the lunar phases.

Descriptions: (1)Teacher illustrates Newton's finding about gravity. (2)Teacher guides students to be aware that tide is caused by moon's gravity. (3)Teacher illustrates that there are twice flow and ebb tides per day while the earth spins. (4)Teacher illustrates that there are twice highest and lowest tides per lunar month while the moon evolves around the earth. (5)Ask student to collect data through internet or *Taiwan Astronomy Year Book* about high tide hours within one day around Taiwan's coast. (6)Ask student to read the book of *Taiwan Astronomy Year Book.* The students will find that high tide and low tide match lunar calendar, e.g., high tide is on full moon and new moon days as well.

Modules of "The Star"

Lesson I: What Birth Sign of Constellation You Are?

Objectives: (1)To find the pattern of constellations. (2) To know some myth stories of constellations. (3)To create students' own constellations. (4) To write a creative story about a constellations.

Descriptions: (1) Teacher shows the birth sign of constellation, and asks students to tell his/her own sign. (2) Ask why and how the birth sign of constellation named. The students shall notice that the picture of imagine of constellation. (3) Divide students into groups according to the birth constellations, and discuss the stars in their own birth constellations. Doing so, students will find patterns in the sky. (4) Present the Chinese folktales of "The Lovers of Vega and Altair." and Greek's mythical stories about constellations. (5) Distribute fluoresce star stickers; students stick them on a dark room, so that students can see shinny stars, constellations in a black paper.

Lesson II: How to Find a Star and Name It?

Objectives: (1) To collective data about stars using internet. (2)Be able to use paper "star chart disk." practicing how to find a star. (3) To know the star "move" counterclockwise when observe it.

Descriptions: (1) Pre-request student to collect data about birth constellation from web, includes verbal descriptions and pictures. Students share their findings. (2) Distribute paper "star chart disk" to each student. Teaches student how to find a star from the chart (3) Go out in night and find the star from correct angle of elevation and direction indicated on the chart. (4) Find a star and name it in the dark sky guided with the chart.

Lesson III: Let's Plan a Trip to an Astronomical Observatory or Field in Night

Objectives: (1)To acquire ability of planning, organizing and practicing. (2)To learn cooperatively work with others.

Descriptions: (1) Teacher proposes a field trip to an astronomical observatory/field. The students should work as leader, reminder, data collector, expense manager, and discuss how they cooperatively work as a group.

Lesson IV: Let's Go Out to Observe the Stars

Objectives: (1) To recognize a star in the dark sky. (2) To compare the brightness of stars. (3) To learn the social skills.

Descriptions: (1) Gathering students in a dark field. (2) Teacher assigns the Polaris/Big Dipper and ask student to identify it in the dark sky. (3) The students use the chart to help finding the angle of elevation and direct of Polaris/Big Dipper.

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The New Opportunities Fund 'ICT for Teachers' Initiative, in the UK and the SIfT 'Virtual Tutor' Model

C. M. Whitehouse*, C. S. Durbin** and H. U. Shah*

*School of Computing
Staffordshire University
The Octagon, Stafford
Staffordshire, UK
C.Whitehouse@staffs.ac.uk
H.Shah@staffs.ac.uk

**Quality Learning Services
Staffordshire LEA
The Kingston Centre, Stafford
Staffordshire, UK
Chris.Durbin@staffordshire.gov.uk

Abstract

SIfT, as an Approved Training Provider to the Government New Opportunities Fund, 'ICT for Teachers' initiative in the UK, has created a highly structured model for designing and delivering course materials to remote teachers, via a Virtual Learning Environment. Based on the face to face delivery model and Gagné's (1985) nine events of instruction, it incorporates the qualities of the 'virtual tutor' in pedagogically sound materials (TTA 2001). With SIfT training accessed via the Internet, the international aspects of delivering training for teachers by this medium are continuing. SIfT materials are currently being used by in excess of 1000 teachers, in England, Jersey and Germany and have been trialled in Norway.

Introduction

Staffordshire ICT for Teachers (SIfT), a collaboration between Staffordshire University and Staffordshire Local Education Authority (LEA), in the U.K, is a Government Approved Training Provider, to the New Opportunities Fund, 'ICT for Teachers' initiative (NOF 2001). This UK Government scheme, which commenced in April 1999, provides a sum of money for every 'serving' teacher in the UK to 'buy' professional development training in ICT (Information and Communications Technology), from Government approved trainers. SIfT (1999) was approved as a national provider, following a competitive tendering process, to deliver ICT training to secondary teachers (of students aged 11-18), within the subjects of geography and design and technology.

SIfT delivers highly innovative training materials for secondary teachers, directly into their working environment using a web-based Virtual Learning Environment (VLE), in this instance Lotus Learning Space. A VLE is defined as "*an integrated software system, which combines within a package facilities for the delivery of learning materials, communication (synchronous or asynchronous), assessment and student feedback*" (LTSN/THES 2001).

The SIfT 'Virtual Tutor' Model

SIfT, through action research, has created a highly structured model for designing and delivering course materials to remote teachers, through a Virtual Learning Environment. The model is based on delivering *'learning on demand'* training, which is highly subject focused to the user requirements and which is developed to a structure which teachers are able to conceptualise. The model also provides a template for the development of clear 'bite-sized' pieces of learning, which incorporate qualities of the *'virtual tutor'*, delivered through the technology (Whitehouse *et al.* 2002).

In a face to face training environment, the able tutor will incorporate their own personality and style to the delivery of their materials. They will not only include delivery of the key messages, but will also incorporate humour and will provide scenarios and examples to contextualise the subject matter. They will reiterate material to accentuate importance, will judge the understanding of the audience and will re-visit areas of difficulty if not understood, adopting a different emphasis or slant to aid understanding. They may ask questions of the audience, even if no response is expected, to encourage each participant to think and individualise their own response, or answers may be requested, in order to draw the learner into the process and clarify understanding.

The role of the face to face tutor though goes further in developing and supporting the learner, offering references for background reading, providing hand outs, answering questions, supporting requests from the learner in the form of guidance and ideas and ultimately offering formative and summative feedback to assignments.

Gagné (1985) identifies nine events of instruction for any desired learning, (see Table 1). These instructional events provide the external conditions that are necessary for learning to take place; the events usually occur in the order listed. Within the SIfT Coursework materials, qualities of the face to face tutor and Gagné's nine events of instruction are developed and incorporated within the 'virtual tutor' model, through innovative use of the interactive facilities that the technology provides.

1. Gaining attention.
2. Informing the learner of the lesson objective.
3. Stimulating the recall of prior learning.
4. Presenting the stimulus material with distinctive features.
5. Providing learning guidance.
6. Eliciting performance.
7. Providing information feedback.
8. Assessing performance.
9. Enhancing retention and learning transfer.

Table 1: Gagné's nine events of instruction

SIfT's highly subject specific ICT training for teachers, is based on a 12 Unit grid, consisting of four subject strands, each with three levels of ICT capability - beginner, intermediate and advanced. The extensive multimedia material is innovative, lively, interactive and dynamic, with special emphasis being placed on understanding and accommodating the many requirements of teachers' daily needs. The materials have been created for teachers, by teachers (Whitehouse *et al.* 2002).

Teachers are given stimulus ideas within the SIfT units and are supported with tutorials in teaching and learning and ICT skills. The teachers then implement their ideas as part of their assignment, in a way that is relevant to them within their school – usually in planning an appropriate piece of teaching and learning. They have access to an on-line mentor. The teachers get advice on how to improve their lesson assignm ents submitted. The product of their work goes into the on-line library of the VLE course room, to build the resource base for others, with individuals able to download and use other teachers' endeavours. Discussion facilities and student profile areas are also provided.

Conclusion

The impact of SIfT provision, under the New Opportunities Fund, 'ICT for Teachers' initiative, cannot be underestimated. The 'virtual tutor' model has enabled teachers to be engaged in mass on-line training, which is highly targeted and meets teachers' needs for semi negotiated professional development. The Teacher Training Agency (2001) said of SIfT *"The model is actively chosen by schools, mainly because of it's subject specific nature and networking potential…The material and structure of the training can facilitate the development of significantly advanced pedagogical thinking and extend the use of ICT within the school."* A library of resources has been created and is continually being updated facilitated by SIfT– reinventing networking between ordinary classroom teachers on a national and international, rather than on a local scale.

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Designing a Web-based Curriculum for Middle School Students

Timothy Youngman
University of Houston
Houston, Texas, USA

Abstract: This paper addresses the implications for designing instruction for delivery over the Internet. A small education company in the southern United States has developed a unique Web-based middle school program that incorporates multimedia to deliver instruction in the context of a problem-based scenario. Specifically, this paper outlines a theoretical perspective for the development of on-line education, discusses one company's approach, and outlines some initial qualitative feedback from students.

Introduction

In recent years an increasing number of schools have made large investments to bring computers and Internet access into the classroom. With this technology, there is both opportunity and controversy as educators seek ways to integrate these innovations into classroom instruction. Much of this debate has addressed whether the pedagogical foundation of instruction changes when components of the class can be delivered via the Internet. Curriculum that was originally designed for the traditional setting is afforded different instructional activities and learning opportunities that were not perceived or even possible before Web-based instruction (Dabbagh & Schmitt, 1999).

Theoretical Perspective

Many organizations have moved toward constructivism as the foundation for the development of their instructional program, but there is a great deal of variety in what people mean when they say they are constructivist. Some of this can be accounted for by the differences in the theories on which constructivism is based. In general, most constructivists agree on three broad principles (Dalgarno, 2001):

- People form their own unique representations of knowledge.
- Learning occurs when people uncover an inconsistency between a new experience and their current representation of knowledge.
- Learning occurs within a social context (Vygotsky, 1978).

Although there is agreement on these broad ideals, different organizations emphasize them in different ways. For example, an individual manipulating objects on the computer screen emphasizes the second principle whereas collaborative learning using computer-mediated communication is based on Vygotsky's theory. Both activities can be considered constructivist (Dalgarno, 2001).

The movement toward a brain-based curriculum has also taken precedence in recent years, focusing on an integration of both constructivist and cognitive learning theories (Bruer, 1999). Brained-based learning is a progressive movement in education that seeks to recognize the strengths each individual brings to the classroom while supporting students as they overcome their weaknesses. Instruction from this perspective emphasizes that as students improve their underlying cognitive skills and memory levels their ability to learn is enhanced. This creates a strong foundation for the development of higher-order thinking skills (Kuyper-Erland, 1999). Effective instruction should help students learn to self-monitor their performance, reflect on their progress, and use forethought in making decisions about future learning experiences. This promotes a sense of self-efficacy and motivates students to become better learners. In addition, when information is presented in a variety of different formats students learn to recognize the similarities and differences between types of information.

A multi-modal approach also provides for individual differences based on variations in students' learning strengths. Traditional education has placed emphasis on some types of cognition over others (Gardner, 1986). This one size fits all approach to education means that some learners may be disadvantaged if their cognitive strengths fall into areas that are not traditionally addressed by educators (Driscoll, 1994).

Components of the System

The curriculum under study has been designed to meet the needs of middle school students. Informal research conducted by the company revealed that although there is a great deal of computer based instruction for use in the elementary school, there is little being developed specifically for middle school students. In fact, it has been argued that the middle school years coincide with the most critical period in adolescent development, and yet it is the least understood age group in our society (Hurd, 2000). Consequently, there is a need for a clearer vision of what a middle school curriculum should address.

From the perspective of cognitive psychology, key instructional strategies have been implemented into the learning system (Driscoll, 1994). Students are able to manipulate information in a variety of ways, which enhances understanding and facilitates long-term retention. Each topic is covered using a variety of multimedia that presents information in different modalities. This further facilitates retention and helps students see relationships among important concepts. Students choose their own learning pathway, increasing motivation and the depth of learning. The students have the freedom to explore new ideas and test their assumptions without the fear of failure that often hinders learning.

The company has developed an on-line system for the delivery of the curriculum. Although the content varies according to the course, there are common elements students use including:

- Problem-based scenarios
- Content according to each student's unique learning strengths.
- Software that allows students to build an on-line presentation.
- An on-line quiz and testing feature.

Currently, the system is implemented in 14 schools across the United States in a variety of settings with differences in both physical environment and socio-economic status. Early qualitative reports from students indicate an overall favorable impression of the system, but continued research will help validate its use and effectives for middle school students.

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INTERNATIONAL

SECTION EDITOR:

Dee Anna Willis, Northwestern State University of Louisiana

It has been a privilege over the years to write the introduction to the International section of the SITE Annual. From the early days of STATE, (the Society for Technology and Teacher Education, the former name of SITE), this section has grown and flowered and changed. At first any paper from a country other than the USA was deemed "International" and arrived with exotic stamps. While I miss the stamps I don't miss converting files to a format acceptable to PageMaker, our old desktop publishing program. As STATE became SITE so the body of the organization itself became International and the criteria for inclusion in this section changed.

Today an International paper should report on IT in teacher education in two or more countries. Whether the report is a comparison or of a collaborative effort between two nations or a comparison of methods, philosophies, governmental support or lack thereof among several, the underlying criteria is "two or more" countries. Not all of the papers published in the section meet this criteria, however, there is always some slippage between a proposal and the final submission. Time allows for few alterations at this point.

More and more collaborations are occurring; many sprouted from seeds sown at previous SITE conferences and/or at the conferences of our sister UK organization, the Association for Information Technology and Teacher Education (ITTE), some watered by funding from UNESCO. It is always a pleasure to see these develop. In the past those of the more 'electronically developed' countries came at partnerships with a patronizing attitude [as an American I can say we excelled at this deplorable practice] which meant no real partnership. Today, more and more I see an equal give and take, a recognition that we each have much to share, but even more to learn from each other. This is the spirit of not only this section, but of this organization. As you read the following papers consider links you can forge across national boundaries. What do you have to share? What do you need to learn?

We have presentations and/or papers representing viewpoints from Botswana, Canada, China, the Czech Republic, Denmark, France, Germany, Ghana, Spain, Switzerland, Taiwan, United Arab Emirates, UK, as well as the USA. Several papers stand out. Beal, Clark, Alibrandi, Pope, White, Robertson, and Lambert explore the results of their students work on a website, part of a larger project: Going Global: Cross Cultural Conversations Around the World. Chatterton describes the experiences of two groups of student teachers, one in Germany, the other in the UK. Morin considers an IT challenge used in the UAE but modeled on successful ones from Stockholm and Rome.

Weber address a question that we all ask, "How does one talk of learning communities with such discrepancies of funding and the effects of terrorism in place?" Davis leads several panels with participants from around the world who begin to address the answers.

The Management of Technological Change within Faculties in International American Schools

Martine Audéoud
Komensky Institute of Prague
Prague
Czech Republic
furaha82@yahoo.com

Abstract: The management of technological change within the schools' faculties was the main focus of this study. What are some of the indispensable ingredients for success in this area? The faculty has been considered as being at the core of the Human Resource Management of these educational institutions. The study focused on 'professional development' and 'instructional leadership' primarily in terms of technology and looked for some answers to the following question: How are international school managers going to manage staff development dynamics within their institution in order to comply with a global world more and more driven by technology? The study looked for factors that affect success in the management of technological change within a school faculty. Cultural richness, connection to the community outside and a high degree of exposure to technology seem to be the major keys to the success of the management of technological change in international American schools.

Introduction

In educational organizations, technology has generally been managed and implemented within specific business-oriented frameworks of thought and action directly influenced by the United States. However, in cross-cultural situations like in the TRI-Regional (Association of international schools regrouping 3 sub-regional associations accredited by SACS) schools, little is known as to the scope of growth in technology. The findings of this research show that international American schools succeed to various degrees in furthering technological growth.

Summary of Findings

Given this context, the purpose of the study was to examine the *factors that influence the management of technological change* in the faculty of international American schools that belong to the TRI Regional Association. The study focused on 'professional development' and 'instructional leadership' primarily in terms of technology.

In undertaking this study, the concern was to help the TRI leadership and the school managerial teams to evaluate the factors that have been influencing the success of staff development practices in the area of technology and to help them frame decisions and recommendations for forward planning. An action-survey research model has been selected. The survey focused on the following areas:
1. The management of school culture.
2. The management of staff development in schools.
3. The management of school technology.

Part 1: Findings Pertaining to the Management of School Culture

In order to research that question, data collected through the teachers' survey were computed according to the three areas previously defined. Respondents were asked to evaluate their school's staff development programs against the standards established by the National Staff Development Council. Similarly, respondents were asked to assess their own technology proficiency against the national Milken Exchange standards and to describe their school culture against the two sets of culture traits identified by Wilson (1996). Frequencies were computed and averaged by school in order to get a general description of how the school is perceived against set standards. One could note the following:

1. The means assessing sensitivity to business-influenced (B) Culture traits and those assessing technological proficiency are almost identical, showing a close the relationship between both areas.
2. The trends of the means assessing culture, staff development and technology proficiency are almost identical, showing that the three areas are closely linked together. In schools where there was a low level of what could be called 'cultural presence', from either B Culture or traditional (T) Culture, there was a lower level of staff development program and a lower level of technology proficiency. The richer the culture, the higher the level of technological proficiency and the higher the level of staff development.
3. The difference between the means describing Culture B traits and the means describing Culture T traits was also calculated and graphed. This was an attempt at finding out whether a high level of discrepancy between the prevalence of each type of cultural traits would have an impact on the level of technology proficiency in schools. This did not seem to be the case.

Conclusion to Part 1

It appeared from the data collected and analyzed that teachers who have had the *strongest local cultural background* (i.e. who were non-certified, and/or tenured and/or locally hired) were those who have *benefited the most from their school's staff development programs*. Their goal was to increase their level of technology proficiency. Furthermore, their technological growth came from the fact that they *have been deeply affected by exposure to Culture B traits in their school.*

In contrast, *administrators* seemed to be the only category of respondents who have *capitalized on Culture T* traits to further their proficiency level in technology.

According to data collected, *certified teachers* might belong to a category of teachers that presented similar characteristics as the *non-tenured and/or import hired teachers* and showed a high level of technology proficiency. They must have drawn their abilities in technology *from other sources* than those analyzed in this study.

Part 2: Findings Pertaining to the Management of Staff Development

School administrators' perception of their staff development programs was 44% above median and 20% more favorable than the perception of certified teachers. Pearson's correlation coefficients showed a correlation of 0.21 between technology proficiency and staff development programs for administrators, whereas for certified teachers that coefficient was –0.37.

Non-certified teachers, in spite of, and perhaps because of, their low level of technology proficiency and especially of their low level of job security, have had a greater desire for professional growth than certified teachers. Thus they have been much more sensitive to staff development programs. This may have accounted for the higher correlation coefficient of 0.565 between staff development programs and technological proficiency.

Tenured teachers have had a positive perception of their schools' staff development programs whereas non-tenured teachers have had a negative perception of their schools' staff development programs. Staff development programs seemed to positively influence tenured teachers in the area of technology growth, but did not seem to have much of an impact on non-tenured teachers. An explanation may have been found in the fact that tenured teachers have worked several years with the school and might view technology growth and professional growth as more needed or desired. Furthermore, non-tenured teachers may have been in the school for a shorter period of time. Generally, the majority of them have come from an international background and thus they may have been less in need of and more critical of staff development programs. They may have had more extensive or formal exposure to technology during their previous professional experiences.

Furthermore, non-certified teachers were the ones that have made most use of and perhaps have valued most their school's staff development programs. The Pearson correlation factor between staff development programs and teachers' technology proficiency was the highest (of all categories) for locally hired teachers. On the contrary, it was negative for the import hired teachers. This has confirmed that teachers hired locally were much more prone to appreciate or take advantage of staff development programs than import hired teachers. They were perhaps more eager to promote their personal growth in technology proficiency for various reasons that have not been researched in this study.

Conclusion to Part 2

At the faculty level, there seemed to be a strong case showing *that locally hired teachers were those benefiting most from staff development programs* to increase their technology proficiency. Furthermore, they were the ones who took the greatest advantage from their sensitivity to the specific cultural traits they were surrounded with in an international American educational setting.

On the other hand, at the school level, it seemed that *the culturally richer the school climate, the higher the school's technology proficiency and the stronger the school's staff development program.* Furthermore, research showed that attention should be paid to increasing teachers' sensitivity to students' needs and to the community's needs in the area of technology.

Part 3: Findings Pertaining to the Management of School Technology

Technology coordinators had been asked to fill in a Seven-Dimension Progress Indicator for Technology in American schools developed by Milken Exchange on Education Technology. This framework has been designed to help technology coordinators, policy makers and researchers to assess their school's level of technology according to seven specific dimensions:

1. Learners
2. Learning Environments
3. Professional Competency
4. System Capacity
5. Community Connections
6. Technology capacity
7. Accountability.

In each of these areas, several assessment questions were asked that related to a sub-area, according to the same above-mentioned framework. Technology coordinators were asked to respond according to a Likert scal. Data were computed with a spreadsheet, and Likert values have been averaged by dimension.

It was comforting to note that the strongest area of competency was that pertaining to the learners, that is students. Schools are primarily for students, thus serving their purpose in the area of technology. All other types of indicators did not indicate a high number of schools being technologically competitive, with the weakest areas being related to community connectivity and accountability.

Attempts have been made to integrate results drawn from the teachers' survey and to correlate the level of technology proficiency as assessed by faculty members to the various indicators of progress in the survey presently analyzed. The correlation (using Pearson's correlation coefficient) between schools' technological proficiency, all background categories included, seemed to be fairly strong as far as system capacity, technology capacity and accountability were concerned. Next, when narrowing down the range of faculty members to certified teachers (as they constituted by far the greatest majority of teachers' survey respondents), the correlation coefficient between their technology proficiency and the various progress indicators was the highest in the areas of learning environment, professional competency, system capacity, technological capacity and accountability. The weakest areas seemed to be those related to the learners and to community connectivity, which may be worrisome. Finally, because of administrators' leadership role, the correlation between administrators' technology proficiency and the 7-progress indicators has been looked at. The correlation coefficient between both ranges of data appeared to be highest in the areas of learners, system capacity, community connectivity, and accountability. Administrators appeared to have stepped in to cover areas where teachers were less involved, especially in the areas concerning learners and connectivity with the community. However, the correlation coefficient between administrators and learners was still fairly low, that is 0.208.

Conclusions to Part 3

Survey results have shown that school administrators have a more positive outlook concerning technology plans and their success than faculty members. A possible reason may be that the total staff is not committed to the vision, plan and implementation. Instead, the total school community should be participating to the development of the school's technological vision and plan, including staff development plans, financial management and accountability related issues.

Conclusions, Implications and Recommendations

Culture and Technology in International American Schools

1. *Teachers who had the strongest local cultural background (i.e. who are non-certified, and/or tenured, and/or locally hired) were the teachers who benefited the most from their school's staff development programs.* School administrators should be encouraged to devise staff technology training plans that focus especially on the needs of local teachers.
2. *Teachers with a strong local cultural background also seemed to capitalize mostly on their sensitivity to culture B traits* (US-influenced business-like cultural values) in order to grow in their level of technology proficiency. School administrators would be wise to ensure that this sensitivity is enhanced in a productive way and not a factor of frustration for local teachers. The latter need to realize that building positively on their sensitivity to Culture B traits will, in the long term, give them a competitive edge in that 'global village' that their school has been increasingly connected to.
3. *The richer a school culture, i.e. with both Culture B and Culture T traits (business and traditional cultural values), the richer the staff development programs and the higher the level of the school's technology proficiency.* Therefore, school leaders investing in developing the cultural climate will see their school faculty greatly benefit from that cultural richness in areas related to technology training and technology integration into curricula delivery.
4. Another finding worth noticing is that *technology proficiency in schools rises and falls according to the level of Culture B traits in the specific schools.* Therefore, school leaders would be well advised to ensure that an appropriately high level of Culture B traits be developed and promoted in their school. This would in turn enhance teachers' understanding of the 'cultural requirements' that technological change in educational settings brings with it.
5. *School administrators seem to capitalize more efficiently on culture T traits to increase their level of technology proficiency.* They have been taking advantaged of the various opportunities for technology growth throughout their career. They have no doubt as to the necessity for them to continue to expand their knowledge and experience in that area.

Leadership, Management of Staff Development and Technology in International American Schools

School leaders should take the following elements into consideration as they lead and manage their schools' human resources.

1. *Certified teachers (who seem to belong mostly to the non-tenured and/or import-hired category of teachers) draw their abilities in technology from other sources than those analyzed in this study.* They do not appear to need to be the prime focus of schools' staff development programs in the area of technology. However, they *may constitute resources and leadership potential* in the area of technology that are available to the school.
2. *Students are the most technologically proficient members of school communities.* However, their teachers need to become more sensitive to ways of integrating technology into their curriculum

delivery. This would ensure that their curriculum delivery would adequately prepare students to meet the challenges of this new 21st century. Therefore, the school leaders' role should be to *ensure that their technology coordinators are being constantly kept abreast of the possible implications on education of the latest technological advancements.*

3. *Staff development plans should emphasize a higher degree of hands-on exposure to technology* in order to promote a higher level of 'technological know-how'. But it also seems more important that teachers' technological staff development plans aim at demonstrating, modeling, making resources available to teachers on the multiple ways and means by which teachers can integrate technology into their curriculum delivery. Teachers should be given opportunities to be able to become knowledgeable as to the specific assets technology may bring to their own areas of study. This may also take place when schools have subscribed to professional magazines that include reviews of technological advances. It also may necessitate for *technology coordinators and school leaders to take a pro-active role* to discover what technological advances have been made that may be applicable in various educational fields.
4. Schools need to focus on *connecting more closely and consistently with the community outside* in order to provide their faculty and students with more resources and partnerships that will strengthen the general schools' technology programs. According to the findings of the survey, school leaders step in adequately into two areas where teachers seem to be lacking: focus on learners and community connectivity. Schools would greatly benefit from reconsidering how they manage their external relationships with the community in order to increase the technological resource base on which they can operate.
5. Schools need to *develop accountability procedures* in regard to technology management in order to be able to measure progress, both in the quality of curriculum delivery and financial management. This would enable school leaders and community to supervise the coherency of the various aspects of technology management.
6. Schools should make it a *priority to develop and monitor their technology vision and plans* as a tangible way of monitoring technology growth in their institutions. This should take place while involving all the stakeholders of the community in developing these management tools.

This study hopefully contributed to analyze some of the characteristics of the management of technology international American schools in the TRI Association, a further step towards effectively managing technology in international American schools.

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Going Global: Using a Website Development Project to Teach Technology Integration, Enhance Global Perspective, and Empower Students to Imagine the Teaching Possibilities in Their Own Technology Enabled Classrooms

Dr. Candy Beal, Department of Curriculum and Instruction, College of Education, NC State University, USA <candy_beal@ncsu.edu>

Dr. James Clark, Humanities Extension/Publications, College of Humanities and Social Sciences, NC State University, USA, james_clark@ncsu.edu

Dr. Marsha Alibrandi, Department of Curriculum and Instruction, College of Education, NC State University, USA, marsha_alibrandi@ncsu.edu

Amanda Robertson, School of Design, NC State University, USA, amanda@imediagraphics.net,

Judy Lambert, Department of Curriculum and Instruction, College of Education, NC State University, USA, jlambert@intrstar.net

Shannon White, Department of Curriculum and Instruction, College of Education, NC State University, USA.

Abstract: The Great Ghana Website is part of a larger project, Going Global: Cross Cultural Conversations Around the World. The website project seeks to help graduate and undergraduate students enlarge their global perspective while developing technology skills for the classroom. The site was developed to supplement a video conversation between a University of Kentucky professor and her doctoral student from Ghana. Their conversation examines what they see as the mismatch that may occur when cultures, values and relationships between developing nations and benefactor nations are dissimilar. To better understand the cultural divide, a website was developed to inform students about the culture of Ghana.

Teaching is never the same day to day. Educators must be ready for unexpected opportunities and be willing to take advantage of them when they occur. The Great Ghana Website grew out of two such opportunities. One occurred at the National Council for the Social Studies Convention in November, 2000. We chose to attend a session that paired an American professor at the University of Kentucky with her doctoral student who was from Ghana, but temporarily studying at the University of Kentucky. They enacted a cross cultural conversation they had written that compared and contrasted the cultures of the United States and Ghana. The exchange was as powerful as it was enlightening. We believed that it would be informative for teachers who were preparing to teach about Ghana to their students. We also believed that to see and hear the exchange was much more powerful than just reading it. We flew in the educators from Kentucky/Ghana and spent the day filming their conversation. As we worked, they offerred new information and opinions that proved invaluable in preparing the viewing guide for the video.

The second opportunity came in the person of a former Peace Corp worker. She is the wife of one of our Masters students. When she heard of our interest in Ghana, she volunteered to tell us her stories about her Peace Corp years spent in Ghana. At first, we planned to tape them so that they might be used in classrooms around the state. Later, we determined that because of their richness we could include activities that were inspired both by her stories and the digital pictures we took of her artifacts from Ghana.

After both of these treasures had been taped we examined possibilities for dissemination. How could we best get them to teachers and students and what form should they take to ensure they were used to their fullest? It was decided that a website would be built to include information about Ghana as well as the taped conversation and stories. The viewing guide would also be put on the website.

The website development process by graduate and undergraduate teacher education students was highlighted by a formal study of what makes a good website - design, font, format, appropriateness for the audience, reliability and variability of material presented, etc. Students surfed the net and evaluated examples of website design. We discussed issues of copyright, permission, credits, etc. Students also studied the teaching and learning approaches that best meet the needs of early adolescents. This helped them understand how students learn and enabled them to craft effective and appropriate lessons. Students viewed the videotaped conversation, heard the Peace Corp stories and saw digital pictures of artifacts brought back from Ghana.

The website was planned to include the following five parts:

$ The first part would have information - population, economics, climate, etc. that was accessed through GIS (Global Information Systems). This part also included a tutorial about GIS, what it is and how to use it.

$ The second part included the Peace Corp stories. Each story was written on two different reading levels. Because all members of the target audience (seventh graders) are not always reading on grade level, both seventh and third grade reading levels were included. Preservice teachers selected four stories and wrote each on the two different levels.

$ The third part was completed by graduate education students, many of whom are seventh grade teachers. They wrote activites to accompany digital pictures taken of artifacts brought back from Ghana. The activities were intended to sharpen middle school students'observation and reflection skills.

$ The fourth part was a retelling of folk tales from Ghana. The folktale segment was prepared by preservice teachers who will student teach elements of African history. They chose seveeral well known Ghana tales, illustrated them and rewrote them on two different reading levels.

$ Finally, the fifth segment included the viewing guide which sketched background information about the long standing relationship between Ghana and the United States and suggested ways to best enjoy the video. The video was prepared to include scenes from Ghana. The video will serve as an ancillary to the seventh grade social studies textbook and will be used primarily by teachers as background information to prepare them for their study of Ghana with their students.

This website development approach is based on learning theory and on-going research that suggest that students who are novices in the area of technology, when partnered and in a supportive, risk free learning environment, have a more positive learning experience using technology, become technology empowered, and are thus more likely to incorporate the use of technology in their own lessons and classrooms.

International Leadership for Educational Technology: A Transatlantic Bridge for Doctoral Studies

Niki Davis, Iowa State University & London University Institute of Education
Andrew Brown, London University Institute of Education
Kara Dawson, University of Florida
Elsebeth Sorenson, Aalborg University, Denmark
Jose Luis Rodriguez, University of Barcelona, Spain
Glen Bull & Zahrl Shoeny, University of Virginia
Christina Preston, MirandaNet & London University Institute of Education
Victo Udin, Iowa State University

Abstract

Leaders in education in universities, schools and services to education and vocational training, are challenged in their leadership of new technology. This round table aims to raise awareness of the efforts of 3 European and 3 USA graduate programs of technology in education and teacher education, who are prepared to revitalize leadership through sharing of their graduate communities through a project recently funded by the European Commission and the US Department of Education.

The ILET project aims to permit experts in multimedia, cultural studies, and distance education to develop a certificate in *Intercultural Educational Technology* within Ph.D. programs of the six partner universities. The planned components of the certificate are: comparative study of educational technology systems, policies, and applications; language and cultural learning activities before, during, and following a semester of study abroad; project work and/or internships that require application of theories and technological skills to real life challenges of digital and cultural divides; and an intensive international course at the major professional conference to induct students into the international professional community. An Intensive International Course may bring together students and faculty and incorporate study and reciprocal mentoring in future Society of IT for Teacher Education conferences.

The project will enable our multi-disciplinary consortium to educate a new cadre of leaders with experience in today's global context, while taking care to include both sides of the digital divide plus commercial partners. Student selection will positively discriminate to redress inequalities of the digital divide. In addition, students will be encouraged and supported to undertake project work on related issues of national and international importance for agencies such as UNESCO. Exchanges of faculty and staff aim to ensure coherence in curriculum, assessment and support services. Preliminary exchanges and research indicate promising flexibility with innovative web-based learning strategies (see for example Davis, 1999; Bronack Kilblane, Herbert & McNergeny, 1999) ; and Davis, Nilakanta & Li, 2001).

The consortium is committed to creation of a prestigious knowledgeable community of alumni who value their continued collaboration with faculty and students in an online

learning environment that Oracle has created for learners across the UK, USA and beyond. The Universal Forum of Cultures in Barcelona 2004 will showcase the global service of this project worldwide. This transatlantic project is potentially the first stage in an ongoing global program with additional partners and students.

The Round Table Agenda

The 3 collaborating universities in the USA (Iowa State University, University of Virginia and University of Florida) and their 3 partner universities in Europe (University of London Institute of Education, Aalborg University in Denmark and University of Barcelona in Spain) already recognize that there will be many challenges in this collaboration. Obvious issues of the Danish and Spanish languages are accompanied by additional less obvious language challenges: English misunderstandings between the UK and USA and the need to value minority languages of Danish and Catalan. The local cultural differences provide a exciting and challenging mix for faculty and graduate students who will travel, and they will also be visible online. Cultural differences in academic structures and organizational behavior have already been raised in pilot activities. Memoranda of Understanding will be developed to clarify the collaborative activities and mutual support. Selected MOU and other guiding documents will be shared with the round table for review and comment.

The development of a learning community across universities has been the focus of graduate work and pilot activities between several partners, particularly Iowa State, London Aalborg and Virginia (Davis et al, 2001; Sorensen & Tackle, 2001). Other partners include the educational community of leaders in information technology in education who have been creating a learning community and mentoring resource for others called MirandaNet, founded and led by Christina Preston, with support from many organizations including Oracle (Preston, 2000). Examples of the artifacts, environments and associated research will be available for review to stimulate discussion.

Thirty students and twelve staff will study abroad and collaborate with many more in the project's innovative web-based learning environments, supported by professional communities and commercial experts. Significant challenges are expected in recruiting students and faculty to work abroad for a semester and to become comfortable in foreign and international learning environments.

The project aims to broaden the impact of the EC and US cooperation by 'training the trainers' of faculty involved in open and distance learning. While many graduate students in the USA do become future faculty, the lack of turnover in Europe provides additional challenges for that continent. Managing extension of collaboration and dissemination of the project may also prove challenging, but the partners are committed to this and the round table will provide a means to listen to our future audience at an early stage, because the three year project commenced in October 2001.

The round table aims to promote discussion of travel, both real and virtual, and collaboration between programs and institutions in a way that promotes international and inter-cultural education.

Teaching and Learning in Information and Communication Technology and Modern Foreign Languages

This paper examines the experiences of two groups of student teachers working together to encourage the use of ICT in language teaching.

Student teachers specialising in Information and Communications Technology (ICT) have worked with a group of Modern Foreign Language (MFL) students, within university-based sessions and on teaching placement, to support the development of ICT-based language learning activities.

This has recently been extended to include working, via a computer-moderated conference, with a group of students in the University of Gießen in Germany.

A rich range of activities is developing, including the use of the conference to exchange school materials, lesson plans and 'native speaker' recordings of school pupils talking about themselves, their interests, school life etc.

Dr John L Chatterton j.chatterton@shu.ac.uk
Head of IT
Sheffield Hallam University
School of Education
Collegiate Crescent Campus
Sheffield S10 2BP
England

Mr Chris Willan c.willan@shu.ac.uk
MFL Subject Leader
Sheffield Hallam University
School of Education
Collegiate Crescent Campus
Sheffield S10 2BP
England

Student teachers and the development of ICT- based language learning activities.

Introduction

As we enter the fourth year of this project, we have been encouraged to build on the success of earlier years and to extend the range of ICT-based activities and experiences available to the 'Modern Foreign Language' students as they work with the 'Information and Communication Technology' students.

Previously (Chatterton, J. and Willan C. 1999, 2000, 2001), the two groups of students have jointly developed appropriate ICT-based MFL teaching materials within the university and have then used the materials to teach French, German and Spanish in local secondary schools.

In this phase of the project, a number of ICT and MFL students have been paired for their school placements so that we are able to examine the extent to which the departmental structures and attitudes affect co-operation in teaching. The work is being further developed with the use of a computer-moderated conference, using FirstClass™. This phase involves links with student teachers at the University of Gießen, in Germany, and will involve the exchange of ideas and the development of materials using English school children as 'native speakers' for the development of materials in German. The final paper will include the experiences of the current intake of students with these materials.

Student Teachers and School Placement

All the students taking part in this study are postgraduates, following a one-year professional training programme leading to 'Qualified Teacher Status'. The majority have worked for a number of years before deciding to train as teachers. All such courses are 36 weeks (180 days) long and a total of 120 days must be spent in schools. Details of the placement pattern and the structure of the course can be found on the PGCE Information Technology website (Chatterton, J. 2000).

Typically, the professional year cohort consists of approximately 360 students training to teach any one of a range of subjects at secondary school (High School) level. The students will undertake placements in two of our partner schools - we typically use around 120 schools, so the average is three students per school. Of the 360 students, about 18 will be studying ICT and a similar number in MFL. Both subjects are regarded as "shortage subjects" as it has been difficult to recruit enough trainees in these areas for some years. Schools offer places in the various subjects, we cannot demand them, and this makes 'pairing' students in ICT and MFL problematic: schools have to offer places in both subjects. Each student is placed in two different schools during the year, teaching a 50% timetable on the first placement and a 75% timetable on the second placement. For the students in the ICT and MFL groups, working together to develop materials and lessons is not compulsory, nor is this aspect assessed. However, the students have shown great enthusiasm for the work, both individually and as a group and, where we have been able to pair them on placement, they have made marked efforts to work together and in some cases have effectively introduced the use of ICT in language lessons in schools where staff have been reluctant to take on the work involved. This is now changing as the new National Curriculum requires all subject areas to make use of ICT in teaching and learning.

ICT and Modern Foreign Languages

Government regulations (DfEE 1998) for the training of teachers require that all student teachers become competent in the use of ICT to enhance their subject teaching and more recent changes to the National Curriculum (DfEE 2000) have complemented these by insisting that ICT become an explicit part of teaching and learning in every curricular area. The UK government, through the National Lottery, has provided funding of £230 million ($322 million) to train teachers, not in the basic skills of computer use, but in these much more complex areas: using of ICT in teaching and learning, planning and assessment and in the teacher's own continuing professional development. The expectation is that all teachers will at least meet the ICT competences laid down for the training of new teachers in all subject areas and over all phases of education. At the same time, the government is spending some £500 million ($700 million) on the provision of hardware for schools and every school is gaining a 2MBit broadband connection to the internet, with a nationally supported school-web structure— every school has a website address and every teacher and pupil is to have a personal email address.

To be effective, ICT must be used genuinely to support and develop MFL skills and the ICT must not be just to entertain or to fill time. Many examples of poor practice have be seen where, for instance, pupils spend 30 minutes drawing a picture, then use only a few words or a single sentence to describe it. Part of the standards requirement for student teachers is that they learn to judge when it is appropriate to use ICT and to recognise and evaluate subject gains amongst the various motivating elements, which are not necessarily subject related, that using ICT still provides in the classroom. Learning to work effectively with ICT in the classroom is of concern across national boundaries and education systems. The following two quotes from the *French National Educational Resource Centre* (CNDP, 2001) for example, shows that they too are faced with the same range of opportunities and concerns.

"Démarches pédagogiques Les cédéroms n'ont pas vocation à remplacer l'enseignant, c'est l'enseignant qui a recours à cet outil pour les besoins de sa pédagogie et qui les intègre dans sa progression."	Pedagogical steps. CD ROMs' job is not to replace the teacher, it is the teacher who makes use of this tool for his pedagogical needs and integrates them into its progression

> "Correspondance scolaire
>
> Par la messagerie électronique, la correspondance scolaire ou individuelle gagne en souplesse et en rapidité: rien de tel pour préparer des rencontres réelles!"

through email school or individual communication becomes quicker and more flexible - there's nothing like it for preparing for real life encounters!

Materials developed as part of this project have proved to be beneficial from a language learning perspective as well as being enthusiastically received by the school pupils. The school staff have also been keen to retain the materials for their use with other classes. At the same time, ICT staff within the schools have recognised the value of the materials in providing much needed cross-curricular support for the use of ICT.

The Shared Sessions

It was clearly important, for both groups of students, that they developed the skills and attitudes which would enable them to match the government's requirements for the award of Qualified Teacher Status.

The IT students were asked to evaluate the needs of the linguists and to plan and deliver sessions which would enable the MFL students to cope with the ICT demands of their course and to focus on the development of school-classroom materials. For both groups of students, these experiences would enable them to meet many of the required criteria and would, hopefully, encourage co-operation in the school setting. The current group of students will be trying their materials in local high schools in January and February 2002.

Sheffield Hallam University School of Education takes part in an exchange programme with the University of Gießen, in Germany, and Gießen students form part of the MFL group in the first semester of each academic year. In October 2001 we established a joint computer moderated conference, allowing students in each country to discuss experiences of learning to teach and to exchange materials. Because of the way the two courses are organised, much of the initial traffic has been from England to Germany: this should be redressed are the year progresses.

The School Experience

In the second semester (February to June) of the 200-2001 cohort, we were able to pair MFL and ICT students in three schools and in the first semester of the 2001-2002 cohort (September to January) we were able to pair students in five schools. With the first group we were looking for activities that were both useful and practicable given the local circumstances in each school.

Being paired on placement allowed students to try to take their good practice into a real setting. While the students were able to work together, in some schools the extent of the work was markedly affected by pre-existing relationships between the departments, the perceptions about the ICT infra-structure within the school and by the attitude of some school staff to the 'usefulness' and 'reliability' of ICT in general. Nevertheless, the student experience was sufficiently positive to encourage us to develop the model further and to extend the pairing into the new academic year, starting September 2001.

As teachers have become more aware of the reality of the new curricular requirements, MFL students are being actively used as change agents within language departments: teachers are seeing the students as a useful resource to help to update their own (the teachers') skills. This has happened in many schools, not just those where ICT and MFL students were paired. The links to Gießen have been used by students who are currently on their first placement: personal information and descriptions of school life have been exchanged and, more interestingly, pupils within the schools have been recorded (sound only) and the resulting mpeg files have been sent to the conference to provide native-speaker examples for the German students to use. This aspect is currently being studied and results will be available for the final paper presentation.

Gains — skills and attitudes

In the second placement of last year's cohort, which ran until the end of the course in June 2001, it was noticeable that MFL students were making significantly increased use of ICT in their teaching. This was apparent from the students own teaching files, lesson plans and evaluations and from the comments of their mentors (usually the head of languages in the placement school). Last year both the ICT and the MFL courses were inspected by 'OfSTED', the Office for Standards in Education and in both cases the joint group work was praised (OfSTED 2001 (a), OfSTED 2001 (b)) and the languages inspector praised the MFL students' ability to apply their ICT skills to MFL teaching. Exit evaluations by last year's students showed that they, too, valued the experience: they regarded it as one of the most useful/interesting aspects of the course. It has proved to be a significant motivating factor in student evaluations and both student-teachers and experienced school staff reported that pupils in schools were motivated by the lessons and materials produced by the students and that they (school pupils) made real gains in language experience.

For the current cohort, even at this early stage, there is no doubt that both groups of students value the experience of working with each other. Comments made of the FirstClass™ conferences show the level of interest and the extent of help being offered during the placement. Teaching placements are inevitably stressful and students are under great pressure to perform well in class at the same time as keeping up with academic assignments, yet almost all have made the time to continue the process of developing skills begun in the joint sessions. This, as much as anything, is a clear indication that the students themselves find it significantly helpful.

Using ICT in language lessons has allowed students to explore, with their classes, areas which would otherwise have been difficult or impracticable. In one of the 'paired' schools, the language student got one of her classes to do a survey of the school, enter the results in Excel, create a series of bar charts and add text commenting, in French, on the results. Such a well integrated example of using a range of key skills[1] within a language lesson would be rare for an experienced teacher. It will be interesting to follow her progress next semester to see if she remains confident enough to manage similar activities without the direct support of an ICT student.

Conclusion

As we write this paper, the individual and paired work still continues in schools for the current cohort of students. Early indications, from both students and mentors, shows that both groups are making good use of the experience. MFL students are making good use of ICT to support their planning, teaching and assessment and ICT students are becoming positively involved with other departments in their schools and are able to offer appropriate support for the development of subject-based ICT. This is a marked shift from the experiences of a few years ago.

Initial comments regarding the links with Gießen are also positive and we hope to have more definitive results by the time of the presentation: in particular the exchange of 'real' conversations between pupils and students seems to be worth pursuing.

Simple, well-targeted ICT material, designed with careful consideration of the curriculum aims and objectives, has clear benefits for pupils in schools. The supported development of such material, ***by student teachers***, and the experience of planning delivering and evaluating the lessons in which it is used has enormous benefits for all those involved. For the ICT specialists, the ability to help colleagues plan and deliver ICT in subject areas is crucial: for the MFL specialist the confidence gained by working with a supportive ICT colleague is vital in encouraging them to use ICT in their lessons. Each year, the skills demanded of the groups have increased and each year the students have responded with enthusiasm and success. Working together in a challenging and supportive environment has produced gains for the students that have not been matched elsewhere and we seem to have a model that is cost-neutral while bringing marked benefits

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[1] 'Key Skills' are defined within the national curriculum (DfES 2001 (a)) and both the DfES (DfES 2001 (b) and (c)) and the Qualifications and Curriculum Authority (QCA 2001)

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UAE IT Challenge Competition and Zayed University – Project Overview

Jacques E. Morin (Jacques.morin@zu.ac.ae)
Information Technology Department
Zayed University

George Kontos (george.kontos@zu.ac.ae)
College of Arts and Sciences – Department of Natural & Quantitative Sciences
Zayed University

Background

The United Arab Emirates will be hosting a regional IT competition in 2002. Based on the well known Stockholm IT Challenge (http://www.challenge.stockholm.se/), the UAE Challenge is an initiative of the Higher Colleges of Technology, in collaboration with the Universities and the Ministry of Education. Dubai Internet City is proudly supporting and sponsoring the Challenge. Many other national and international business organisations have also joined in sponsoring this national event. It involves the three main educational sectors, schools, colleges and Universities of the UAE. The Challenge is designed to reward excellence in the use of IT, increase links between the educational sectors, promote team-work, sharing and co-operation, and best practice in the classroom.

One of the institutions participating in this project is Zayed University.
Zayed University (ZU) is located in the Arabian Gulf Region in the United Arab Emirates. It is a four year old all female institution providing undergraduate education in an outcome based curriculum.

The university currently has over 2000 students enrolled in six degree programs on two campuses located in Dubai and Abu Dhabi in the UAE.

This paper first describes the types of projects submitted to the competition by Zayed faculty, staff and students. Second, the paper will review the competition criteria. Finally, it concludes with a review of the success of the projects in the competition as well as the impact of the projects at ZU and the potential for future integration into the regular curriculum. (The competition results will be provided during the conference.)

Description of projects.

Each submission by ZU for this competition was supported by the respective college of department and implemented in 2001 either as test or pilot phase. The results of each of the projects in terms of efficacy in the educational technology integration at ZU is still under review. This is a summary of the projects submitted by faculty and staff.

Description

Project 1 - ZU Magazine is a student-created web newsletter that includes articles of interest to the Zayed University community. Submitted by amy.kayser@zu.ac.ae

ZU Magazine is a web-based newsletter about Zayed University that was written by Module 8 students from Readiness Program using a template on www.tripod.com. The website mainly talks about the students, faculty and the activities at Zayed University. Five students participated in this project with their teacher's help. The newsletter includes many topics that interest those who would like to know something about Zayed University. You can read about many subjects such as faculty biographies, students' trips, clubs, etc. Teachers, students, and other members of the university community can enjoy this project. In addition, it includes many pictures and links.

Project 2 - This is an online learning opportunity for students to learn about international management and teambuilding through direct participation in academic projects with others in an international interactive environment.
Submitted by Warren.Lee@zu.ac.ae

This is an online classroom project that unites two separate college classrooms from different cultures and countries in an online interactive international academic project that uses high technology as the media and means. The objective is to provide an "open window on the real world" that enables students to learn the basics of intercultural management, leadership and teambuilding through direct experience with peers from another culture and country. This is accomplished by forming international teams, and working collaboratively to introduce themselves and exchange intercultural information, and then to work collaboratively on an academic writing and research project using high technology and the Internet as the medium. It is expected that students will learn more about globalization, intercultural communication, the integration of high
technology in management/leadership as well as learning more about themselves and the dynamics involved in intercultural leadership. It further provides students an opportunity to communicate with teacher/instructors from different cultures and countries and to gain new perspectives on the course itself. Communication and study are supplemented by digital photos of students, campuses and campus life that further demonstrate our similarities and differences. A detailed academic project description is provided on a separate page, as are student teams with names and email addresses for each student to facilitate group and direct contact and communications. Each course syllabus is also on-line in the website, and students can compare and contrast learning requirements and course expectations across cultures.

Project 3 - A Math web site developed to provide students, faculties and peers of ZU across both campuses with a unique online course structures with reference and worked examples as well as home works assigned. Submitted by Nakhshin_Karim@zu.ac.ae

This project is a web site based on Front page 2000. It covers two courses of Mathematics (Algebra and Pre-Calculus) being taught by Ms. Karim and other instructors at ZU. The basic Index of the web site includes, for each course: the outline of the course, MS Power Point Presentations for each topic, assessment of the course (Quizzes and Exams), and references and related websites that students and faculties might use. Students can refer to this site and have the opportunity to acquire what they need. Feedback from students are felt to be the good measure of being useful site for them to strengthen their capabilities in the subject Maths courses.

Project 4 - At Zayed University, College of Education students complete an extraordinary integration of their total University experience by creating a digital portfolio of their work. Submitted by frederick.vansant@zu.ac.ae

The cornerstone of the new outcome based Academic Model, is the digital, or electronic portfolio. A portfolio is simply a container for a person's work. In a portfolio an artist might show a selection of her best work, an architect might show photos and plans from houses or buildings. However, an academic portfolio is not quite so simple. By definition, a student's academic experience in not limited to the work that they have done, rather, the true measure of a student's experience is the learning that has taken place. This then, requires a more defined structure, and the requirement that a student exercise considerable critical thinking about what would go into their portfolio. By bringing together evidence of the student's learning in both formal and informal contexts, the students and the faculty can more easily see the relationships all the different types of learning in the student's academic career. All students enrolled in the College of Education are required to complete a professional portfolio. This portfolio is digital, and web based. It may include web pages, documents, PowerPoint presentations, hyperlinks, images, digital audio and/or video.

Project 5 - This project is a collection of WebQuests that are problems-based units of study supported by Internet resources and have been developed by UAE national preservice teachers and aspiring educational technologists to support UAE K-12 curriculum. Submitted by f7517@zu.ac.ae

The WebQuest is a technology-supported unit of instruction that is problems-based and uses the Internet as an educational tool. It is a teaching strategy that emerges from a problem that requires a unique solution based upon available information. It contains the following components: introduction to the problem, tasks for cooperative group members, processes required for successful completion of the challenge, off-line and online resources, and an evaluation rubric for products and solutions. WebQuests are typically written for cooperative groups with each student having a specific responsibility for doing research that will support decision making and an assigned role in product development. The interdisciplinary nature of WebQuests makes use of student interests and current issues related to the subject being studied. Students at Zayed University are trained to implement technology as a tool to facilitate student-centered educational practices in the classroom. The WebQuest, once published to the Internet, is accessible and usable by all teachers and students. The faculty members submitting this project do so as a model innovative approach to helping teachers develop student-centered teaching practices, create authentic teaching materials, and appropriately use technology in the classroom.

Project 6 - A distance English course in which students collaborated to research, write, revise and post articles on a website using videoconferences, email, chat, discussion board, file exchange, phone and face-to-face communication. Submitted by William.Radecki@zu.ac.ae

The Cross-campus Web Newsletter course was the first distance course offered at Zayed University's two campuses in Abu Dhabi and Dubai. Twenty-two students (11 on each campus) and two teachers participated in the 10-week (50-hour) course.

Project 7 - Students from various schools around the world get together via videoconferencing technologies (PictureTel) to learn from and with each other. Submitted by george.kontos@zu.ac.ae

The project was established to help broaden the horizons of students in a school by connecting them electronically with students in other countries. Using compressed video and audio-videoconferencing as the primary medium, the project is designed to: encourage a greater understanding of different cultures, investigate selected topics in depth, become familiar with new communication technology, and use student-centered techniques to make learning engaging and meaningful.

Project 8 - Easy-to-use authoring of multimedia capable multiple-choice and fill-in tests that randomize the order problems are presented, and also randomize the choices within each problem. Submitted by dale.havill@zu.ac.ae

Features of Hypertester Hypertester is free to use for educational purposes. Two free downloadable applications are required to run Hypertester: (1) HyperStudio Player (submitted with this project), and (2) Quicktime.? Each time a student takes the test, problems are presented in randomized order and choices within each multiple-choice problem are also randomized (A., B., C., etc.) are changed. Problems are created using a simple text file format, and then input automatically into Hypertester to create a test. A set of alternatives can be defined from which only one alternative will be randomly selected and presented to the student each time the test is run. Tests are automatically graded and can be printed or automatically saved in a results file. Multimedia content can be added to problems using HyperStudio 4, a low cost multimedia authoring application (multimedia example is submitted with this project).

Project 8 - Teacherbytes is an email newsletter and web-based resource for English language teachers in the UAE wishing to use the Internet in their instruction. Submitted by brian.oflynn@zu.ac.ae

Teacherbytes converges the two most useful aspects of the Internet, the web and email to create a resource bank of ideas for teachers. Subscribers receive a regular email newsletter containing a reflective commentary, an application review or a set of topic-based links that can be used in the language learning classroom. This opt-in mailing list is supplemented by an archived web site where teachers can browse and search for ideas on using the net in their instruction.

Project 9 -

The Com 309 portal is a central resource for materials and best practices for students in a web design class. Submitted by brian.oflynn@zu.ac.ae.

Com 309 portal was an all-inclusive website for students in a website design and publishing class. As a one-stop shop, students could access their lecture notes and assignments, contribute their ideas, access extra internet resources, take quizzes online with immediate results and also through the site structure itself, get a view of best practices in website usability design.

Competition Criteria.

The competition criteria are an important component of this paper because the same criteria can be used to evaluate the projects relative to the applicability of the innovations into the ZU curriculum. Each category as provided and detailed by the UAE Challenge is outlined into four critical areas. Each area asked the participants to provide details, as well as the answers to several key questions.

These are the areas, as provided to each participant as guidelines:

1. Innovation
An innovation must be new, exciting, interactive, exploratory, engaging. It means more than just displaying data. For example, a web site produced by students that displays traffic accident data will score less than the same web site that attempts to explain the data and draw conclusions from it, possibly using "what if" analysis. We are looking for projects that go beyond the display of data. New and exciting ways could be 3D rotational models, simulations, online games, chat, guest books, all designed to involve the participants in more than just clicking on a link and looking at text. Is this a project that captivates the attention and imagination of participants? Is there interaction and activity that engages the viewer and allows them to contribute? Are there any feedback mechanisms? In judging this section, jurors will look at the questions on the entry form related to innovation, as well as the aims of the project (how it differs from other projects of the same type). Jurors will also give consideration to the project problems, and how these problems were overcome. For projects that involve websites, jurors are expected to visit the web site.

2. Transferability
Projects are marked on how transferable they are to other educational sectors or areas. Jurors are looking for generic ideas that can be transferred. If the ideas behind the project could be used again by others then they will score high. For example, a website dedicated to preserving culture by cataloguing native birds would score high because it can also be used to catalogue other species. In judging this section, jurors will look at the questions on the entry form related to the project's future (will it be piloted or used in other schools), are the authors willing to assist other educators start similar projects, and the questions related to how many other participants are involved (this gives an indication on transferability, a project being used in more than one location means it is transferable).

3. Participation
This section deals with how the project has involved other people. Projects that involve a lot of people will score higher than those that involve few people. For instance, a school e-newspaper that is produced by teachers and students, and has a readership of 500 has a great deal of participation. If it was read by people outside the school it would score higher. In contrast, a website produced by a teacher that is only used by their students would score lower. If the teacher took the step of sharing their web site so that other classes or schools could use it, then it would score much higher. In judging this section, jurors will look at the questions on the entry form related to the student involvement, How many students are using the project, teacher involvement, other schools/etc involvement, and how they are involved.

4. User Needs
This section deals with how the project fulfills the needs of the end user. Jurors will be looking for evidence that the project has clearly demonstrable goals and that these are achievable or have been achieved. In some instances, this can be verified by user feedback (typically guestbooks on websites that

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have user comments). In other cases, it may be by supporting testimonials included in the project documentation. Jurors are also looking for the future of the project and suggestions for improvement. Projects are seen as learning exercises for those involved; as such projects authors should be able to suggest areas for improvement. Projects that meet user needs would score about average, those that are clearly exceptional will score higher. Projects that fall short of the user needs would score less. In judging this section, jurors will look at the questions on the entry form related to Project Outcomes, the lessons learned by students, suggestions for improvement, and the future plans for the project. Jurors will examine these answers with the original aims of the project in mind, to see whether these aims have been realized.

Integration into the Curriculum - Success Factors.

To be presented at the conference.

Internet and Education in the United States and China

John Ronghua Ouyang, Kennesaw State University, US
Robert Zheng, Marian College, US

Internet is growing rapidly and has a great impact on Education. Distance education has become an extremely important area of using instructional technology. The Unite State is one of the largest developed countries and China is one of the biggest developing countries in the world. What is the current status of Internet in these two countries? How does Internet impact on their education? Presenters are going to examine the development trend of Internet, compare the policymaking and use of Internet in education, and provide suggestions for future implementation of advanced Internet technology in the classroom instruction and the learning at distance according to the similarities and differences of the east and the west giants in the world.

In the late 1960s, the U.S. Department of Defense created a network of computers to share military data in case of being of nuclear attack. Getting into the 21st century, the Internet is accessible anytime, anywhere for people with computers that can connect to the network (Anderson, 2001). In 1999, Nielsen Media Research and NetRatings estimated that there were 35 million U.S. householders with Internet access. Now is more than 56 million. It is estimated that by the end of 2003, the number of users on the Internet will be above 300 million (Sharp, 2001).

In the past three years, Chinese Internet users have grown exponentially. According to China Internet Network Information Center (CNNIC), the Internet users in China have jumped from 2.1 million to 26.5 million from January 1999 to July 2001. Moreover, the instructional use of Internet in Chinese education has also grown rapidly. Online instruction and learning have found their ways into Chinese classrooms (He, 1998; Zhang, 2000).

The comparison of the status of Internet use in Education between the United States and China, presenters will collect up-to-date data about the expenses, educational uses, and Internet accessibilities to discuss the future Internet implementation in distance education in both countries. Instructional strategies, online designing as well as online delivering tools will also been examined for making suggestions.

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Web-based Learning: An Action Research

Chien-hsing Wang, Graduate School of Education, National Changhua University of Education, TW

Web-based learning has been a hot topic in education. Student-centered instructional methods are highly recommended to implement web-based learning. It is claimed that web-based learning has the potential to facilitate cooperative learning, enhance group thinking, and cultivate group creativity. Therefore, the researcher will apply action research to explore the phenomena of student learning on the web.

The researcher will conduct an action research in the course "Introduction of Education." The course is designed based on the thematic curriculum theory. The issue chosen is "Network Café." Project-based learning, cooperative learning, role-play and discussion are instructional methods employed for this study. Students are divided into ten groups with 4-5 in each group. Each group must study one of the following fields: Educational Philosophy, Sociology of Education, Educational Psychology, Educational Technology, Curriculum and Instruction, School Administration, Teacher-Parents Cooperation, Parenting Education, Psychology of Adolescent, Teaching-Discipline-Guidance All-In-One [TDGAIO]. There is a roundtable meeting for are five weeks. Each group member has to be the representative attending the roundtable meeting at least once. In the meeting, each group has its own role related to its study field. They have to discuss the "Network Café." issue based on the five topics: the purposes and functions of education, technology integration, adolescents and society development, parenting, school administration with [TDGAIO]. After five roundtable meetings, each group has to submit a paper based on their study, video-taping their oral presentation for the web show.

The web-based learning system for this study consists of 5 main sections: Course Content, Course Information, Class Interaction, Personal Tools, and System Tools. There are 5 subsections in Course Content Section: course introduction, course arrangement, table of content, on-line test, and assignment. Course Information Section includes 6 subsections: news, course announcement, FAQ, classmate information, ranking of courses, grade information. Students can check their grade and feedback from teacher for each assignment under the grade-information section. The system also provides the grade range for the whole class to students. Class Interaction Section has 6 sub-sections: course discussion, online discussion, group discussion, topic discussion, mailto teaching assistant, and survey-voting. Topic Discussion Section allows instructors to post topics for discussion and setup a deadline for each topic. Group Discussion is accessible for group-member-only and instructor. On-line discussion is a synchronous communication channel. Since the on-line discussion does not provides "save" function and file-sharing function, the researcher uses the software of netmeeting for roundtable meetings. Personal Tools Section includes personal information, my courses, calendar, calculating, and two games. System Tools Section: suggestions, ranking of students, school questionnaire, and on-line help.

The subjects are 46 freshmen majoring in Special Education and 3 first-year master students from Special Education program. The data will include on-line student journals, both synchronous and asynchronous discussion contents, e-mails, surveys, teacher journal, and documentation. Data will be analyzed with the following themes: student-teacher interaction, peer cooperation, student perception and attitude toward web-based learning, technology issue, and administrative support, and the function and design of web-based instructional management system.

MATHEMATICS

SECTION EDITORS:

Michael L. Connell, University of Houston
Norene Vail Lowery, University of Houston
Delwyn L. Harnisch, University of Nebraska Lincoln

Coming in the year of 9-11 and Tropical Storm Allison it is perhaps not surprising that the submission process being piloted this year seemed to be ridden with gremlins. But, as the old adage states, "Real boats rock". Growth and improvement bring their own growing pains which are quickly forgotten once the new has become old. We would like to urge SITE members to be patient as the wrinkles are worked out of the new submission processes. Due to some of these constraints readers of the annual will notice that the section introductions this year are abbreviated, but the sections they serve to introduce remain as crucial and important as ever. We would also like to reemphasize that each paper accepted within the mathematics section was carefully peer reviewed - although the introduction might be abbreviated, the bar for acceptance was held high!

We would like to thank all of those who submitted papers to the mathematics section this year. Although space and time does not allow us to provide the annotated introduction of previous years we feel that you will be pleased with the rich and diverse representation of mathematical themes and teaching approaches and the enhancements which technology has enabled. As was the case in last year, the large number of PT3 related presentations have strengthened not only the SITE conference, but the entire field of technology and teacher education. It is wonderful to finally be able to seriously examine technologies impact upon teaching and learning within mathematics across a broad context of methods, situations, and populations. It's quite exciting to think about what the years ahead might bring when we are able to focus upon substantive issues without having to spend huge efforts in maintaining a stable workplace within which to perform our research.

In looking ahead, we would like to restate last year's themes as organizing frameworks within which to consider and evaluate research efforts. The first area concerns itself with the nature of the content to be taught. Mathematics in a technology-enhanced world looks substantially different than it does when the sole tools to think lived are calculator, paper and pencil. Clearly, content issues need to be addressed in a markedly different fashion in teacher preparation. Secondly, the role of teacher and the interaction between teacher, technology and student will need to be carefully addressed. One might expect to see a growing number of papers dealing with these interactions. The third area of potential change lies in that of the student as they use this new technology enhanced environment to explore mathematics. We feel more strongly then ever that these organizing frameworks will go far in helping readers integrate the various research findings in technology enhanced mathematics education, not only from this conference but from other sources as well.

Michael L. Connell is an Associate Professor in Mathematics Education at the University of Houston in Houston, Texas. He can be reached at mkahnl@aol.com.

Norene Vail Lowery is an Assistant Professor in Mathematics Education at the University of Houston in Houston, Texas. She can be reached at nlowery@uh.edu.

Delwyn L. Harnisch is a Professor in the Teachers College at the University of Nebraska Lincoln in Lincoln, Nebraska. He can be reached at harnisch@unl.edu.

Teachers' Learning of Mathematics in the Presence of Technology: Participatory Cognitive Apprenticeship

Mara Alagic
Mathematics Education
Department of Curriculum and Instruction
Wichita State University
United States
mara@math.twsu.edu

Abstract. The purpose of this paper is twofold: (a) to present the theoretical background and development of an evolving design of the learning environment for the technology-based mathematics course for K-12 teachers, and (b) to explore the qualitative features of the instructor-teacher and teacher-teacher interactions, while integrating technological and mathematical teaching/learning through the participatory cognitive apprenticeship instructional methods.

Introduction

Shifts in the philosophy and theory of learning as well as emerging technologies support the view that a paradigm shift in teaching and learning mathematics with the use of information and computing technologies (ICT) is taking place. The existence of increasingly efficient ICT tools lends support to the view that the learning environment in school mathematics is changing into a more technological one. Teachers are aware of current changes and are involved in the processes of these changes in their schools.

Many teachers are disillusioned by their experience with technology integration so far. Marcinkiewicz (1991) points out that teachers are often not sure that the skills and experiences they acquire in available technology training will be easily transferable to classroom instruction. High-quality training, sufficient resources and awareness of necessary change are some of the critical factors necessary to regain the trust (Cafolla & Knee, 1995). To build confidence, teachers need successful experiences and ongoing pedagogical and technological support when integrating technology into their curriculum (Byrom, 1997).

Finding ways to apply modern teaching theories integrating technology within the confines of the traditional classroom poses many challenges. Within the field of instructional design there is a growing support for addressing these challenges (Lebow, 1995). One of these is the need to help students develop mastery of their own learning, and provide teachers with the tools they need to facilitate that development. One of the implications, the shared responsibility for student learning co-created by both student and instructor, termed as an apprentice-mastership (Winn, 1995) indicates a possible direction in instructional design. Several studies have used the cognitive apprenticeship model as a means to support and enhance technology training (e.g. Cash et al.1997).

"Technology in the Mathematics Classroom K-12" is a course that pre-service and practicing teachers take to advance their knowledge of technology integration. This paper describes the evolving design of a learning environment model during facilitation of that course. Learners' interactions (instructor-teachers, teacher-teacher) played a significant role in developing this course. The qualitative features of these interactions will be explored. Other results have been reported elsewhere (Alagic & Langrall, 2002). Data collected is comprised of online interactions, questionnaires, assignments, and interviews of the teachers (students in the course).

Participatory Cognitive Apprenticeship in the Technology-Based Learning Environment

Cognitive apprenticeship model is developed within the situated learning paradigm. Learners participate in a community of practice that is developed through sequenced guided activity and interaction, in ways similar to that in craft apprenticeship, with more emphasis on the development of cognitive skills (Lankard, 1995). A cognitive apprenticeship instructional model merges the components of Schoenfeld's model for teaching mathematical problem solving and Treisman's collaborative workshop model (Johnson & Fischbach, 1992). These models appear to successfully develop not only the cognitive, but also the metacognitive, skills required for true expertise. The cognitive apprenticeship can be viewed as a representation of Vygotskian "zone of proximal development." Cognitive apprenticeships suggest project or problem-based group-work for students with close scaffolding of the teacher. An expert does modeling of a task. Learner performance and reflections are accomplished with coaching. Students' tasks are more difficult than students can manage independently, but only so that they require the aid of peers and instructors' scaffolding guidance. Knowledge and skill are made meaningful by the context in which they are acquired. Learning from modeling, coaching, fading, articulation, reflection, and exploration of ideas are the most significant phases of this process (Cash et al., 1996).

Since instructional strategies in developing technology-enhanced material are often complex in natural school settings, a cognitive apprenticeship model is a more applicable means of facilitating technology integration than traditional apprenticeship (Cash et al., 1996). Collins (1991) perceives technology to be the resource-intensive mode of education and a supportive environment for cognitive apprenticeship.

The impact of technology on students' achievement is linked with the way the technology is used: Grade appropriate use of computers, for example, has been found to be more important in producing increased learning than the amount of computer use. Yet as research findings regarding the use of technology in classrooms are domain-specific and often reflect a narrow set of conditions, they require careful interpretation. Jonassen (1999) gives five ways in which instructional technologies have been used to support learners' internal negotiations and meaning making, as:

1. Tools to support representing learners' ideas, understandings, and beliefs,
2. Information vehicles for exploring knowledge,
3. Support for simulating meaningful real-world problems, situations and contexts,
4. Social media to support learning through conversation, and
5. Intellectual partners to support learning-by-reflecting.

Empowering teachers through the use of technology in open-ended problem solving process, interpreting mathematics and developing conceptual understandings is at the heart of mathematics education. Mathematics teachers need high quality and on-going opportunities to experience and do mathematics supported by diverse technologies (Dreyfus & Eisenberg, 1996; Schoenfield, 1991).

Emerging research and teaching practice increasingly focus on the role and effects of classroom interaction to the learning process. The effects of social interaction on learning have support in Vygotsky's view of cognitive socialization and Piagetian ideas of cognitive conflict. The developmental research inspired by Vygotsky's view has focused on collaborative cognitive activity emphasizing interaction between learners as a source of development. The theoretical concept of interactions has novel characteristics in a technology-based mathematics learning environment. This view characterizes learning as *participatory activities*, and includes both peer and student-teacher interactions. The thinking processes behind learning are extending beyond individual cognition to include features of both the groups as well as the technological tools employed. Group interactions and communications converge to the joint task to be solved. A simulation of complex mathematical phenomena or reflections on the learner's thinking processes assists in reaching a joint goal. This common goal helps students in explaining their difficulties, while providing new opportunities for teacher to scaffold. The teacher-students' interaction episodes in this environment may involve qualitatively new formats.

The participatory cognitive apprenticeship in the technology-based learning environment (PCATLE) is a variation of the cognitive apprenticeship learning model developed as a result of two years of teaching "Technology in the mathematics classroom K-12", author's work with prospective and practicing teachers as well as teaching experiences in mathematics and ICT. It has been evolving in association with the teachers/networking partners involved. This paper describes the main characteristics of the development of this model (up to this point) and some of the qualitative features of class interactions during that process.

The view of *learning for understanding* is a backbone for the PCATLE model. We recognize understanding through a "flexible performance criterion" (Perkins 1993). Knowledge and skills are important, but if they are not understood the student cannot make a good use of them. Learning for understanding requires thinking in number of ways with what we "know", practicing and negotiating our thinking until we can make the right connections flexibly. That also means that the pillar of learning for understanding must be actual engagement in those performances.

"Technology in the Mathematics Classroom K-12"

"Technology in the Mathematics Classroom K-12" is a three credit hours summer course which teachers take either as a part of their graduate coursework or to advance their knowledge of technology integration. Assuming that common overarching goal of teaching and learning mathematics with and for understanding, guiding questions for the course are the general ones: How do I reach a necessary understanding of my audience and how do we together reflect about potential audiences that participants in this class will be teaching? Where do we want to be at the end of this course? How are we going to get there? How are we going to know if we are there?

We focus on what teachers (students in this course) bring in and on the negotiated learning goal in the existing context (where they want to be and where we would like to take them) by the end of the course. We take into account the learner's original ideas, we stage discrepant or confirming experiences to stimulate questions and encourage the generation of a range of responses with the opportunity to apply these in various situations, as suggested by Berryman (1993).

The second cohort, one this paper is focusing on, had 19 teachers (two primary, five elementary, six middle, five high school teachers, and one pre-service teacher). The underlying themes are:

1. Experiencing and doing mathematics as problem solving, reasoning, connecting and communicating through a variety of representations in the technology-based learning environment.
2. Recognizing how conceptual understanding and procedural knowledge are developed together and that their mutual development is enhanced (reinforced) through technology.
3. Reinforcing awareness of changes in the School mathematics brought both by current school reform for standards-based teaching that supports integration of technology and by the development of ICT;
4. Evaluating a variety of computer programs and web resources for learning and doing mathematics; and
5. Organizing class so those teachers take the first steps towards becoming self-reliant, self-regulating, and self-evaluating learners in their technology based design of mathematics activities. The course environment is structured so that it helps students reach these goals. Both the didactical approach of the course as well as the time available for personal interaction between teacher and instructor ask for the embedding of scaffolding into the course site.

Daily assignments included metacognitive reflections via e-mail with the facilitator and either a mathematical task or reporting on teaching strategies in classrooms that integrate technology. Part of class time was spent on critical evaluations of available software and Web resources based on evaluative resources and teachers' experiences. The computer lab used during the course had state-of-the-art equipment, including wireless technology and most of the mathematics software available on the market. During class time, the facilitator also had technical support. Teachers chose to complete mathematics projects using the following resources: LOGO (n=2); CAS (n=4); Maple (n=2); dynamic geometry (n=5); spread sheets (n=6). Initially, everyone explored all of the above software, as well as concept mappings, graphic organizer software, and Internet resources.

The entire group was motivated to try possibilities and share their experiences with the contributions of emerging technologies to mathematics education. Nurturing, self-reliant, self-regulating and self-evaluating environment requires ongoing class negotiations where instruction-authority is based both on pedagogical content knowledge related to mathematics and technology, and expert-utilization of what the class participants bring in terms of both knowledge/understanding and classroom experiences. Learning and instruction in both cohorts was based on reciprocal understanding between the participants. That was accomplished by establishing shared goals based on common interests in learning about technology-based mathematics phenomena. The following learning environment rules have also being helpful in keeping everybody engaged in their tasks: Try to find answers on your own before asking questions; Ask your partners first, specific area-experts next, ask your instructor the last.

Activities are brought about in three levels: *Learner's level.* The first task for learners is to get oriented to the context and determine a reasonable but challenging goal for their studies based on available opportunities that include not only existing mathematical software but also level of available expertise. The learners can study different things depending on their individual objectives related to the field. The final "product" is realized through the portfolio that includes lessons/activities of technological representations of mathematical phenomena, a (group) project/presentation on the mathematics topic using appropriate technology for developing the concepts, and reflective online journaling. *Network level.* The lecture materials are available for students on the Web, which offers a possibility for the discussion on these materials. The students' group projects are also available on the network level. Reflective discussions are usually initiated by instructor's reflective question, but often, they take life of their own. On the *local level* the studies consist of lectures and activities on integrating technology in mathematics teaching usually done by instructor or experts in the field. Teachers are encouraged to share their classroom experiences in integrating technology. Discussions about student's study products are based on the shared idea of collaborative learning for understanding.

During discussions, although very enthusiastic when preparing lessons for the coming fall, teachers talked about day-to-day obstacles such as class management, absence of appropriate ICT-based curriculum materials and "covering material" -- *capturing the struggle* (Alagic & Langrall 2002) between wanting to promote technological innovations and everyday realities. They indicate that integrating technology require both curricular and scheduling adjustments. Some teachers expressed need for more training. On the positive side, including technological representations of mathematical ideas in developing conceptual understanding through scaffolding was well supported by most of the teachers; well planned participatory activities were most often mentioned. An agreement to keep in touch via online discussion was supported by everybody.

These deliberations clarify for us the need to identify research questions and appropriate methods for both development and implementation of PCATLE model and further investigations of learning opportunities provided by participatory activities and reciprocal interactions in ICT-based differentiated mathematics instruction.

Implications

The PCATLE model has been experienced by the participating teachers as a well-designed and a fruitful way of organizing the course, as it makes possible, for example, to share expertise and also to develop the model and the curriculum together. The combination of different kind of activities including lectures, collaborative activities in the lab and on the Web, and individual studying are for many teachers a new way of studying. This kind of learning model is challenge for all involved, but also for the organizing network, because it does not necessarily fit very well to the traditional teaching/learning structures.

For me, the researcher, this report reflects (1) a "term introduction" stage of the concept *participatory cognitive apprenticeship in technology-based environment,* and (2) beginning stages of this concept expansion. The PCATLE as an orienting framework for the teaching practice is an effort to support teachers as they were learning to interpret and interact in the new mathematical culture they were immersed in.

Although a number of change theorists insist that reform efforts start the process with a clear, specific vision of what they want to accomplish, approaches based on postmodern epistemologies as well as chaos theory suggest that the reverse is preferable (Fullan, 2001). Research outcomes suggest that the PCATLE is an inviting direction/framework for supporting teachers as learners. The following stage of the learning cycle, expansion, awaits new challenges. In believing that a computer-supported learning environment creates an optimal environment for participatory cognitive apprenticeship, we are going to continue revising our technology-based learning environment focusing on analyzing learning (mathematics) for understanding and social interaction in that context.

Attention has to be brought to the fact that this kind of learning environment requires far more individualized attention and interaction than a full-time teaching practice allows. The researcher had a particular affinity for teaching this course, a great support from colleagues, and an excellent technical support in the lab. My belief at this point is that a technology-supported learning environment creates an optimal situation for the PCATLE-based learning. Such an environment provides multiple opportunities for students to negotiate meanings concerning different abstract mathematical phenomena. Appropriate and modest scaffold assistance either from me or my lab-assistant seemed to enhance the learning activity and move the projects forward.

How to create optimal conditions for PCATLE and its interaction challenges future studies. Focus from traditional theories on mutual understanding needs to be broadened to study the other possible aspects of the social interaction. Relevant viewpoints in future studies will be students' motivational interpretations in a computer environment and embedded opportunities for differentiating instruction. Reaching every student at an appropriate, yet challenging cognitive level will increase learning for understanding, recognizing understanding through a flexible performance criterion (Perkins, 1993) and providing better conditions for differentiated instruction which ultimately provides better individualized learning for ALL learners (Postlethwaite, 1993).

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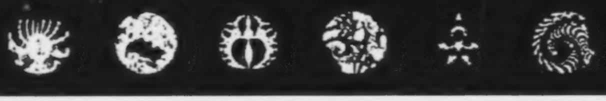
A Fractal is a Pattern in Your Neighborhood



http://www.pages.drexel.edu/~bachcn/Fractals

> Fractal geometry is not just another chapter of mathematics, but one that helps every person see the same world differently."
>
> – Benoit Mandelbrot

Contact Information

Craig N. Bach, Ph. D.
109 Disque Hall
School of Education
Drexel University
Philadelphia, PA 19104

215.895.5963 (tel)
215.895.5879 (fax)
bachcn@drexel.edu
http://www.drexel.edu/~bachcn

Abstract

In recent years, the development of fractal geometry and the study of chaotic structures have gained widespread attention. The study of these "new" geometries has influenced recent work in almost all areas of intellectual endeavor (e.g., computer science, mathematics, physics, art, systems analysis, management, meteorology, and biology). The patterns of scaling geometries also have been found in the hair-weaving practices, architecture, and artwork of several African and Southern Indian cultures (Eglash, 1999). In addition, given that students often find the study of mathematics to be an isolated collection of arbitrary rules and abstract objects disconnected from their experiences, the beauty of fractal imagery provides a unique aesthetic element to the study of mathematics that can have a positive effect on student interest and motivation (Bach, 2002). In short, fractal geometry is a field with wide application, relevance and pedagogical promise.

However, with all of its potential for improving mathematics education, there has been insufficient attention given to teaching the basic concepts of fractal geometry to secondary students (see references for notable exceptions), and providing them with tools that assist and encourage hands-on exploration of these geometries within their local experience, within different cultures and societies, and within other areas of study. The web-based mathematics environment, A Fractal is a Pattern in Your Neighborhood, was developed to address this concern.

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The tool was designed with several goals in mind: 1) to present fractal geometry in a carefully scaffolded manner, starting with the most basic properties of fractal structures and building to more sophisticated properties of chaotic structures and complex numbers, 2) to implement a method of teaching mathematics that first introduces mathematical concepts as they can be found in familiar environments, 3) to build into each lesson a writing component that encourages students to seek connections between fractal properties and other areas of human inquiry, 4) to provide students with a communication tool that allows them the opportunity to share their ideas with other students, teachers and experts, as well encouraging self-reflection (e.g., e-mail, online discussions, Web searches, online portfolios), and 5) to facilitate student use of various Web technologies (e.g., QuickTime VR, Java Applets, Javascripted functionality, animated GIFs, and PDF files).

A Fractal is a Pattern in Your Neighborhood was implemented during a NASA-funded project directed at preparing high school instructors to teach fractal geometry, use the fractal site in their classes, gain proficiency Web-based technologies, and utilize online NASA resources. In this session, I will demonstrate the online fractal lessons, describe their pedagogical foundations, and discuss some of the challenges that arose during the implementation of the lessons conducted with in-service teachers over the past year.

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Redesigning College Algebra Delivery from Direct Instruction to a Computer Environment

Brian Beaudrie, Northern Arizona University, US

Introduction: In the summer of 2001, the Department of Mathematics and Statistics at Northern Arizona University received a grant from the PEW foundation to radically redesign its delivery of College Algebra. The course would change from a traditional lecture course to one that would be web-based in nature. Part of the reason for making the change is to provide a learning atmosphere that is more active in nature, and one that would allow students of differing abilities to progress at their own rate. A web-based format would also allow for flexibility of use on the part of the students; they could work on the course materials whenever it fit into their schedule. The location would be flexible too; they could work on the course in the computer lab in the mathematics department, in other computer laboratories close to their dorm rooms, or even at home. Another reason for making the change is to attempt to stem the tide of students who fail the course. Approximately thirty to forty percent of College Algebra students withdraw from the course or receive failing grades; of these, almost half (47%) will leave the university entirely.

During the fall of 2001, the committee in charge of implementing the transition began to meet and discuss all of the necessary steps that would have to be taken before the project could be implemented for the Spring Semester of 2002. The committee consisted of an Assistant Dean of the College of Arts and Sciences and three members from the Department of Mathematics and Statistics: a tenured professor, a tenure-track assistant professor, and a full-time lecturer. The following report details the some of the work that has been performed by the committee up to this date concerning the transition.

The Redesigned Course

Software: Once the proposal was formally accepted, it was decided that the department should begin testing various software programs that were written specifically for College Algebra. During the summer sessions, different software packages were tried out in the College Algebra courses that were run during that time. Students were asked to spend a minimum amount of time (about one hour per week) trying out the software and evaluating its functionality from their perspective. The use of the software was not made a requirement in the courses; rather it was made available for the students if they wished to use it.

Based on this, during the fall semester two different software packages were selected to be evaluated by the committee: ALEKS, which is published by the ALEKS corporation through McGraw-Hill, and My Math Lab, an Addison-Wesley product. It seemed to the committee that there existed two possible courses of action. One route was to plan out the course, while at the same time testing each software product to see how well it "fit" the planning, and making a decision on software at the end of the process. The second option reversed the process: choose the software package first, and design the course to best fit the software. It was decided to follow the second course of action, and after roughly one month of testing by individual committee members, ALEKS was selected.

Scheduling: As part of the grant, a new computer lab was created dedicated to the College Algebra classes. Three graduate teaching assistants and several undergraduate students serving as computer laboratory assistants would staff the computer lab. These staffers would be responsible for helping support and enhance the students' learning of College Algebra. However due to constraints in both budget and the staff's own class schedules, the lab could only be open approximately 32 hours per week. And it was decided that part of this time would include the regularly scheduled class meeting times.

It was quickly realized that some initial instruction concerning the proper use of ALEKS would have to be provided to maximize efficient student use of the software. Therefore, it was decided that students would meet at their regularly scheduled meeting times (as listed in the class schedule) for the first week of the course. During this time the students would work through a tutorial, take an initial assessment exam provided by the software package (used to determine the level each individual student should begin work in College Algebra), and receive additional instruction from the computer laboratory staff.

Since the students would first come to the computer lab during their regularly scheduled class time, it seemed natural that the computer lab should remain open during these times throughout the semester. It guaranteed that the lab would be open for all students at a time when they had no other classes, thus ensuring that all students had access to it. It was also hoped that if the students knew the lab would always be open at the times when their classes were supposed to meet, some would establish the routine of always working on the College Algebra materials at these times.

By keeping the computer lab open during these times (mostly between 9:00 a.m. and 3:00 p.m.), a majority of the allotted hours were used up. The remaining time was designated for Sunday evenings.

Assessment: The committee considered several different ideas on how to best assess the students. After much debate, it was decided that traditional paper-and-pencil testing would be used. While this has the disadvantage of not being aligned with instructional method, the advantage lies in accountability; in other words, it would be known that the person taking the test would indeed be the same person who should be taking the test. The students could take these tests at any time they believed they were properly prepared for them. However, it was decided that a deadline should be set for each test, to ensure that students did not wait until the last week of the semester to begin taking them. There would be five tests during the semester; each would be worth 50 points. The final test would be worth 100 points, for a total of 350 points.

It was also decided that the use of ALEKS should in some way be calculated into their assessment. While discussing many options, it was determined by the committee that students would be given credit for working 6 hours each week on ALEKS, and making adequate progress. They could earn up to 4 points per week (for 12 weeks), and if they met established goals for at least 10 of those weeks, they would receive two bonus points, for a total of 50 points.

Because students could take the tests at any time (up to the deadline), it would be necessary to have several versions of tests available. For this purpose, it was decided to create a large database of College Algebra questions. These questions would be created and stored electronically on a computer; if a student wished to take a test, the lab assistant could use the program to randomly select the appropriate questions for each test from the various databases.

Finding an appropriate software product to handle this proved to be a difficult task. Many software packages investigated could not handle the complicated mathematical symbols and graphs necessary. Others only allowed for a multiple choice/true false/short essay type of question. In the end, a data base program (File Maker Pro) was chosen since it had the ability to handle most of the demands that would be placed on it. The committee then hired three other instructors to write questions for these test databanks. Each question will have 15 different versions of it, making it virtually impossible for anyone to be dishonest when studying for the tests.

Assessing Impact: During the Spring Semester of 2002, half of the College Algebra classes will be taught traditionally, and half using the web-based curriculum. The numbers of students in both designs should be roughly the same. For comparison purposes, all students in both designs will be given a pre-test; and throughout the semester students in both classes will have identical (i.e., similar in content) questions in their exams. These matched questions will allow for the comparisons of student performance on specific outcomes, as well as compare student performance on those outcomes in both the traditional and web-based course. The pre-test data will be used to help control for variations across the different sections. Questionnaires will also be used to assess the affective variables concerning how the students feel about using a web-based curriculum in general, of ALEKS in particular, and of the entire redesigned course structure. All of the assessment measures will look at the overall effectiveness of the redesigned course when compared to the more traditional method of teaching College Algebra.

Mathematical Modeling of Motion
Captured with a Calculator-Based Ranger

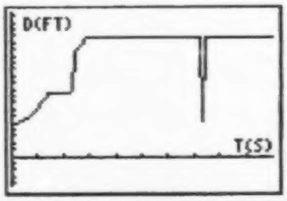
John E. Bernard, Ph.D. and Olga M. Ramírez, Ph.D.
Department of Mathematics
The University of Texas-Pan American
Edinburg, Texas (USA)
bernardjet@panam.edu and oram@panam.edu

Abstract: The National Council of Teachers of Mathematics (1996) has stipulated that a most exciting potential of technology is its effect on increasing the amount of time that can be devoted in developing conceptual understanding and reasoning processes that lie at the heart of mathematical problem solving. In fact, whether it be with the use of spreadsheets, graphing utilities, or instructional software, technology permits students to explore situationsenabling them to visualize relationships readily and to test ideas quickly. In general, the same is true in using a Calculator-Based Ranger (CBR), a motion detecting device. A CBR enables real data from real experiments to be captured in real time. In turn, using a CBR with graphing calculators (e.g., TI-83 Plus graphing calculator) permits rapid production of visual displays, with statistical summaries possible leading to prediction models. For this reason, a CBR should be a standard instructional tool in mathematics classrooms 8th-12th grades. This equipment shows promise in making algebraic and statistical ideas accessible to all students. With CBR-based lessons, simulations and modeling, in particular, make it possible to study mathematical situations in a less abstract way.

One role of mathematics teachers is to help students interpret and analyze situations from mathematical perspectives, as well as to assist them in seeing interrelationships of mathematics (e.g., unifying ideas such as set, relation, function) that tie various concepts together. However, even students who display a high level of mathematical skill often fail to see any relationship in what they may be learning or doing to real-life situations. Furthermore, in recent years greater emphasis has been placed on teaching problem solving in the mathematics curriculum. Nonetheless, research shows that students= problem-solving skills are still considerably weaker than their computational skills. Although most educators agree that much more needs to be done to improve students= abilities to solve problems and to think critically, as well as to ascertain that mathematics not be learned in isolation from its applications, seemingly the level of maturity required to work with data, formulas, graphs, and other such mathematical concepts, generalizations, and procedures can be a hurdle for many students especially when data collection and analyses is cumbersome and time-consuming. Yet, if one feels that problem-solving skills and an understanding of the usefulness of mathematics is important, shouldn=t one teach students to transfer the mathematics they have learned or are learning to applied areas despite the toil or challenges? Is it possible that with a little technological help, opportunities that make applications and connections accessible and that help students make discoveries can and will make a difference? ***We believe such is the case.*** With a Calculator-Based Ranger (CBR) and a TI-83 Plus graphing calculator, students can collect, view, and analyze motion data without tedious measurements and manual plotting. Motion data is essential in many applied fields of mathematics (e.g., physics, engineering), so rather than having this skill be a stumbling block to students= continued success, studying motion data, even in mathematics classes, can be a real benefit then and later as students encounter an awareness of mathematical concepts and unifying ideas, and their applications in this context.

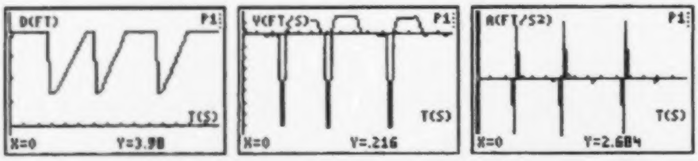
From a curricular perspective, a Calculator-Based Ranger lets students explore mathematical and scientific concepts such as: (1) motion: distance, velocity, acceleration; (2) graphing: coordinate axes, slope, intercepts; (3) functions: linear, quadratic, exponential, sinusoidal; (3) calculus: derivatives, integrals; and (4) statistics and data analysis: data collection methods, statistical analysis. Indeed, the Calculator-Based Ranger sonic motion detector can also be used with TI-82, TI-83, TI-85/CBL, TI-86, and TI-92 and easily brings real-world data collection and analysis into the classroom making it possible for students to also explore relationships between studied concepts. Fortunately, for most people, a Calculator-Based Ranger is easy-to-use, especially with the TI-83 Plus Graphing Calculator which includes the RANGER, MATCH, and BOUNCING BALL programs as standard built-ins. Consequently, getting started with CBR activities does not require extensive calculator or programming experience. To exemplify how to operate a CBR, the activity entitled A**Experiments about Motion Captured with a Calculator-Based Ranger**@ shall be demonstrated. This activity acquaints students with basic functions and properties of motion under various settings (e.g., people, cars, and pendulum in motion). The purpose for elaborating on this activity is to demonstrate that a CBR enables real data from real experiments to be captured in real time, helping students to develop the skills to apply mathematics to more realistic settings, as well as to help them see interrelationships between concepts studied. This is demonstrated by using a CBR with a graphing calculator (e.g., TI-83 Plus graphing calculator) which permits rapid production of visual displays, with statistical summaries possible leading to prediction models. Critical to this demonstration is the belief that when students actively participate in helping to shape their own understanding of an idea, as facilitated with technology, they are learning how to learn. Consequently, their view of mathematics as a tool for answering questions that are meaningful to them can only be strengthened.

As an example, the diagram from a TI-83 Plus graphing calculator display shown below shows the motion detected by the CBR of a person walking away from the motion detector from a distance of about 5 feet. The person is walking rapidly away from the motion detector for about 3 seconds, and data is collected for about 10 seconds altogether. The diagram depicts these continuous actions. The second diagram depicts the motion of three distinct battery-operated "toy" cars. Here, the velocity of the cars are detected by the CBR and diagrammed in a TI-83 Plus graphing calculator environment. By using technological tools, students are able to obtain skills via experiments which show them how to look for applications, and how to see unifying ideas in mathematical context. Indeed, this equipment shows promise in making algebraic and statistical ideas accessible to all students.

Start at about 5 feet from the motion detector and walk **rapidly** away from the motion detector for 3 seconds. Collect data for 10 seconds.		CBR Ranger Settings Realtime: No Time(s): 10 Display: Dist Begin on: [Enter] Smoothing: None Units: Feet

Who=s the FASTEST? Data Collection on Three "Toy" Cars

Collect data for 15 seconds. Run each car in turn, with a few seconds in between. Interpret the graphs generated by the motion detector on the TI-83 Plus Graphing Calculator. What do the graphs suggest?



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General Logic Actions and Database Oriented Methods of Their Development in Teaching Advanced Calculus

Mikhail M. Bouniaev
Mathematics & Computer Science Department
Southern Utah University
United States
bouniaev@suu.edu

Abstract: This paper discusses how databases can be used in developing general logic actions in teaching Advance Calculus. The methodology of teaching advanced calculus that we are currently developing has a special importance for training mathematics teachers. Actually teachers of mathematics and those who are going to pursue careers in other related to mathematics fields are going to use knowledge and skills from this class differently. For mathematics teachers the most important thing is to learn how to structure calculus theorems, how to use previously proved theorems in proofs of other theorems, how to use examples and counterexamples to substantiate different issues, etc. The methodology that we have been developing for the last four years is designed specifically for teaching this kind of things.

Introduction. Functional and operational composition of action.

As theoretical and experimental research shows (Bouniaev, 1993) that databases and bases of knowledge (complete with a designed interface) can serve as construct frameworks in organizing interactive computer oriented instruction.

The methodology of teaching advanced calculus that we are currently developing is of particular importance for training mathematics teachers. Actually teachers of mathematics and those who are going to pursue careers in some other related to mathematics fields are going to use knowledge and skills from this class differently. For mathematics teachers the most important thing is to learn how to structure calculus theorems, how to use previously proved theorems in proof of other theorems, how to use examples and counterexamples to substantiate different issues, etc The methodology that we have been developing for the last four years is designed specifically for teaching this kind of things. .

Our analysis of using information technologies is based on the theory of stage-by-stage development of mental actions (SSDMA theory) developed by the Russian school of psychology (Galperin &Talizyna, 1979), (Talizyna, 1975) as applied by the author in teaching advanced mathematics (Bouniaev, 1991&1996).

According to Talizyna (Talizyna, 1975) all actions can be referred to two categories: general logic actions and specific actions. General logic actions are inherent in every subject field and are different only in objects at which they are directed. Examples of such type of actions are qualification, break up into classes, comparison, contributing to a concept, action of proof. For example, qualification as a type of action exists in mathematics (qualification of the conics and differential equations) as well as in other disciplines. Specific actions are basically inherent to a given subject field. For example, in mathematics they are arithmetic operations, differentiation, etc.

The SSDMA theory specifies four independent characteristics of any action used to judge the level of development of an action. An action can be in a materialized (material), speech or mental form. Mental form of action is the highest form of action development. The mental form of action also means that its objects are representations, notions, concepts and all operations are performed in the mental form. The ability to perform a whole action in the mental form indicates that it has gone through all the stages of development and interiorization.

As a rule, the performed actions themselves consist of other, more primitive actions and in their turn can be part of other actions. Actions that are part of a given whole, are called operations. That is, operations are also actions, hence the term emphasizes only the hierarchial subordination among actions.

Databases in studying advanced calculus

The structure of any database significantly depends on what kind of information this database is used for. Therefore as points of reference for constructing databases we offer students typical questions that will be part ofthe test (Bouniaev, 2001).

1. Formulate the theorem. 2. What is the theorem's premise? 3.What is its conclusion? 4. What notions are used in the theorem's formulation and what is their meaning? 5.What theorems were used in the proof of the given theorem? 6. Give examples of problems, which are based on solving this theorem. 7. What theorems need to be used to do this problem? 8. Is the conclusion true in absence of any of the premises? 9.Are all the premises necessary for the conclusion to be true? 10. If you answered, "yes" in 9, demonstrate it. 11. Give an example of an object that can be attributed to this concept. 12. Give an example of an object that cannot be attributed to this concept. 13.Prove this theorem. 14. Solve a proof problem.

At our first experiment the students themselves determined the structure of databases, fields, records, etc Theoretical analysis conducted after the experiment led us to the conclusion that teaching was based on the first type of the orientation part of an action (Talizyna, 1975), the learning process was not fast enough and required considerable efforts on the part of a student. Thus taking into account this fact at our next stage we made a decision to base instruction on the fourth type of the orientation part of an action

We believe that fields in the databases can serve as this generalized system of points of reference in developing the action of theorem proof. Since the structure of proof of any mathematical statement is practically identical, the system of reference points developed by us can be successfully used both in Advanced Calculus and Abstract Algebra as well as in any other course with one of the main goals being to teach proofs. Thus as a generalized system of reference points the students were offered tables "Theorem Statements", "Concepts and Their Definitions", "Theorem Proofs".

In table, "Theorem Statements" the following fields were established: "Name of the theorem" (for example "Intermediate value theorem"); "Object of the Theorem" (for example "A function f"); "Premise 1" (for example "Domain is an interval <a, b>"); " Premise 2" (for example " Continuous on the interval"); " Premise 3" (for example "Domain is a closed set"); "Premise 4" (For example "f (a)<C<f (b)");"Premise N"; Conclusion 1" (for example "There is a point "c" between "a" and "b" such that f (c)=C); Conclusion N"; " Concept 1 Used in the Theorem Statement" (for example "Continuity on a set");"Concept N Used in the Theorem Statement"; "Model Problem 1";...;"Model Problem N".; "Theorem Used for the Proof of..."(For example, Theorem used for the proof of Theorem 5-11, Theorem 7-3, etc.)

It should be noted that filling in fields while developing a particular action takes place at different time periods of study.

The structure of table "Theorem Proofs" is determined by the following fields. "Name of the Theorem"; "Object of the Theorem"; "Definition of Concept 1 Used in the Proof";" Definition of Concept N Used in the Proof"; "Theorem 1 Used in the Proof"; " Theorem N Used in the Proof"; "Transformation 1 of the Proof" "Transformation N of the Proof"; " Proof Structure".

Table "Concepts and Their Definitions" contains the following fields (as an example we use the definition of the least upper bound). "Name of the Definition" (in our example "least upper bound"; "Object of the Definition" (number L); "Auxiliary objects (in our example it will be set A, since we analyze the definition of the least upper bound of a set); "Concepts, Used in the Definition" (in our example "upper bound"); "Requirement 1" (L is an upper bound); "Requirement 2" (for any upper bound L', L≤L'); Requirement N"; "Example of the Object that Can be Attributed to the Concept" (1 for interval (0,1)); "Examples of the Object that Can Not be Attributed to the Concept" (½ for interval (0,1) & 2 for interval (0, 1)); "Definition Used in the Proof of Theorem..." (Theorem3-4, Theorem8-2, etc.); "Definition Used in the Statement of...."(Theorem 2-1, Definition3-4, etc). «Hierarchical Relationship with Other Concepts (in our example "least upper bound" implies "upper bound"; "maximum" implies "least upper bound"

As we already noted, any action developed in the process of instruction can be presented as a sequence of general logic and specific actions or operations. In the study of the majority of disciplines development of general logic actions is not the goal of instruction. In this respect advanced math courses significantly differ from any other disciplines. One of the main goals of instruction of Advanced Calculus is development of the action of theorem proof and the action of using the theorem in solving practical problems. In order to achieve this goal we need to develop certain "elementary" general logic actions. These "elementary" actions include among others such actions as comparison, generalization, concretizing, attribution to the concept and drawing conclusions.

Developing of elementary logic actions

The action of comparison. As a rule, development of the action of comparison is directly connected with the development of concepts. Comparison implies singling out criterions of comparison. Knowledge of the system of possible criterions of comparison and the chronology of their appearance in the process of instruction demonstrates the level of development of basic mathematical concepts.

At the initial stages of instruction criterions of comparison can be presented to students. As observations show, in studying every new concept a student makes a comparison using only the studied criterions. Psychologically it is understandable and logical. However, in the process of instruction it is necessary to make sure that every new criterion does not stay isolated but gets incorporated into the already existing system of criterions. That means that every new criterion first should be added to the set of already existing criterions and, second, that a strong hierarchical connection of the newly added criterion with the previously existing criterions be established in the mind of a student.

Using databases helps to solve this problem in the process of independent construction of databases, during their utilization and updating. Probably, the most important role in incorporating a new criterion into the system of the already existing ones is played by the fields "Object" and «Hierarchical Relationship with other Concepts" in table «Concepts and Their Definitions».

At the initial stages of instruction, students often experience considerable difficulties in understanding what is the object of the definition. Thus the object of the notion "least upper bound" is often described as a set which means that in analyzing the definition the students don't focus on the fact that 'least upper bound" is a number. The existence of the field "Object" makes it possible not only to make an explicit note of this very important element of concept but also to make a query about what concepts studied before had the same object, i.e. incorporate a new criterion of comparison into the already existing system. The necessity to fill in the field "Hierarchical Relationship with other Concepts" not only makes it necessary to make such a query but also to analyze the relationship of the new added criterion of comparison with the already existing ones. The logic of presenting a new material as a rule implies that the newly introduced concept involves theorems connecting this concept with the already existing ones. Therefore in most cases the hierarchical relationship of the new and existing criterions will be established when the students compile the table "Theorem Statements".

Action of generalization. Development of the action of generalization while working with databases is connected first of all with generalization of the earlier applied ways and methods regarding a new class of problems. A significant role in this is played by the field "Transformation" with the table "Theorem Proof" and students actions while working with this field. In the process of filling in this field it is required not only to identify what transformation (inequality, identity, idea, etc.) was used in the theorem proof but also to indicate in the proof of what theorems this or similar transformation was previously used. As an example let us consider Bernoulli inequality and generalizations related to it. Probably it is used in advanced calculus for the first time while proving that the limit of the sequence $a^{1/n}$ is equal to one. The proof that the sequence $(1+1/n)^n$ is monotone in most cases is based on binomial theorem. The proof of Bernoulli inequality can also be based on binomial theorem. That's how the idea of using binomial theorem in " convergence proofs" can be generalized for a wider class of problems.

The next example is the use of triangle inequality in proofs related to convergent sequences (series), uniformly continuous functions, etc. The triangle inequality is used for the first time in advanced calculus while proving that the limit of the sequence is unique: $|a-b| = |a - a_n + a_n - b| \le |a - a_n| + |b - a_n| \le d/2 + d/2 = d$. Later it is used in various proofs. In the chain of inequalities that is written above two beautiful ideas are used. The first one is triangle inequality, the second is the idea of adding zero in the form $a_n - a_n$ to the algebraic expression. Both these ideas are then generalized for a wide class of problems. At the same time despite the fact that the use of the second method as a rule involves the use of the first one these two are different. If a student cannot distinguish between the two and views them only as one entity (what happens in a traditionally organized instruction) then the development of each of them goes very slowly. In this respect it is difficult to overestimate the use of the fields "Transformation # N" in the table "Theorem Proof". First, while filling the fields in "Transformation" a student has to separate these two methods. Second, later on when these methods come up in the study of some new material a student has to analyze the history of using them. This means that a student develops in his/her mind a set of problems that require the use of these approaches together and another set of problems where these approaches are used independently of each other.

Action of attributing to the concept. Performing the action of attributing to the concept implies answering the question whether this object belongs to this concept or not. For example," Is this sequence monotone?" " Is this function differentiable?", etc. While performing this action it is important to understand what objects in principle can be attributed to this particular concept. As our observations of the traditionally organized process of instruction indicate a student very often simply does not understand the meaning of this question. In this regard the presence of the field "Object of the Definition" and the table "Concepts and their Definitions "play a very important role. The necessity to frequently answer the question about the object first of all develops a general understanding of the importance of the object and secondly, connects the object with the system of its possible criterions/attributes. The action of attributing to the concept can involve working both with the Table "Concepts and their Definitions " and "Theorem Statements". In the first case attributing to the concept is based on the definition of this concept while in the second it deals with the use of the theorem. In both cases the student is required to define characteristic criterions of the given concept. A set of characteristic criterions is incorporated into the corresponding record. In the process of work at this record a student is required to single out each of these criterions, so we see the development of the action of attributing to the concept in the step-by-step form. If in proving by definition some of the characteristic criterions present any difficulties then the action of attributing to the concept can be based on using the theorems. In this case a model of proof is developing in the mind of a student with the initial stage being not the analysis of the given but the analysis of the conclusion. For example, it is necessary to decide whether a given sequence has a finite limit or not. To solve this problem it is expedient to analyze the premises of all the theorems with the conclusion "sequence converges". Maybe one the possible sets of premises that leads to the required conclusion matches the characteristics of the given sequence? The existence of a database allows us to easily do this. Naturally, we do not assume that every time when there is a need to use a theorem in order to attribute an object to a concept the student goes to the databases. Our goal is quite the opposite, i.e. to develop this action in the mental form. However, as practical experience shows at the initial stage of abstract mathematics study a simple explanation that there is a possibility to start with the conclusions and after that go to the required premises is far from being sufficient. It is necessary for a student to associate this mental action with some external activity. Working with databases can become such external activity

Action of drawing conclusions. As in the case of attributing to the concept action, the structure of the action of drawing conclusions involves singling out a set of characteristic criterions. Another similarity is that systems of characteristic criterions are actually presented to students in the explicit form. In attributing to the concept this is presented as a system of criterions of the single given concept while in the case of drawing conclusions it is given in the form of a set that is a combination of systems of attributes (criterions) of one or several concepts.

The action of drawing conclusions can be broken up into three classes. The action of drawing empirical conclusions belongs to the first class; the second class contains drawing conclusions with the given premises based on the logically substantiated rules of drawing conclusions and previous knowledge. The third class encompasses drawing free (not given) conclusion with the given premises. Development of the third class is closely connected with organizing the instruction process based on the learning search activities. We believe that this kind of instructional process while studying abstract math disciplines at the baccalaureate level does not fit the level of students learning skills developed by that time. Development of the action of drawing conclusions as empirical conclusions is one of the goals of studying Calculus at the intuitive level. Therefore we will focus on the second class of drawing conclusions.

The very activity of building tables "Theorem Statements" and "Theorem Proofs" is a material model of the action of drawing conclusions. While making a record in the table "Theorem Statements" a student learns to make clear distinctions between all the given premises. Learning to analyze the premises of a theorem is essential for learning how to prove a theorem.

In a traditionally organized instruction the process of reading theorem proofs as a rule is not yet performing an action. The situation radically changes with databases oriented instruction. In the process of creating records in the table "Theorem Proofs" structuring of the whole proof in the material form takes place. All the used theorems, definitions, transformations and the order of their use are presented in the explicit form.

The action of concretizing. One of the most important problems in organizing instruction of advanced calculus is that of developing the skill to use the proven theorems to solve concrete problems. We can not consider a theorem to be learned until a student knows how to apply it. Even if a student knows how to prove it.

In the development of the action of concretizing in database oriented instruction practically all the fields in the table "Theorem Statements" play a very significant role.

The first step in the development of the concretizing action is a search for model problems of the studied theorem. By model problems we mean problems that significantly rely on this theorem for solution. Let us consider the theorem that any monotone bounded sequence converges. When students begin to deal with this theorem their technical skills are not quite developed yet and the number of concrete sequences that are worth discussing without distracting students from the major topic of study is extremely limited.

Formally, the problem to prove that $(1+n)/n$ converges can serve as an illustration (a model problem) for the theorem that monotone bounded sequence converges. At the same time this problem can be easily solved just by using the definition of a limit. Moreover, this problem looks as an ideal model problem for the proof by definition. A «good» model problem for this theorem is the problem that $(1+1/n)^n$ converges.

Taking into account the fact that this kind of situation occurs quite often in the process of instruction we advise students not to use the same (or similar) problem as a model for different theorem. Development of the action of concretizing can be viewed as a sequence of actions of attributing to the concept. In the action of concretizing an object and theorem premises are given. The given set of premises determines a certain set of objects. The problem of concretizing boils down to the attribution of a given object to the concepts defined by each particular premise. The possibilities of using databases in developing the action of attribution to the concept were discussed earlier.

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Mathematical Treats form the Stars: Integrating Curricular Elements Through Partnerships Between NASA and Math Methods Faculty

Caroline M. Crawford
University of Houston-Clear Lake
United States of America
crawford@cl.uh.edu

Evelyn Brown
University of Houston-Downtown
United States of America
BrownE@zeus.dt.uh.edu

Chris Chilelli
NASA Johnson Space Center
United States of America
chris.chilelli1@jsc.nasa.gov

Abstract: Mathematics methods coursework can be an innovative environment through which to emphasize the integration of real-world data structures and opportunities. These opportunities can create instructionally informative opportunities for learners, as well as inform teacher candidates of innovative teaching tools at their fingertips. NASA offers numerous curricular opportunities to the mathematical methods coursework, with work focusing on both PreK-12 learners as well as university learners. Such a wide array of interest levels integrate numerous learning objectives, depending upon the needs and desires of the instructors and learners whom they serve.

Introduction

Teacher candidates with a specialization area focus in mathematics maintain a working knowledge of the learning environment due to their superior university methods faculty; however, the integration of opportunities that will be available within the field are of utmost importance. NASA offers the opportunity to maintain educational excellence through partnerships with PreK-12 instructors. Such partnerships are available through out the United States of America as well as around the world. The focus of this presentation, as well as proceedings paper, will focus upon the innovative opportunities that the NASA educational entity offers to the PreK-12 as well as university mathematical methods courses. The integration of NASA's superior real world curricular abilities into math methods coursework, which offers teacher candidates opportunities to work with real-world data structures and environmental elements that would otherwise be unavailable to the majority of teacher candidates in methods courses, present professional development and learning that will then be integrated into curricular scope and sequence for future PreK-12 learners.

National Standards

The "Technology Principle" is one of six principles that the National Council of Teachers of Mathematics (NCTM) designate as imperative for all teacher candidates to master (NCTM, 2000). The "Technology Principle" states that "Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning" (NCTM, http://www.nctm.org/standards/principles.htm, paragraph 28). However, the key to the success of mathematics teaching is the mathematics teachers, not the technological tools that may support the educational endeavors (Garofalo, Drier, Harper, Timmerman & Shockey, 1000; Kaput, 1992; NCTM 1991, 2000). Through the collaboration that can arise between PreK-12 education environments, higher education environments that support teacher candidates and the National Aeronautics and Space Administration (NASA), the possibilities towards supporting and realizing NCTM's "Technology Principle" are available.

NASA Educational World Wide Web Sites

There are numerous Web sites that are supported by distinct arms of NASA. Each of these Web sites delineate the orientation for each NASA campus, such as the following Web sites:

- Practical Uses of Math and Science: The On-line Journal of Math and Science Examples for Pre-College Education
  http://pumas.jpl.nasa.gov/
- InfoUse's PlaneMath
  http://www.planemath.com/
- NASA Spacelink
  http://spacelink.nasa.gov/.index.html
- NASA-JSC Distance Learning Outpost
  http://learningoutpost.jsc.nasa.gov/
- The Space Place
  http://spaceplace.jpl.nasa.gov/teachers_page.htm
- NASA Human Space Flight Metric Converter
  http://www.spaceflight.nasa.gov/station/reference/calc/index.html
- NASA-AMATYC-NSF Mathematics Explorations I and II
  http://cctc.commnet.edu/lta/
- NASA KIDS
  http://kids.msfc.nasa.gov/
- LTP Glenn Learning Technologies Project
  http://www.grc.nasa.gov/WWW/K-12/airplane/index.html
- Space Science Data Operations Office of NASA/Goddard Space Flight Center: Space Science Education
  http://ssdoo.gsfc.nasa.gov/education/education_home.html

The examples presented in the above Web sites are developed by and in collaboration with scientists, engineers, educators, instructional designers, and other professionals. The sole intent of these endeavors being the support of education pertaining to the emphasis of mathematics and cross-curricular, real-world support in PreK-12 educational environments.

Conclusions

As delineated in NCTM's "Connections" section (NCTM, 2000), "Mathematics is an integrated field of study, even though it is often partitioned into separate topics. Students from prekindergarten through grade 12 should see and experience the rich interplay among mathematical topics, between mathematics and other subjects, and between mathematics and their own interests. Viewing mathematics as a whole also helps students learn that mathematics is not a set of isolated skills and arbitrary rules" (NCTM, http://www.nctm.org/standards/standards.htm, paragraph 30). NASA has made available interactive workshops, real-world data sets and lesson plans focused upon specific levels of mathematical principles to support the educational endeavors of our education profession, and are to be commended.

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Virtual Manipulatives in Mathematics: Addressing the Conceptual Dilemmas

Lawrence O. Cannon
E. Robert Heal
James Dorward
Department of Mathematics and Statistics
Department of Elementary Education
Utah State University
Logan, UT 84322-3900
cannon@math.usu.edu
bob@math.usu.edu
jimd@coe.usu.edu
www.matti.usu.edu

Abstract: The authors are co-principal investigators for an NSF project to create a web-based National Library of Virtual Manipulatives for learning mathematics in the elementary grades (K-8 emphasis). Our virtual manipulatives are tightly focused, highly interactive Java applets, some based on physical manipulatives commonly in use in the schools (e.g. geoboards, tangrams, pattern blocks, fraction bars, etc.); others are concept manipulatives especially designed to teach or reinforce basic mathematical concepts.

These virtual manipulatives, designed for children's learning, are at least as important for the instruction of teachers. They provide unprecedented opportunities and a relatively non-threatening learning environment for teachers. Teachers, as students, "learn by doing." At the same time they give teachers tools with which they can communicate, we believe, a more correct and mathematically accurate understanding of key concepts.

The fact that these teaching tools are web-based also opens entirely new ways to assess mastery in distance learning environments.

Background and Setting

This paper is in some sense a follow-up of, or at least related to, a paper presented at a previous conference, SITE 2000. At that time we were just beginning our three-year National Science Foundation funded National Library project. We are now nearing the end of the funding period, but as with any project of substance, we see as much more to be done as we may have already accomplished.

Our goal in this project is the creation of a substantial library of interactive Java applets that can be used by teachers and parents anywhere to increase conceptual understanding of mathematics. The entire library will continue to be freely accessible from the web at www.matti.usu.edu. The library must be viewed at present as a work in progress; all the virtual manipulatives (applets) presently available at the MATTI site are functional prototypes, subject to continued refinement. (Software has been said to share an aspect of an oil painting in that it is "never done, just at a point where it can be left.") Many of the manipulatives, even if not in finished form, are also being made commercially available from several sources, and we anticipate additional sponsored versions in the future. Early in our project, we worked with the Electronic Format Group and the writers of the NCTM Principles and Standards of School Mathematics ("Standards 2000"). Many of the E-examples that appear in the web version of the Standards are early versions of our virtual manipulatives.

As we continue to create new applets and work with those on our site, we are actively working with teachers and students. Their explorations and experience make a significant contribution to our evaluation and refinement process.

We have been particularly pleased with the reception of our materials by teachers. We intended from the beginning that our applets should serve both elementary students and their teachers, both as instructional tools and to strengthen the mathematical preparation of pre-service and in-service teachers. It has been a pleasure to work with several groups of in-service elementary teachers. In both web-based distance instruction (in Utah and in North Carolina) and in on-site classes (in Utah and North Carolina and Ohio), we have used our virtual manipulatives as part of our technology-supported mathematics courses.

A more broadly based thrust comes from the incorporation of a CD-ROM containing a number of our virtual manipulatives in the updated version of the Fifth Edition of *Mathematics for Elementary Teachers* by Musser, Burger, and Peterson (John Wiley & Sons, 2001). A revision for the forthcoming Sixth Edition (2002) will contain substantially more applets.

It is this work with teachers that supports our claim that virtual manipulatives provide a relatively non-threatening learning environment. By having teachers working individually, or in very small groups at a shared computer, we can encourage them to explore without exposing any perceived areas of ignorance. One of our primary goals in applet design is to maintain a tight focus. We don't want an applet that "does too much." Keeping a single goal in mind and giving the user control, we permit each individual to explore the consequences of various choices at a comfortable pace.

Another critical design objective is to help the user, student or teacher, to develop a clear understanding of a single mathematical idea. An animation or demonstration can perhaps encourage memorization of a rule or algorithm, but a rule seldom helps understanding. It is often not easy for beginners to see why a particular mathematical relationship holds or for them to make a connection to more basic principles. Anthony Ralston has articulated this distinction well (Ralston 2001):

> …many Americans believe that elementary school mathematics consists of nothing more than a lot of rules to be learned ("the algorithms of arithmetic") …there is much more to arithmetic that should be learned by children in elementary school: *not just the how but the why, not just individual procedures but the connections between procedures and the concepts underlying them,* and the *value of viewing problems from multiple perspectives*. (Italics added.)

Why Virtual Manipulatives?

In addition to the above-listed advantages, research into the value of physical manipulatives for student learning is increasing. They have numerous advantages that apply across the spectrum of student ability and interest, from those disadvantaged by economics or language or minority status, to especially gifted, curious students who can direct their interest into unanticipated explorations. Recent studies are supporting our contention that an electronic format, with student interaction with software on a computer screen, shares many of the same advantages, with some additional capabilities not available with physical manipulatives.

Our concern here, however, is teacher preparation. Although not yet quantified, the advantages of virtual manipulatives are real. It has been a delight to have experienced teachers exclaim over the possibilities they see for the use of our Library materials in their classrooms: "Oh, *that's* why that works!" or "This will help them understand *why* common denominators."

Math methods courses, and content courses for prospective elementary teachers, often involve physical manipulatives for demonstration or exploratory purposes, to familiarize teachers with important teaching tools. For virtual manipulatives, working with the computer has a respectable cachet. They are freely available at home, on the web and in the classroom. Furthermore, virtual manipulatives often have features that are impossible to duplicate with their physical counterparts. The computer allows real-time dynamic control. The user can change colors, save, and even print, the state of an applet after creating an interesting or illuminating example. Even when the computer activities are child-intended and designed, controlling their use and exploring consequences is somehow more acceptable than just handling physical objects. There is also the acknowledged value of "learning technology" even if it is really mathematical concepts that are being learned.

With the level of engagement necessitated by interaction with our virtual manipulatives, we get away from what Cuoco (2001) has called "watch-and-do pedagogy" that is so pervasive in college and university classes (and which young teachers often try to carry into their elementary classrooms): the teacher works out a problem, the students mimic the procedure on very similar problems, and then practice on a larger set of worksheet or homework problems. This teaching (learning?) style infects too many current mathematics textbook writers and has been called, in even less complimentary terms, "monkey-see, monkey do." Virtual manipulatives can be used by imaginative instructors to encourage fairly extensive individual explorations, in the best situations using student discoveries to stimulate class and small group discussions.

And because we recognize the importance of drill for learning, the number of variations on simple themes that we can build into our applets encourages repetition without excessive "sameness."

We are learning that virtual manipulatives also have versatility and applicability in the areas of assessment and distance learning. The potential for using our manipulatives in a distance education format is essentially the same for students five feet or five hundred miles away, as long each person is in front of a computer and has real-time access to our manipulatives on the web. We are developing an on-line testing and computer-grading procedure, where the person taking the test also has access to all of the tools that have been used for learning. Thus the computer activities can furnish versatile concept-based test questions. This is important future work, and we will explore these at some length in another paper. Here we more closely examine some specific examples.

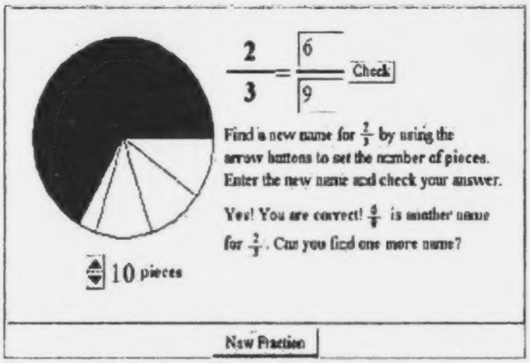
Examples from Fractions

Manipulation of fractions is perhaps as frustrating as any single topic in elementary mathematics. The perplexity and apparent difficulty continues into college, interfering with the learning of calculus as the same mistakes are repeated by those who have ostensibly mastered the techniques years earlier.

Liping Ma (Ma, 1999) has raised questions of serious import for mathematics educators. One of her best-known examples deals with the question of dividing by fractions. She worked with a set of 23 American and 72 Chinese teachers, interviewing them, individually and in groups, on several topics in the teaching of elementary mathematics. The question posed was to compute the quotient of two fractions, 1¾÷½. The lack of general understanding of the concept of division was reflected by a question that came from the father of one of our elementary students, "How come when Brent divides by ½, he gets a bigger answer? Aren't things supposed to get smaller when you divide?"

Not only were there differences of opinion among Liping Ma's interviewees about how to teach the concept, only 9 of the 23 Americans teachers were able to compute the quotient correctly; all 72 of the Chinese teachers succeeded. And several of those who had an algorithm to accomplish the task (usually some variation of "invert the denominator and multiply"), to get the correct answer, didn't have an adequate explanation to give to students as to why their rule should work. In subsequent chapters, Ma talks of the need for a "Profound Understanding of Fundamental Mathematics," that embodies "an understanding of the terrain of fundamental mathematics that is broad, deep and thorough."

We are under no illusions that we have a magical "fix" for the deficiencies observed by Ma or that the proper use of virtual manipulatives will necessarily create a Profound Understanding of Fundamental Mathematics. What we do assert is that we have a collection of tools that can contribute to a better understanding of some fundamental principles. We focus on a couple of ideas to illustrate.



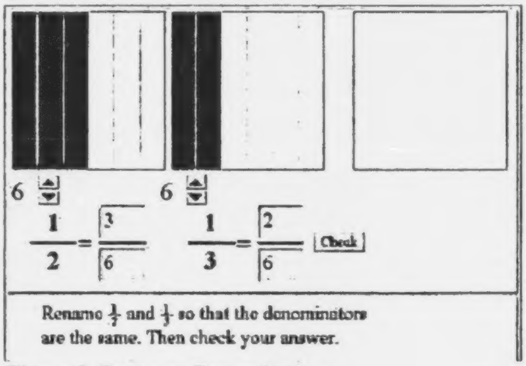
$\frac{2}{3} = \frac{6}{9}$

Find a new name for $\frac{2}{3}$ by using the arrow buttons to set the number of pieces. Enter the new name and check your answer.

Yes! You are correct! $\frac{6}{9}$ is another name for $\frac{2}{3}$. Can you find one more name?

10 pieces

Figure 1 Equivalent Names for Fractions



6 6

$\frac{1}{2} = \frac{3}{6}$ $\frac{1}{3} = \frac{2}{6}$

Rename $\frac{1}{2}$ and $\frac{1}{3}$ so that the denominators are the same. Then check your answer.

Figure 2 Common Denominators

Figure 1 is a snapshot of an applet in which the user is presented with a shaded fractional portion of a whole and is asked for an equivalent name. The up and down arrows change the number of divisions ("pieces"), and as is obvious in the figure, 10 divisions don't line up to divide 2/3 evenly. Any multiple of

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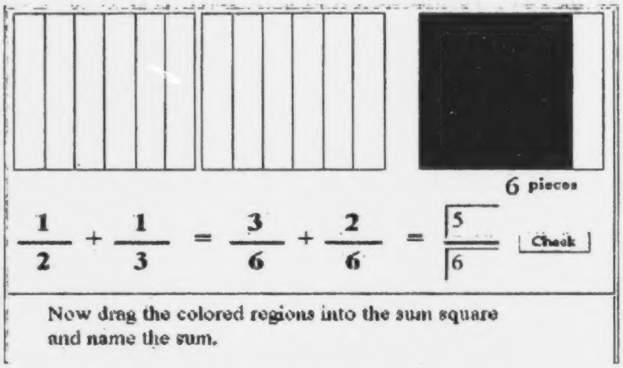
3 clearly works, and the computer will accept any numerical answer of the form *2m/3m*, allowing the user to *observe* the validity of cancellation (or multiplying by 1 in the form of *m/m*). The user can provide as many equivalent names for each fraction as desired, with or without changing the number of pieces. It also becomes apparent that the only possible denominators are multiples of 3. Pressing the New Fraction button shows up a new fractional portion of one of several different shapes.

This is the first of several applets in which the user changes the grid or the number of pieces to show a simple idea. The next one we show examines the ideas necessary for the addition of fractions and why a common denominator makes sense of the process. The goal is to add the fractional parts shown. The first step is to rename the fractions with the same denominator, again using the up and down arrows to change the grid so that both copies of the whole are divided and the shaded part is also divided evenly, as shown in Figure 2.

When the Check button is pressed and the computer verifies that the answers are legitimate (without requiring a *least* common denominator), a new page appears. In Figure 3 we show the result of following the instructions. Initially, the shaded pieces are still located as in Figure 2, but they are now movable and can be dragged to the sum square, where they snap together as in Figure 3. Again, the answer is checked for numerical accuracy, not simply as strings. The pieces cannot be moved until the user has provided common grids that make sense of the idea of putting them together.



$\frac{1}{2}+\frac{1}{3}=\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$

Now drag the colored regions into the sum square and name the sum.

Figure 3 Fractions successfully added

What we hope to accomplish with this applet is the idea that while fractional pieces of a common whole can conceptually be put together to make a larger part of the whole, we cannot reasonably name the sum without proper names (common denominators) for both pieces. There are several observations that may be relevant. First, we only attempt to add fractions of the same whole. This is not explicitly pointed out to the user, but the initial seedings always show the same whole for each part and for the sum. We expect the teacher or parent to observe that kind of distinction, that we are adding numbers. While we use fractions to model parts of physical items, it makes no sense to apply a fraction name to what we get if we add half of an apple to a third of an orange. Secondly, the only sums we illustrate with this applet are less than a whole. We could have allowed other options, but each applet is intended to focus on a single idea. We consider it more important to work repeatedly with the simpler situation, which does, after all, clearly illustrate the utility of a common denominator.

We regret that space limitations do not allow us to more than sample an applet for the division of fractions. It is our hope that a description will encourage interested readers to visit our web site and explore this and many other virtual manipulatives in the NSF Library. We have applets to illustrate multiplication of whole numbers, and of fractions, by showing shaded rectangular regions where the user controls the size of the two factors. Division of whole numbers is similarly illustrated, where dividing 23 by 5 shows 23 squares on a grid, with 4 copies of the set of 5, and 3 left over. Again, the user can change the divisor at will, each time seeing an answer to the question, "How many copies of 5 (or whatever) are there in 23?"

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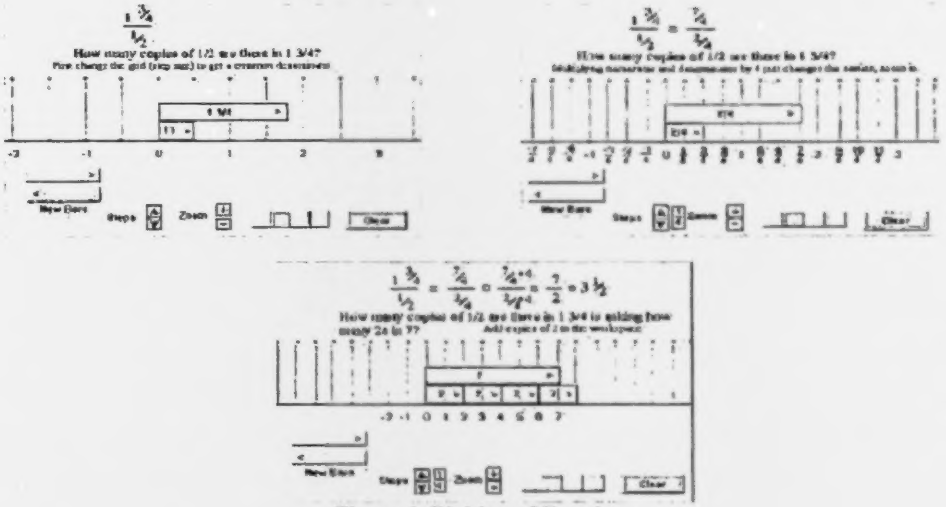
How many copies of 1/2 are there in 1 3/4?
-2
-1
0
1
2
3
New Base
Steps
Zoom
Clear
How many copies of 1/2 are there in 1 3/4?
New Base
Steps
Zoom
Clear
$\frac{1\frac{3}{4}}{\frac{1}{2}} = \frac{\frac{7}{4}}{\frac{2}{4}} = \frac{\frac{7}{4}\cdot 4}{\frac{2}{4}\cdot 4} = \frac{7}{2} = 3\frac{1}{2}$
-2
-1
0
1
2
3
4
5
6
7
New Base
Steps
Zoom
Clear

Figure 4 Division of Fractions

With this kind of experience at hand, Liping Ma's question of dividing 1¾ by ½ becomes, "How many copies of ½ are there in 1¾?" We have a new fraction division applet that allows the user to produce an arrow (rectangular region) of length 1¾ and another, immediately below the first, of length ½. When the user changes the grid size (much as is done in the figures above) to represent a common denominator, the labels on the rectangular regions become, respectively, 7/4 and 2/4, and the user sees that the question is equivalent to "How many copies of 2 are there in 7?" To complete the division, the user lines up three more ½-length (yellow) arrows below the longer one. The labels change, but the number of copies of ½ in 1¾ is shown visually as 3, plus ½. While these activities are underway, they are accompanied by the following sequence of fractions, providing a robust symbolic algorithm that can be used for any division of fractions.

$$\frac{1\frac{3}{4}}{\frac{1}{2}} = \frac{\frac{7}{4}}{\frac{2}{4}} = \frac{\frac{7}{4}\square 4}{\frac{2}{4}\square 4} = \frac{7}{2} = 3\frac{1}{2}$$

The power of this manipulative, as with the others in the library, is that the user is engaged, in control, and can repeat the experience with as many fractions as desired, reinforcing both the concept and the symbolic algorithm.

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Enhancing Statistical Content in Pre-Service Elementary School Teachers' Web Constructions

Jack A. Carter
California State University
Hayward, CA USA
jcarter@csuhayward.edu

Beverly J. Ferrucci
Keene State College
Keene, NH USA
bferrucc@keene.edu

Abstract: Research on future teachers' mathematical Web site constructions shows there is a tendency for these constructions to emphasize design aspects rather than the mathematics content of the sites. In this study, students received more detailed, knowledge-based guidelines for completing Web construction projects. A cognitive analysis of the statistics content in 38 student Web sites constructed before, and 43 Web sites constructed after the more-detailed guidelines were used, showed that the later Web sites contained more items at a procedural applications level of cognition. There was also evidence of small increases in the later Web site items at a conceptual applications cognitive level, but little change was evident in the number of items at the highest of the cognitive levels, problem-solving applications. The findings suggest that further improvements in the cognitive levels of the students' examples and exercises on their Web pages are feasible.

Introduction

Ivers and Barron (1999) reported that there were nearly 10,000 US schools connected to the Internet in 1998, and half of these were elementary or primary schools. The authors further predicted that virtually all US public schools would be connected to the Web by 2001. With this proliferation of Web access there is a growing trend for schools to use their presence on the Web for interactive communication and for more teacher Web pages. Moreover, access to Web site creation programs makes it increasingly possible for non-programmers to create effective Web pages. However, these rapid advances in Web technology may serve to indicate that the instructional purposes of elementary school Web pages have yet to be well defined. As in the introduction of computers into the classroom, it may take some time for elementary school teachers to utilize the full potential of the Web.

The Study

A prior study of future elementary school teachers' mathematical Web site constructions (Carter & Ferrucci 2000) showed that there were tendencies for these students to focus more on the design aspects of Web sites rather than on the statistical content. The present study was consequently undertaken to encourage prospective teachers to emphasize the statistical content of their constructions. This encouragement involved the use of more detailed knowledge-based guidelines in the instructions to the students for completing a Web site construction project. After students completed their projects, the statistical content of the completed Web sites was analyzed to determine the cognitive levels of the examples and exercises that the future teachers incorporated into their sites. Particularly, the examples and exercises that the future teachers used in reviewing the statistical concepts of the mean, median, and interquartile range were analyzed with respect to their cognitive levels. To facilitate the analysis, a cognitive taxonomy was used to classify the examples and exercises from the Web sites. The categories in the taxonomy were essentially the comprehension and applications levels of the well-known Taxonomy of Educational Objectives (Bloom, Englehart, Hill, Furst, and Krathwohl, 1956). The comprehension level of the taxonomy was adapted directly from the Bloom taxonomy, but the applications level in the Bloom taxonomy was refined into three levels to elaborate the complexity of examples and exercises that students used in their Web pages. Hereafter, the designations Mean1, Median1, and IQR1 indicate the comprehension level (Level 1) of cognition about the mean, median, and interquartile range, respectively. Similar notations designate procedural, conceptual, and problem-solving applications cognitive levels (Levels 2, 3, and 4) for each of the three statistics for which students prepared Web pages.

The revised instructions for completing the construction project stipulated that students should include examples and exercises that involved problem solving and higher-level cognitive processes, and samples of these types of examples and exercises were included in the guidelines. Students received a handout of the guidelines in class, and a copy of the guidelines was also included both on the students' and on the instructor's Web sites. To complete the Web site project, students replaced given, blank Web pages for the mean, median, and interquartile range with Web pages intended to help their own future students in reviewing these statistics. Web pages about the mode and the range were included in the students' Web sites as further examples. Students' Web sites also contained a homepage that was customized, as part of in-class instruction, to show the teacher's name, school and grade level. Also in the sites was a Web page that showed assignments and other information about the mathematics program in the future classroom, as well as another page that listed Web resources that the future teachers might use in completing their Web site constructions.

To prepare the prospective teachers to complete the Web site projects, separate class sessions dealt with modifying and editing text on Web pages, inserting backgrounds and images into Web pages, and inserting links onto Web pages. In each of the class sessions examples were used that illustrated images, objects, or text that students could use in preparing their own Web sites. For instance, students practiced inserting images of box-and-whisker plots and links to electronic examples (e-examples) within their own Web pages. In all, the instructional component for the Web site project consisted of four 70-minute class periods in a lab where each student worked individually at a computer. Students were also informed that they should expect to spend 10-15 hours to complete the project.

In all, 38 students from two classes completed the Web site project using an original, unmodified set of guidelines (Carter & Ferrucci, 2000), and the students in these classes are referred to as the "earlier classes" in this report. The cognitive levels of the examples and exercises in the earlier classes' Web sites were compared with the examples and exercises in the Web sites created by two later classes (with a total of 43 students) who completed the Web site project after receiving the revised instructions. The students in these later classes are referred to as the "later classes", hereafter. Aside from the different guidelines, efforts were made to ensure that other instructional materials and activities about the Web site projects were the same for the four classes.

To analyze the examples and exercises in the Web sites from the earlier and later classes, a panel of two instructors and two graduate students rated the examples and exercises using the taxonomy developed for this study. The panel reviewed the Web sites and categorized the exercises and examples based on the taxonomy, and there were no unresolved differences with respect to the cognitive levels of the examples and exercises.

Figure 1 shows the number of items (exercises and examples) on the mean, median, and interquartile range in the Web pages prepared by the earlier and later classes. Although the number of items on each of the statistics is greater for the later classes, the number of items on the interquartile range is approximately half the number of items on the mean and the median.

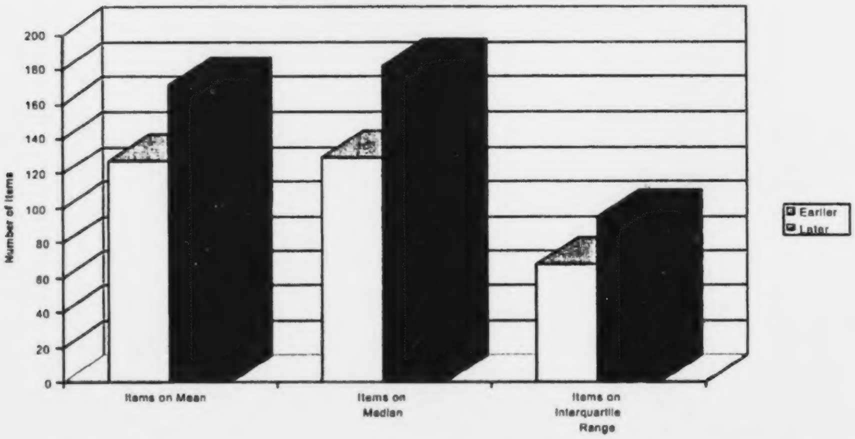

Figure 1: Number of Items on the Mean, Median, and Interquartile Range in the Web Pages Prepared by Earlier and Later Classes

Figure 2 shows the earlier and later classes' distributions of Web page items on the mean by cognitive levels. Mean2, Mean3, and Mean4 in figure 2 refer to the levels of cognition concerned with procedural, conceptual, and problem-solving applications. At each of these levels of cognition, the average number of items increased from the earlier to the later classes. Notably, the increases at the levels of the conceptual and problem-solving applications were small (about .25 of an item) compared to the increase at the procedural applications level (about 1 item). Figure 2 also shows that the average number of items at the comprehension level of cognition (Level 1) was essentially zero for both the earlier and later classes. Moreover, there were comparable distributions for the earlier and later classes' Web page items on the median and the interquartile range.

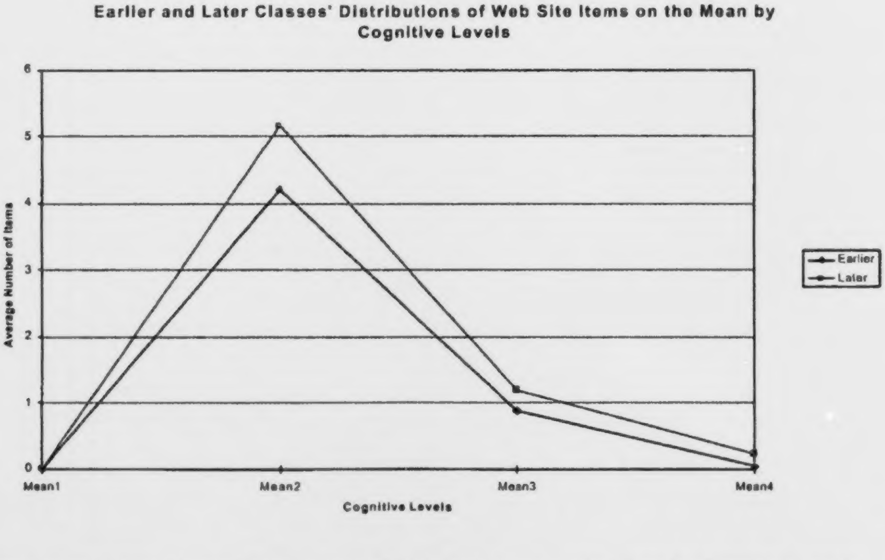

Figure 2: Earlier and Later Classes' Distributions of Web Page Items on the Mean by Cognitive Levels

Figure 3 shows earlier and later classes' average number of Web page items by the entire range of cognitive levels for these items. Particularly, at the procedural applications level, the average number of items increased from about 4 to 5 items for each of the mean and median, while the average number of items increased from about 2.5 to 3.25 items for the interquartile range. At the conceptual applications cognitive level, the average number of mean and median items increased from less than 1 to more than 1 item, while the average number of interquartile range items increased from about 0 to less than .25. For each of the three statistics, the number of items at the problem-solving applications level (Level 4) was virtually negligible for both the earlier and later classes. A possible exception to the later finding may have occurred for items on the mean written by the later classes. The average number of these items at the problem-solving applications level was almost 1/4 of an item.

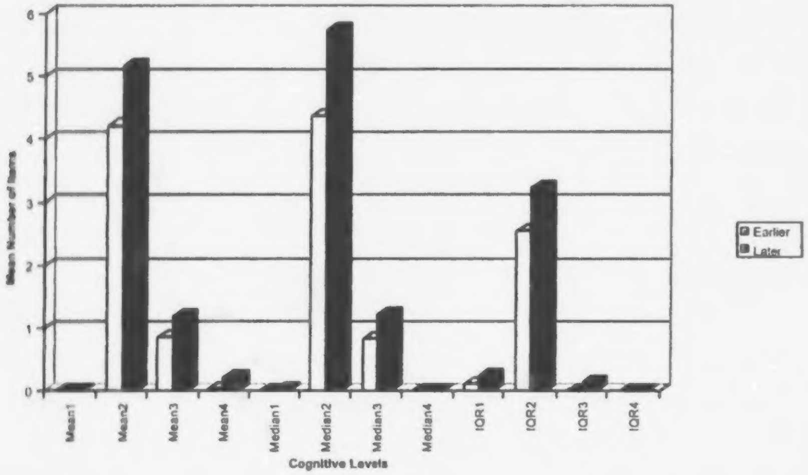

Figure 3: Earlier and Later Classes' Mean Number of Web Page Items by the Cognitive Levels

Conclusions

The results of the study give evidence that the number of items on the mean, median, and interquartile range increased from the earlier to the later classes. This indicates that the revised guidelines for the students for completing the Web site project may have increased the number of examples and exercises prepared by students in completing their projects. The results also showed that the number of procedural, conceptual, and problem-solving applications involving the mean increased between the earlier and later classes. However, the increase was less pronounced in the case of the conceptual and problem-solving applications. In both the earlier and later classes' Web site constructions, there was no evidence of items on the mean written at the comprehension level of cognition. This level of cognition may be applicable to the mean in only the most trivial instances when merely an observation of data or a graph can identify the mean. With respect to Web page items on the median, there was some evidence that the number of items at the procedural and conceptual applications levels increased from the earlier to the later classes. At the comprehension and problem-solving applications levels of cognition, there was no evident increase between the earlier and later classes. For the earlier and later classes' distributions of Web page items on the interquartile range, there was also some evidence that the average number of these items increased from the earlier to the later classes. Particularly, this increase was more evident at the procedural applications level.

An examination of figure 3 shows that there was little or no difference between earlier and later classes on the average number of Web page items at the conceptual and problem-solving applications level of cognition for all three of the statistics. This indicates that the revised guidelines for the Web site project probably resulted in, at most, an increase in the number of items at the procedural applications level of cognition. Correspondingly, the revised guidelines did not appear to affect much change in higher-level thinking. That is, items at the higher cognitive levels (conceptual and problem-solving applications) increased little compared to items at the procedural applications level. Future work in this area may find it feasible to increase the number of higher-level items that students include in their Web site constructions.

Figure 3 indicated that the average number of items at the procedural applications level increased by about 1 item for each of the mean, median, and interquartile range. Particularly, this increase was from an average of 4 to about 5 items in the case of the mean and median, and from 2.5 to 3.25 items in the case of the interquartile range. Consequently, future work on pre-service teachers' Web constructions about statistics may endeavor to increase the number of items at the procedural applications level for the interquartile range. Figure 3 also indicated that the average number of items at the conceptual applications level increased from about .8 to about 1.2 items for the mean and median. The comparable figures for the interquartile range showed that the average number of items increased from 0 to less than .2 of an item. As a result, Web site construction projects in the future might also be aimed toward increasing the average number of interquartile range items to at least match those for the mean and median. Finally, Figure 3 further showed that the major increases between the earlier and later classes occurred mainly at the lower as opposed to the higher levels of cognition for all of the statistics. Notably, the average number of items at the problem-solving applications level of cognition for the mean, median, and interquartile range (Mean4, Median4, IQR4) were almost zero. This result further indicates that work remains to be done to increase the number of higher cognitive level items included by prospective teachers in their Web pages.

A major motivation for this study related to prospective teachers' tendencies to focus more on appearances than on content in Web site constructions. By revising the guidelines for completing the project, there was evidently some increase in the number of items at the procedural applications level of cognition for each of the statistics in the students' Web pages. Consequently, the revised guidelines apparently provided some impetus for students to move from learning about a technological tool to statistical learning with that tool. Put another way, the findings of this study produced some evidence that the powerful technology of Web sites did less to distract the later classes from the underlying statistics than was the case with the earlier classes. Clearly, ensuring that the content is not compromised is an important consideration whenever technology is used in mathematics education.

The Web certainly offers unlimited possibilities for improving statistical understanding, and there are increasing indications that future teachers will need to use sophisticated Web-based systems to post information and to close communication gaps between teachers, parents, and students. Aiding teachers to become more proficient in their Web skills should lead to the creation of more effective and dynamic displays of mathematical information, and projects such as the Web site construction project outlined in this study are apt to facilitate these proficiencies.

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Graphing Calculators and Algebra I, Algebra II, IPC, and Chemistry Teachers' Perceptions of Change

Scott W. Slough
Department of Natural Sciences
University of Houston-Downtown
Houston, TX USA
sloughs@dt.uh.edu

Gregory E. Chamblee
Department of Middle Grades and Secondary Education
Georgia Southern University
Statesboro, GA USA
gchamblee@gsvms2.cc.gasou.edu

Abstract: The purpose of this study was to determine Algebra I, Algebra II, IPC, and Chemistry teachers' initial perceptions of change prior to their participation in a year-long professional development program that emphasized integration of the math and science utilizing graphing calculators. The results indicate that as a group, the teachers (1) exhibited high information stage concerns, high personal stage concerns, and collaboration stage concerns; and (2) are more aware of the graphing calculator and its potential than previous groups. Algebra I and Algebra II teachers reported higher technological proficiency, but their stage concerns were not statistically different from the IPC and Chemistry teachers.

Mathematics and science educators include the use of technology as a common goal in their most recently developed standards. The National Council of Teachers of Mathematics *Principles and Standards for School Mathematics* (NCTM, 2000) suggests a framework for the types of technology-based activities and content that should be taught. Similarly, the National Research Council's *National Science Education Standards* include suggestions for science education reform in technology-based content and professional development (NRC, 1996). Further, both documents point toward significant increase in the integration of math and science. Reading between-the-lines, technology is encouraged as a tool that can facilitate such integration.

Graphing calculators show promise for integrating mathematics and science. There is a growing body of recent research into the use of graphing calculators in the teaching of algebra (Beckman, Senk, & Thompson, 1999; Dunham & Dick, 1994; Embse & Yoder, 1998; Milou, 1999;); in both chemistry and physics (Adie, 1998; Roser & McCluskey, 1999; Taylor, 1995); and even the integration mathematics and science (Tharp et. al.).

The State of Texas has developed the Texas Knowledge and Skills (TEKS) (http://www.tea.state.tx.us/teks/). The TEKS clearly extend the national reform documents by specifically indicating the use of graphing calculators in algebra:

> Students use a variety of representations (concrete, numerical, algorithmic, graphical), tools, and technology, including, but not limited to, powerful and accessible hand-held calculators and computers with graphing capabilities and model mathematical situations to solve meaningful problems (§111.32. Algebra I (One Credit) #5).

Beyond the explicit statement that graphing calculators be used in the teaching and learning of mathematics, the new Texas Assessment of Knowledge and Skills (TAKS) (http://www.tea.state.tx.us/student.assessment/taks/index.html) **requires** the use of graphing calculators on the state-mandated tests at the ninth, tenth, and eleventh grades for math and at the eleventh grade for science.

Theoretical Framework

The implementation of technology will require change in the classroom. One model that has been utilized to inform the decision-making process when innovations are introduced is the Concerns-Based Adoption Model (CBAM). CBAM states that successful implementation of an innovation is a process not an event (Hall & Hord, 1987; Fullan, 1991; Friel & Gann, 1993), developmental in nature (Hall & Hord, 1987), and a highly personal experience for each teacher (Hall & Hord, 1987). Hall, George & Rutherford (1986) define concerns as the feelings, thoughts, and reactions that individuals have about an innovation or a new program that touches their lives. To measure these concerns, Hall, Wallace & Dossett (1973) developed the Stages of Concern Questionnaire (SoCQ). Initial research on the instrument construction verified the existence of seven stages in the concerns process: awareness, informational, personal, management, collaboration, and refocusing, with internal reliability for individual scales ranging from r=0.64 to r=0.83 (Hall, George & Rutherford, 1986).

Participants

The participants in this study are high school math and science teachers from a single large urban school district in Texas participating in a year-long professional development program that is ultimately aimed at improving math and science achievement. Within the professional development program, the teachers are divided into two sub-groups. The two subgroups are Algebra I (ALG I) with Integrated Physics and Chemistry (IPC) and Algebra II (ALG II) with Chemistry I (CHEM). The teachers are paired because the vast majority of students who are enrolled in ALG I will also be enrolled in IPC and because there is significant overlap in the knowledge and skills that are taught in each course. There is less overlap with students for the ALG II and CHEM group, but curricular overlap is strong enough to warrant the pairing. The teachers are recruited through their building principal and science department chairs and must participate as pairs, one from math and one from science.

The focus of the professional development is on increased communication and collaboration between math and science teachers within the district and specifically in individual schools, with a heavy emphasis on technology. Graphing calculators (TI-83s), Calculator-Based Laboratories (CBLs), and Calculator-Based Rangers (CBRs) with multiple probes were provided to all teachers at the beginning of the program to be used in all subsequent workshops. Each teacher will ultimately receive a minimum of 125 hours of professional development that culminates in a two-week summer institute. Upon the completion of the 125 hours, each teacher will receive a set of ten calculators, CBLs, and CBRs, an overhead panel for display purposes, and up to four additional probes for use in their classrooms.

Methods

Research questions

1. Are there significant differences between the holistic stage concerns profiles for ALG I, ALG II, IPC and CHEM teachers?
2. Are there significant differences between the mean stage score profiles for ALG I, ALG II, IPC and CHEM teachers?
3. Do the demographic profiles differ for ALG I, ALG II, IPC and CHEM teachers?

Data was collected from a total of forty-three secondary mathematics and science teachers during their respective introductory sessions in September 2001. The largest subgroup was the ALG I with IPC and consisted of twenty-five participants. Twelve participants taught ALG I and eleven participants taught IPC, with two participants teaching both courses. Eighteen participants were enrolled in the second subgroup, ALG II and CHEM. Ten participants taught Algebra I. Eight participants taught chemistry.

All participants were administered the Stages of Concern Questionnaire (SoCQ) on the first day of the in-service. The SoCQ is a thirty-five item Likert-scale instrument that contains seven levels of responses. The responses range from 0 = irrelevant to me, 1 = not true to me now, to 7 = very true to me now. A demographic survey also was administered at this time. The survey collected two types of information: background and technology-using history. Background information collected included gender, years teaching, highest degree earned and age. Technology-using information collected included self-rating of the ability to integrate graphing calculators and computers in the classroom, in-service training received, and number of years integrating a graphing calculator and computer in the classroom.

Mean stage scores and total concerns score were calculated for ALG I, ALG II, IPC and CHEM teachers. To determine overall concerns levels, two analyses were performed. First, mean stage scores were converted to percentile ranks based on the norms presented by Hall, George & Rutherford (1986). Second, a peak stage score analysis was calculated for each group. Peak stage scores are defined as the stage at which an individual has his or her highest percentile rank score on the seven concern stages (Hall, George & Rutherford, 1986). Finally, analyses of variance (ANOVAs) were performed on mean stage scores and total concerns score to determine subgroup differences. Since there are seven stages of concern, the significant p-level for mean stage score ANOVAs was $p=0.007$ ($p=0.05/7$). Total score ANOVAs used a significant p-level of $p=0.05$.

Results

ALG I teachers had the highest percentile concerns at the information stage and their lowest percentile concerns at the refocusingstage (Awareness=77, Information=84, Personal=70, Management=43, Consequence=43, Collaboration=68, and Refocusing=38). IPC teachers had the highest percentile concerns at the information stage and their lowest percentile concerns at the management stage (Awareness=81, Information=90, Personal=76, Management=47, Consequence=54, Collaboration=84, and Refocusing=52). ALG II teachers had the highest percentile concerns at the awareness stage and their lowest percentile concerns at the consequence stage (Awareness=84, Information=75, Personal=83, Management=56, Consequence=48, Collaboration=68, and Refocusing=52). CHEM teachers had the highest percentile concerns at the information stage and their lowest percentile concerns at the consequence stage (Awareness=86, Information=93, Personal=83, Management=65, Consequence=59, Collaboration=76, and Refocusing=69). Overall, the percentile scores demonstrate that all groups were very aware of graphing calculators and their uses and wanted to learn more about how this technology impacts their classroom. The profile also demonstrates that the participants were users of the technology in the classroom but still needing information on how to best integrate the technology to impact student achievement.

No significant differences ($p<0.007$) were found between ALG I, ALG II, IPC and CHEM teachers group means. Thus, while percentile scores varied slightly as to highest and lowest percentile concerns, all participants entered the in-service with similar expectations.

Demographic analysis found that (1) teachers in each subgroup were predominantly female (>60% for each subgroup), (2) almost all CHEM teachers had a masters degree or higher while the other groups had more teachers with only a bachelor's degree, (3) years of teaching experience was related to course taught (CHEM vs. IPC; ALG I vs. ALG II), (4) few ALG II teachers had used computers in instruction while almost half of the ALG I teachers had integrated computers, however, most science teachers regardless of level had integrated computers in their instruction, (5) all ALG II teachers and almost all ALG I teachers had integrated graphing calculators in the classroom while few CHEM and IPC teachers had used graphing calculators in instruction, and (6) CHEM and IPC teachers self-rated themselves as novice users of graphing calculator and intermediate (almost experts) at using computers in the classroom while ALG II and ALG I teachers considered themselves novices at integrating computers in the classroom and intermediate (almost experts) at using graphing calculators in the classroom.

Summary

All groups entered this in-service wanting to learn more about the how to successfully integrate technology in the classroom (high information stage concerns). These needs focused primarily in the areas of how will this curricular change impact me and my teaching (high personal stage concerns) and how can I work with others to help bring about this curricular transition (collaboration stage). This early awareness of graphing calculators and interest in the integration process is atypical for those entering previous math, science, and technology professional development programs (Chamblee, 1996; Chamblee & Slough (in press A); Slough 1998;). This warrants further investigation.

Demographic data present distinctly different groups. Group differences can be classified according to discipline more than subject taught. This fact agrees with previous research in this area (Chamblee & Slough (in press A)). Of particular note, both groups of math teachers, ALG I and ALG II, rated their technical proficiency high with regard to the graphing calculator and the science teachers, IPC and CHEM, rated themselves as novices. Yet, there was no statistically significant difference between the groups mean stage concerns. At first, this may appear to be problematic with regard to either the self-reporting or the CBAM model. When, in fact, mere technological proficiency does not make one immune to the same concerns. This warrants further investigation.

Similar research questions were utilized to analyze the differences between all math and all science teachers who participated in the professional development program. Due to the limited space, the results are discussed in a separate paper (Chamblee and Slough (in press B)).

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Actions on Objects:
Useful Internet locations.

Michael L. Connell, Ph.D.
University of Houston
United States
mkahnl@aol.com

Abstract: The modern classroom computer has an unparalleled ability to implement both graphical and procedural components of mathematics understanding in a single unified object. This dual encapsulation allows students to see both the form of representation and their actions upon the representation simultaneously. An extension of activity theory, Action on Objects (Connell, 2001), has been developed incorporating this ability which has proven of great worth in instructional planning and effective utilization of technology to enhance mathematics learning.

During the summer of 2001 the author lead a graduate course where we carried out an extensive review of existing websites focusing upon those best fitting this action upon objects model. This paper will provide a brief overview of the model and the rubrics used in the course of this website evaluation together with annotated links to the resources themselves.

Background

A major conceptual framework used in my research and writings has been that of *action upon objects* (Connell, 2001). This has in turn lead to some foundational questions surrounding the nature of the technology-enhanced objects and the types of actions that one might be expected to perform upon them. I have created a conceptual framework of actions upon objects that has proven to be very powerful in both experimental settings as well as in school classrooms. I feel that it also captures recent thinking on object reification in mathematics (Sfard, 1994).

It is clear, however, that if this approach is to be effective that the objects to think with must be developmentally appropriate for the student. The following model captures my current "best attempt" to put this into an easily presentable format.

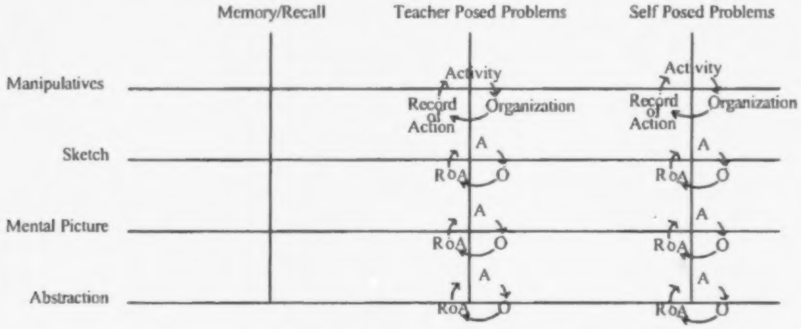
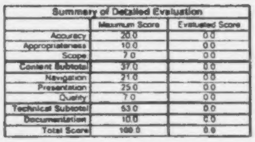


Figure 1. Model illustrating the type of *actions* as performed upon the *objects of thought*.

Evaluation Rubrics

During the summer of 2001 the author lead a graduate course within which we carried out an extensive review of existing websites focusing upon those best fitting this action upon objects model. The following illustrations serve to outline the evaluation template used. The final paper will develop the rationale for these in more detail and provide a copy of the template for inclusion on the SITE CD. It will also include some selected sites and their annotations so that a preview of the database might be achieved.



Summary of Detailed Evaluation		
	Maximum Score	Evaluated Score
Accuracy	20.0	0.0
Appropriateness	10.0	0.0
Scope	7.0	0.0
Content Subtotal	37.0	0.0
Navigation	21.0	0.0
Presentation	25.0	0.0
Quality	7.0	0.0
Technical Subtotal	63.0	0.0
Documentation	10.0	0.0
Total Score	100.0	0.0

Figure 2. Summary of Evaluation

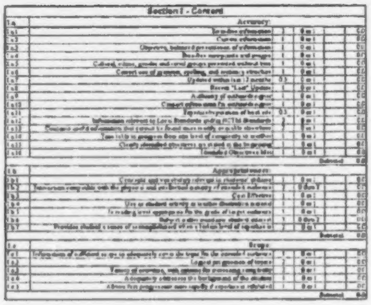


Figure 3. Detail of data collection 1.

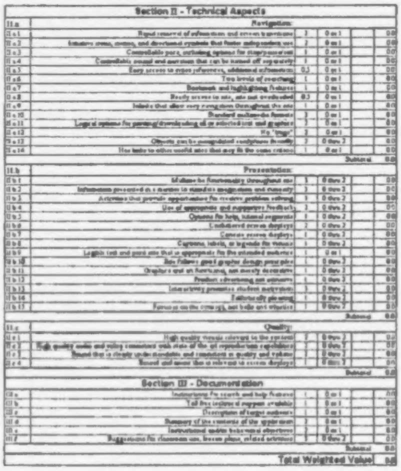


Figure 4. Detail of data collection 2.

Conclusion

I am planning on including both the template file and the developed database of all reviewed websites (94+) with this submission. The inclusion of the database will allow others to have access to a peer review of excellent materials that support not only the action on objects model, but also the NCTM emphasis upon student-centered learning and problem solving. It is my hope that SITE members will avail themselves of the opportunity to contribute to this developing database using the provided template.

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Using Technology Tools to Revitalize Mathematics Teaching: Perspectives from the United States and Namibia

Thea K. Dunn
College of Education
University of Wisconsin – River Falls
thea.k.dunn@uwrf.edu

Abstract: This study reports on a research project whose goal was to provide secondary mathematics teachers in the United States and Namibia with opportunities to utilize technology tools to teach mathematics for understanding. Qualitative and quantitative methods were utilized to examine the responses of the teachers to the introduction of technology tools in the mathematics classroom and the ways in which the teachers utilized the technology tools in their teaching. The teachers were provided with extended opportunities to teach mathematics in an environment supported by diverse technology tools, including dynamic geometry software, graphing calculators, virtual manipulatives, and general-purpose tools such as word processing, paint programs, and spreadsheets. Throughout the study, the researcher provided a mentoring component by offering technology support, instructional ideas, classroom activity samples, and suggestions to enhance instructional ideas developed and implemented by the teachers. Examples of instructional practices illustrate that technology tools encouraged the teachers to pursue more conceptually focused teaching strategies. The analysis suggests that the technology tools facilitated the teachers constructing an image of technology -enhanced mathematics teaching and learning.

Introduction

Technology tools have a powerful role to play in education. As Bransford, Brown, and Cocking (1999) note, "What has not yet been fully understood is that computer-based technologies can be powerful pedagogical tools...extensions of human capabilities and contexts for social interactions supporting learning" (p. 218). The research reported in this paper is part of a project to revitalize mathematics teaching and learning by providing teachers with extended opportunities to do and experience mathematics in an environment supported by technology tools. An overarching goal for the project examined in this study was to promote innovative practices in the use of technology tools to enhance secondary mathematics teaching and learning. A secondary goal was to promote the use of technology tools to facilitate the teachers' own understandings of mathematics while enhancing their ability to utilize the technologies to teach mathematics in the spirit of educational reforms of both nations. The part of the project relevant to this paper examines the responses secondary mathematics teachers in the United States and Namibia to the introduction of technology tools in the mathematics classroom. It explores the ways in which the teachers utilized the technology tools in their teaching. These tools included dynamic geometry software, graphing calculators, virtual manipulatives, and general-purpose software such as word processing, paint programs, and spreadsheets. The teachers were provided with extended opportunities to experience mathematics as problem solving, communication, reasoning, and building connections (President's Committee of Advisors on Science and Technology, 1997) and to teach mathematics in an environment supported by diverse technology tools.

Theoretical Framework

While the existent literature does not directly address the issues raised by this study, several works provided a lens through which the data in this study were viewed. Research on the appropriate use of technology reveals that students can enhance their mathematical knowledge and conceptual understandings with technology tools (Groves, 1994; Dunham and Dick, 1994). Because they enable students to visualize and experience mathematics, engage in real-world problem solving, and generate representations of their own learning, technology tools are important resources for teaching and learning mathematics (International Society for Technology in Education, 2000). According to the National Council of Teachers of Mathematics' *Technology Principle*: "Mathematics Instructional programs should use technology to help all students understand mathematics and should prepare them to use mathematics in an increasingly technological world." (NCTM, 2000, p. 40). This suggests that teachers should be provided with adequate preparation and support to implement technology tools in their classrooms. Teachers should be provided with ongoing mentoring and should have time and support to familiarize themselves with software and content to incorporate technology into their lesson plans (President's Committee of Advisors on Science and Technology, 1997).

When Namibia became an independent nation in 1990 it mandated reforms based upon the goals of access, equity, quality, and democracy (MEC, 1993). The reformed educational system rejects authoritarian, teacher-centered instruction, emphasizes student-centered learning, and takes into account students' prior experiences. The redesigned school curriculum is structured upon a constructivist view of knowledge, learning competencies in content areas, and developing a reflective attitude and creative, analytical and critical thinking (NIED, 1998). In the United States, implementation of reforms regarding mathematics curriculum and instructional practice efforts requires that teachers and students engage in problem solving, reasoning, communicating, and making mathematical connections (NCTM, 2000). The technology-rich environment for teaching and learning mathematics in this project supports the implementation of these standards which assert, "Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning" (NCTM, 2000, p. 24). The research study described in this paper sought to combine the findings of these earlier works by providing mathematics teachers with extended opportunities to experience and do mathematics in environments supported by diverse technologies (Dreyfus and Eisenberg, 1996). The essence of the pedagogical theme underlying this study is to empower teachers through the use of technology tools in mathematics explorations, open-ended problem solving, developing understandings, and communicating about mathematics (Bransford, et al, 1996; Schoenfeld, 1982, 1989, 1992; Silver, 1987).

Methods

Participants and Context

The participants for this study were four secondary mathematics teachers in the United States and six secondary mathematics teachers in Namibia who voluntarily enrolled in one of two professional development workshops taught by the researcher. A fundamental goal of both workshops was to assist teachers in becoming familiar with technology tools available for teaching and learning secondary school mathematics. The teachers met in the workshops for one week, then returned to their respective schools. During the workshops, the researcher modeled the ways in which technology tools can improve teaching and learning (Knapp and Glen, 1996). The teachers engaged in activities that included the integration of technology tools with, or application to content areas in the secondary mathematics curriculum: geometry, including constructions; algebra, including graphs of relations; patterns and functions; estimation and computation; and, data display. The participants spent time engaging in mathematical investigations utilizing Geometer's Sketchpad, TI-82 calculators, and Excel Spreadsheets and in discussions of those explorations. The activities examined in this paper focused on exploring the capabilities as well as the limitations of the technology tools. The teachers were required to explain and justify their results. Included in the spreadsheet explorations was creating a spreadsheet to find a solution to a system of two linear equations. Another activity involved designing a spreadsheet to show the calculations that occur in computing a square root using the divide-and-average method. One investigation with the dynamic geometry software involved constructing square ABCD, with point E as the midpoint of AD. After constructing segment BE, the teachers were to construct point F on segment BE such the CF would be perpendicular to segment BE. The teachers were to determine how the area of quadrilateral CDEF compared to the area of square ABCD and explain their reasoning. Another exploration required constructing a trapezoid with three sides of 6 cm and then determining what length the fourth side would have to be in order to maximize the area of the trapezoid.

Data Collection

In order to enhance the validity of the findings, multiple data sources were utilized during the research process (Lincoln and Guba, 1985). Data were triangulated via multiple sources of evidence including informants, events, and documents. The methodological underpinning of this study is derived largely from orientations to research that draw attention to the importance of detailed qualitative fieldwork and the observation and analysis of teachers in context. Several interrelated research strategies facilitated the analysis of the teachers' experiences. These included: (1) participant observations, audio and videotaping, and field notes of the professional development workshops and the mathematics classrooms; (2) structured and semi-structured, open-ended interviews with each of the teachers; and, (3) collection of teaching artifacts, including the teachers' technology-based problems, activities, and visual representations. Each participant completed questionnaires designed to probe their mathematics content knowledge and their knowledge of mathematics-specific pedagogy. The questionnaires were completed at the beginning of the workshops, at the conclusion of the workshops, and after returning to their classrooms to teach with technology. In addition to the questions pertaining to pedagogy and content knowledge, the teachers were asked to respond to the following questions, in writing and during their interviews, at the onset and the conclusion of the study: (1) how do technology tools influence decisions about what mathematics should or should not be taught? (2) how do technology tools impact teaching? (3) how do technology tools affect students learning? and, (4) how do classrooms that employ technology tools differ from the classrooms in which you may have learned mathematics?

Data Analysis

In order to gain insights into the ways in which the teachers interpreted and implemented technology tools, the developmental research cycle was utilized to organize, analyze, classify, and consolidate the data (Spradley, 1980). Major themes were developed using taxonomic and thematic analytic strategies (Spradley, 1979). Findings were shared, discussed, and compared by the researcher and the teachers. In order to provide a measure of external validity (Goetz and LeCompte, 1994), the researcher reviewed transcripts and analyses with the participants and allowed them to react to analyses and clarify and elaborate on their responses. This process also enabled the teachers to reflect upon what transpired in their classes when they used technology tools for teaching and learning mathematics.

Findings

This study sought to examine the responses of the teachers to the introduction of technology tools in the mathematics classroom and the ways in which the teachers utilized the technology tools in their teaching. Several themes emerged from the analysis of the data. Four will be summarized here: (1) modeling; (2) problem solving; (3) student-centered learning; (4) collaboration; and (5) education reform.

The researcher utilized technology tools to model for the teachers the ways in which the tools could be utilized to enhance mathematics teaching and learning (Barron and Goldman, 1994) in their own classrooms. Conceptual knowledge and procedural knowledge were emphasized together and technology tools were used to reinforce their mutual development. The data from this study support the notion that effective modeling of the ways in which technology tools can enhance teaching and learning should be an integral component of teacher education programs (Knapp and Glenn, 1996). During the workshops, all of the teachers mastered the use of the technology tools and explored the potential of the tools for doing mathematics. As the teachers engaged in teaching with the tools, they began to design innovative and effective ways in which to integrate the tools into their mathematics teaching. At the conclusion of the study, Z, a teacher from the United States wrote on her final questionnaire, "I understand what you were doing. When you taught us the technology, you showed us the way to teach."

One of the most widely noted insights by the teachers was the recognition of problem solving as a method of teaching and learning mathematics. Across both sites, the majority of teachers utilized technology tools to create visual representations and began to introduce mathematical concepts within the context of problems. All of the teachers used the technology tools to design pedagogical presentations of mathematical concepts. However, several noted that this process was more difficult than they had anticipated. At the conclusion of the study, Ms. H, a Namibian teacher noted, "One important thing I have learned is that the technology was fairly easy to learn. Teaching with it will take more time. It requires many changes for me."

The teachers developed their knowledge of how to use the tools to enhance their own as well as students' mathematical learning. When they returned to their respective classrooms, the teachers engaged their students in technology-enhanced mathematical investigations in which the students were active participants. The technology did indeed influence what and how mathematics was taught and learned (NCTM, 2000). Observations revealed that the teachers moved toward a student-centered approach as they engaged their students in technology-based mathematical explorations. For example, after interacting with and observing their students, several teachers restructured the planned activities to accommodate students' interests and experiences. This suggests that working with the technology tools challenged the teachers' pedagogical thinking. During a final interview, a teacher from the United States, Mr. K, stated, "I took an idea from the workshop but when I saw that it was going nowhere with the kids, I had to make some adjustments to make it work for them and keep them involved."

Mentoring and collaboration facilitated the ability of the teachers to create visual representations to model and explore mathematical concepts. The high ratio of teachers to technology made it necessary for the participants to work cooperatively in groups of three or four as they engaged in open-ended problem solving tasks. It appears that this collaboration, because it encouraged discussions about both the technology and the mathematical concepts, may have facilitated the teachers' construction of mathematical understandings as they developed proficiency with the technological tools. The data from this study suggest that the introduction of technology tools transformed teaching and learning in fundamental ways, including facilitating communication about mathematical ideas. At the conclusion of the workshop, a Namibian teacher, Mr. K., said, "I never imagined learning maths in this way – talking about problems, working together as one."

Significant differences between the teachers in the United States and the teachers in Namibia did not emerge. The findings from this study suggest that utilizing the technology tools enhanced the teachers' ability to teach mathematics in the spirit of educational reforms of their respective nations. With regard to the teachers in Namibia, an unexpected observation was that staff room discussions about the technology tools often cited *Toward Education for All* (MEC 1993) and its implications for teaching mathematics. One Namibian teacher, Mr. T, stated, "As I have done this kind of teaching, the reforms are now understandable." It appears that participating in the process of teaching and learning mathematics with technology tools enabled the teachers to recognize connections between this seminal policy statement of the independent Namibian government and the way in which the technology tools changed how they taught mathematics. In particular, the discussions centered on a critical element contained within this document, that "teaching methods allow for the active involvement and participation of learners in the learning process" (MEC, 1993, p. 60).

Conclusions

At the core of the project examined in this study is the development of mathematical power–understanding, using, and appreciating mathematics. The results of this study point to the conclusion that technology tools enabled the modeling and exploration of collaborative instructional strategies, diverse and creative problem-solving, and investigations of mathematics content areas. This study generated a large body of data pertaining to the teachers' responses to and uses of technology tools in the classroom. These data may be presented to teachers as a basis for reconsidering their own uses of technology tools in the mathematics classroom. The present study revealed that mentoring and collaboration within a mutually supportive environment facilitated the teachers' use of technology tools in mathematics instruction and enhanced their pedagogical practices. This study suggests areas for continued research that will extend our understanding of how teachers construct an image of technology-enhanced mathematics teaching and learning, including examining what conceptualizations of mathematics teaching and learning are useful to teachers as they integrate technology tools into their teaching. The next critical step will be to examine the impact of technology tools on student learning.

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Using Animations in the Teaching of Calculus Concepts

Jose H. Giraldo, Texas A&M University-Corpus Christi, US

SUMMARY

During the last decade a lot of emphasis has been placed on the understanding of calculus concepts. To achieve this purpose the use of technology has been introduced as part of the regular instruction. The visualization of mathematical concepts plays an important role in developing intuition about them and insight in their understanding. With the idea in mind that the visualization helps in understanding of some mathematical concepts, I am implementing animations to teach certain key concepts in the Calculus course with the use of *Mathematica*, as a Computer Algebra System. In this paper I will share my experience in the implementation of these concepts, the reaction from the students, and some qualitative and quantitative results on the learning of those concepts and use of Mathematica as a software package.

BACKGROUND

Through my teaching experience in Mathematics one of the problems I have faced and that has intrigued me throughout the years is the lack of students' insight into mathematical concepts, which leads to confusion and rote memorization of concepts without meaning, with the obvious consequences. Research shows that the proper use of technology, new pedagogical approaches, and a good learning environment are factors, which will favor the learning experience. Even though I have used a variety of techniques to enhance the learning of Calculus such as graphing calculators, projects, group work, computer laboratories, and web support, I noticed that the use of animations brings more attention from the students.

As part of the web material I use to enhance the learning I decided to implement the use of animations for certain concepts to which I will refer later. The main drawback was that in order to accomplish this I had to spend a lot of time learning software itself in order to create the animations. A major disadvantage to this approach was that the students could see the results but without any option to manipulate the information, or explore the concept deeper. However, a year ago as part a project I was involved in, I ran into one the Computer Algebra Systems most broadly used in the teaching of Mathematics, *Mathematica*. With the use of *Mathematica* I have been able to create animations that can be modified as needed to explore the concepts. It is likely that I could have done the same things with another software, but in this case I got the motivation to work with Mathematica.

A Computer Algebra System (CAS) is a software package with which one can perform mathematical manipulations, and computations. Their use is becoming more popular in education as well as in private industry. The type of software used by a particular institution depends greatly on the needs.

THE PROJECT

The Calculus I class is one of the two classes offered by the Mathematics program as part of the Core Curriculum at Texas A&M University- Corpus Christi. As a Core course the class emphasizes on verbal, written, critical thinking, and mathematical skills among others. Students from a variety of majors and with different backgrounds take this class, even though the majority of them are from the College of Science and Technology. The class meets three times a week. Two of the meetings are for the regular lecture, one hour and fifteen minutes each, and the other meeting is for the laboratory component, two-hour block. During the laboratory meeting, the student works on projects aimed to reinforce the concepts learned in class or to explore concepts to be covered soon in class. Each lab has a capacity for thirty students where each student has access to a computer.

In this project I am teaching two classes, one uses *Mathematica* during the lab and the other one uses *Derive* in the lab. With *Mathematica* one can create notebooks (pages), in which one can type regular documents (wordprocessing), as well as mathematical expression. The mathematical capability of this software includes among many of them: solving equations, plotting graphs, create and see animations. The class that uses *Mathematica* in the lab component also has the opportunity to see the software during the class to demonstrate some of the concepts. The other class sees some of the demonstrations but mostly concentrated on the animations, and some times fixed graphs needed for the concepts.

The *Mathematica* notebooks can be made available on the web for demonstration purposes using the Mathematica Reader. As I said they are available only as demos and cannot changed. However, students who have the software installed in their computers can download them to their machines and manipulate them as desired.

These are some of the concepts covered in the notebooks:

1. Transformation of functions. In this case a familiar function is taken and a parameter is changed in the animation. The student can see the effect on the graph when the parameter changes.
2. Intuition about the existence of the derivative of a function at a point. A function is zoomed in at a point. The linear or not linear behavior of the graph locally will indicate the existence or not existence of the derivative.
3. The meaning of the tangent line at a point and its relationship to the derivative of the function at the point. Animations showing the secant lines to a curve from a fixed point are shown. The slopes of those lines are displayed during the animation, to develop the intuition of the concept of the derivative as a limiting process.
4. The graph of a function and its derivative. One of the focal points of calculus I is to interpret the meaning of the first and second derivatives in terms of the original function Through this sequence of simultaneous animations, the original functions, its first, and second derivatives the student can visualize in a more vivid manner those relationships.

Warrick's Secrets: Teaching Mathematics Through an Internet-Based 3D Massively Multi-Player Role Playing Game

Dr. Tracy Goodson-Espy
Department of Education
The University of Alabama in Huntsville
United States
tespy@pobox.com

Samuel L. Espy
Physitron, Inc.
Huntsville, AL
United States
samespy@pobox.com

Dr. Victor Cifarelli
Department of Mathematics
University of North Carolina at Charlotte
United States
vvcifare@email.uncc.edu

Abstract: The project leverages students' fascination with 3D digital entertainment and medieval fantasy stories to teach mathematics to middle school students by situating the mathematics in an appealing virtual environment--an Internet-based Massively Multi-Player Role-Playing Online Game (MMPORPG) called *Warrick's Secrets*. The development team consists of individuals from the IT industry and researchers from three universities. *Warrick's Secrets* is the result of a Phase I Small Business Innovation Research grant (SBIR) completed for the US Department of Education in April 2001. Second stage development is on-going following the September 2001 award of a Phase II SBIR by the U.S. Department of Education. An MMPORPG is used as the vehicle to deliver National Council of Teachers of Mathematics *Standards*-based educational content. The system includes advanced 3D computer rendering capabilities and high quality 3D artwork since both have proven crucial to maintaining players' attention in the gaming community. The results of the pilot study are reported along with the progress of the Phase II program.

Background & Theoretical Framework

What are Massively Multi-Player Role Playing Games?

Warrick's Secrets is modeled on currently popular MMPORPG's such as, Ultima Online (UO). Everquest, and Microsoft's Asheron's Call . Currently, more than 150,000 customers play Ultima Online-including players from 114 countries. (Walton, 2000). Sony's EverQuest and Asheron's Call each have a substantial customer base as well. A MMPORPG is a game with a thousand or more players gaming concurrently in real time. Role-playing indicates that a human player controls an in-game character's speech and actions. The virtual world in the most successful games is like the historical middle ages, including some degree of fantastic creatures (e.g., dragons) and magic. Due to limited resources and time, the Phase I prototype of *Warrick's Secrets* only supports single-player activity. With future funding, we plan to add multiplayer capabilities.

At first glance, some people mistakenly think the educational tool described and the total system planned differs little from existing products which attempt to make learning into game, e.g. Math Blaster, etc. Most existing products are far more successful with younger students. The approach of simply trying to transform learning into a game is less successful with middle school and high school students. Our approach is to tightly integrate the educational content with a MMPORPG. This seemingly subtle difference (integrating educational content with a particular game genre versus attempting to make learning into a game) has an enormous impact on the way students react to the product. There are numerous other differences in our approach that significantly increases the student acceptance rate, potential learning success rate, and age range for which the teaching tool can successfully be used. Physitron's educational tool is the only one based on a MMPORPG. Additionally, it is one of the few tools to use standards-based mathematical content (NCTM, 2000) and provide teachers a mapping of each mathematical challenge to the corresponding topic/skill within the standard. Other distinctive advantages of Physitron's educational tool are listed below.

- Educational content imbedded into realistic situational context
- Inherent promotion of cooperative learning
- Ability for students to interact with remote students
- Vehicle for covert and overt learning
- Advanced motivation and reward system

Related Research

Areas of mathematics education research for this project are situated perspectives on learning and constructivist views of representation. Mathematics viewed as socially constructed knowledge has strongly influenced other learning theories. Many researchers (Kieren, 2000; Steffe & Thompson, 2000; Sfard, 1998; and Cobb & Yackel, 1996) describe the theoretical underpinnings of their work in terms of "social constructivism." The learning theory that grounds many of these researchers, including those in the present project, may be traced to von Glasersfeld's (1991) radical constructivism, and Piaget's (1970) genetic epistemology. Lave and Wenger (1991) describe situated learning as developing as a function of the activity, context, and culture in which such learning occurs. One of the primary benefits of integrating educational content with a virtual environment and storyline is that educational content is imbedded into a realistic situational context. These ideas are important here because we consider how such theories apply to the development of educational interactive multimedia. An example of such multimedia research is the work of Herrington and Oliver (1997).

Mathematical representation is considered from a constructivist perspective. Representation describes the form in which a problem is encountered- such as graphical, numerical, verbal, or symbolic representations. It also describes the learner's mental construct of the problem. Another advantage of the virtual environment for problem solving is that students have many opportunities to attempt solutions of mathematical tasks. Furthermore, the virtual environment affords a natural mechanism for providing hints and alternative teaching representations based on a student's previous success with a concept or skill. This may increase the number and quality of the mental representations that the students apply to the problems. The project relied on the research of Cifarelli (1988) and Goodson-Espy (1994, 1998) to use the notion of reflective abstraction to explain how, as students work through multiple attempts to solve a problem, they may develop progressively more abstract mathematical conceptions. It has been observed that if students cope with recurrent mathematical themes, they are more likely to develop higher levels of reflective abstraction, and thus attain more powerful mathematical concepts.

Example Problem Included in the Phase I Prototype

The Phase I prototype included on complete problem pathway. This began with a meeting between the mentor magical character, Adel, and the student character, Palus. The first challenges required him/her to solve a series of problems involving percent. If the student was not successful, he or she was provided with a series of hints and provided with the opportunity to try again. The next series of challenges required Palus to interact with a series of talking flasks in the laboratory. The flasks gradually helped Palus learn to read the measurements on a flask and, in a progressive manner, helped him/her learn how to solve a mixture problem such as the following:

Flask #4 asks Palus: "I have 75 milliliters of liquid, which is hotfish soup diluted with the spittle of glowworms. If there is a 30% concentration of glowworm spittle, then how many milliliters of glowworm spittle do we have?"

The prototype including this series of challenges was piloted tested with middle school students, as described below.

Pilot Study Methods

Subjects

The subjects included seven students from a middle school in the southern US. The subjects included two sixth graders, two seventh graders, two eighth graders, and one ninth grader. The subjects included one African-American, six Caucasians, four males, and three females.

Data Sources and Analysis Method

The prototype testing took place at school on April 6, 2001. The individual sessions each lasted between 45-60 minutes. Students attempted all the problem scenarios and completed a questionnaire and participated in a concluding interview. Students were given a pen, paper, and a calculator. The problem set included two problem paths–an initial problem path dealing with percent and a second developing a series of questions about mixture problems. The data sources for the pilot study include: (1) videotapes and transcripts of the prototype testing sessions, (2) student written artifacts, (3) completed questionnaires, (4) observational field notes, and (5) researcher notes from the post-game interviews. Analysis of these data resulted in seven case studies.

Summary of Results

The results of the game prototype testing include three parts: (1) a summary of student reactions, (2) the questionnaire results, and (3) seven case studies. Only excerpts of the results will be discussed below.

- All subjects expressed increased interest in working on mathematics problems that were situated in a computer gaming environment.
- All subjects reported some level of self-confidence in solving mathematics problems but expressed less self-confidence in terms of solving word problems in a classic classroom or textbook setting.
- One of the students specifically stated that he liked the graphics quality of the characters and that the quality was much higher than those of characters in computer game he had at home.
- Several of the students indicated that they enjoyed being an active character in the game and that this improved their ability to interact with the mathematics. Students wanted to control the character's gender, skin color, clothing, ethnicity, character name, and skills.
- Numerous students indirectly noted the fact that the mathematical content was imbedded into a realistic situational context increased their ability to understand and thus solve the problems, particularly the mixture problems. All students indicated that they clearly understood what the problems were asking them to do. Students indicated that it was easier to solve the problems because the in-game flasks were displayed with measurement calibrations. Another student made a similar comment about the collection bins used to represent the percentage problems. The students liked the visual representations of the problems. All of the students attempted all of the problem scenarios. Two of the subjects were able to solve all of the problems on the first try. Three of the subjects were able to solve all but one of the problems on the first attempt.
- All of the subjects were able to attain the levels of reflective abstraction: Recognition and Representation in their problem-solving activities. Three of the subjects were able to attain the level of Structural Abstraction. Three of the students were able to complete the second problem pathway by building on their solution strategies for the previous problems.

Conclusions and Future Directions

Student Enthusiasm for this Genre

The favorite adjective used by the students to describe the game was, 'Cool!" The students explained that the game made learning math easier for them because it placed the mathematics into a meaningful context for them. The students indicated that they were motivated to solve problems because they wanted to find out what would happen next in the game or because they wanted to gain access to the next magical tool that was described in the story.

Character Creation and Communication

The students made numerous positive comments about the faces, clothes, and details such as being able to see the characters breathe. The students were intrigued by the ability to assume the role of a character in the game. They were greatly attracted to the capacity to arbitrarily maneuver their character in the virtual world. Students wanted to be able to choose gender, race, clothing, facial appearance, and other attributes of their character, including the character's name. This is a standard option in most MMPORPG's.

Interactivity In The Game

The students were universally interested in gaining character mobility in the virtual world. They were fascinated by character head motion, lateral motion, climbing stairs, moving underwater, etc. Most of the students wanted to wander about in the game world before beginning the problem sequence. This activity allowed us to gain valuable data about the ease of character controls. It also reinforced our notion that interactivity with objects in the game environment and exploration of new aspects of the virtual environment are crucial factors in gaining and maintaining student interest and represent mechanisms for in-game rewards.

Problem Pathways

The students indicated that they found the collection bin representation for the initial percent problems to be very helpful in solving these problems. The students were very emphatic that the visual representations were extremely useful to them. The students' interactions with the flasks in the laboratory appear to have influenced their problem-solving success with the mixture-related problems. Based on the researchers' experiences in teaching very similar problems to college-aged students in traditional college algebra classes, the success rates of the middle school students on these problems were much higher. In the videotapes and post-session interviews, the students indicated that the visual nature of the representations were also useful in reducing their anxieties about this type of question. The students positively evaluated the hints that were provided for each task. Because of the visual representations of the problems and the scaffolded hints that presented themselves upon incorrect student responses, students were more willing to attempt what they considered to be difficult problems. The students problem solving activities and successes indicate that carefully crafted problem pathways can be a successful teaching tool in assisting students with making necessary conceptual connections via reflective abstraction.

Progress of the Phase II Program

We seek to explore the on-screen 3D conceptual vehicles that can be used to pose interesting mathematical problems in this interactive computer environment. In Phase II, we plan to answer a number of research questions, including the following:

- Does use of this type of an educational tool raise the performance level of students in a regular mathematics classroom?
- Can the notion of reflective abstraction be used to describe mathematical concept building when educational content is integrated with a MMPORPG setting?
- Will our collection of situation-based and "scaffolded" mathematics pathways encourage students to apply problem-solving skills that encourage the development of higher order thinking?
- If allowed to create their own character, what kind of character will they choose in terms of gender, race, ethnicity, facial appearance, and clothing?
- Given that research has found computer gaming to be more popular with males (except for role-playing games, which are essentially as popular with females), will this educational resource be popular and effective with females?
- Do students display an increased motivation to try to solve problems?
- Can standards-based mathematical content be integrated into an MMPORPG in a manner that allows students to discover, learn, and even teach other students without forcing the student to step out of the role of their online character?
- Can the mathematical content be integrated into the MMPORPG innocuously enough so that it does not destroy the enjoyment factor we are trying to leverage?

The number of research questions is obviously large, but warranted, as this area has very little formal investigation.

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Are Teachers "TechReady?"
Evaluating the Technology Competencies of Preservice Teachers

Delwyn L. Harnisch, C&I, University of Nebraska, Lincoln, United States, harnisch@unl.edu

Michael L. Connell, University of Houston, United States, MKahnl@aol.com

Ronald J. Shope, Assessment, Grace University, Omaha, United States, rshope@mail.graceu.edu

Abstract: Technology must be essential part of teacher preparation. Technology training also needs to be evaluated against ISTE standards. This paper is a report on the development and initial findings of an online self-reporting instrument that can be used to evaluate the technology competencies of preservice teachers. Data from the field-test of the instrument reveals that while teachers understand how to use the hardware and software, they need more help in knowing how to integrate technology into their instructional strategy.

Introduction

Today's world has grown smaller because of technology. Satellite trucks allow us to view images from anywhere in the world. Cellular telephones allow instantaneous communication. Palm top computers give us powerful tools to plan, store, and present data. Satellites, with power imaging technology provide us with high quality images from hundreds of miles in space.

New technology has created two broad changes in our world today. First, there is a changing economy. New technology is making workers more productive. In addition, financial trade, communications, and assets are being acquired globally. An example is "Sony" who has major holdings in the entertainment business in the U.S.

Second, there is a changing workplace. Globally, we have entered into what some have termed, "The information age." There are many sources of information that are available electronically that can be accessed at the click of a mouse. Therefore, knowledge is quickly becoming a major commodity. I believe that one skill that an educated person must have is the skill necessary to search the vast number of information sources that are available, which address the problems that need to be solved (Report from National Commission on Mathematics and Science Teaching for 21st Century 2000). The skills needed for successful living have altered radically, primarily as a result of the technological revolution and its impact on most jobs and professions. That is to say that technology is changing the way we work and live.

These global changes have two implications for educators. First, we must train our children to use the technology and information tools that are available to them so that they can work effectively in our global society. Schools of education must provide school systems with prospective teachers who can help student's function in our new society, and that means that the teachers themselves must gain new skills and new knowledge. Second, we must use technology to create a more effective teaching learning system to deliver our lessons. If technology is to be used effectively in teaching, it must be used to create a student-centered learning environment. Teachers entering today's classrooms must not only be competent in teaching skills, but they must also be able to integrate technology in their teaching. Technology can be used to help supply five key conditions for learning: (1) real-world contexts for learning; (2) connections to outside experts; (3) visualization and analysis tools; (4) scaffolds for problem solving; and (5) opportunities for feedback, reflection and revision. In short, the focus of the technology evaluation should be on learning and the learners and not the technology. The long-term goal is to build schools as learner-centered communities by expanding the notion of collaboration, which will transform current educational systems. Technology has an obvious role in both of these areas, but it is a role that must evolve from the foundation of research-validated principles and practices.

Because of these global changes, technology has become an integral part of instruction in P-12 schools (NCATE, 1997). New demands are being placed on teachers to use technology in their instruction, which has been brought on by the rapid influx of hardware and software (Matthew & Kimball-Lopez, 2000). Both the National Education Association (NEA) and the National Council for Accreditation of Teacher Education (NCATE) consider computer technology skills critical for teachers (Gladhart, Carroll, & Ellsworth, 2000). Rosenthal (1999) notes, "Bringing faculty members and America's teaching force up to speed [technologically] is a massive task. . . a problem that will be greatly exacerbated if the teachers entering the profession have not been adequately prepared to use information technologies" (p. 22).

Preservice teachers, therefore, must be able to demonstrate technology competencies that are based on the National Education Technology Standards (NETS) set by International Society for Technology in Education (ISTE). The ISTE standards are an appropriate framework for evaluating technology competencies because they are widely recognized and are comprehensive (Ropp & Brown, 2000). The NETS Standards are divided into six categories which are Technology Operations and Concepts, Planning and Designing Learning Environments and Experiences, Teaching, Learning, and Curriculum Assessment and Evaluation, Productivity and Professional Practice, Social, Ethical, Legal, and Human Issues. In each of these categories are suggested skills that should be mastered before an individual enters the Teacher Education Program, following the completion on an Educational Technology course, following the completion of methods courses and student teaching, and following the completion of the first year of teaching.

The challenge is to properly assess the technology competencies at each of these areas. McCombs (2001) notes the following four essential questions that should be the focus of assessment: (1) How is technology perceived by individuals learners and teachers relative to its teaching-learning support?; (2) What changes in learning and performance outcomes can be observed with different technology uses and with different learners?; (3) What changes in teaching processes can be observed that enhance learning outcomes?; and (4) What changes in the learning context can be observed that create new partnerships and climates for learning?

McCombs (2001) also identifies five data sources that can answer these questions. These are student and teacher self-assessments of technology practices and strategies; students and teacher attitudes toward technology and its specific uses; multiple student motivation measures; multiple students achievement measures; and observational information on learning outcomes, teaching and learning context. I would like to add a sixth, which is student products. While this is related to student achievements, I would like to emphasize that student projects give teachers and other administrators the opportunity to observe the student's ability to apply knowledge to real-world situations.

The Study

To measure the competencies of preservice teachers, a self-reporting web-based form was developed that consisted of Likert type items that were built around each of the six NETS standards for teachers. The six items on the form were as follows: Basic Computer Operations; Basic Communication Tools; Planning Technology-Rich Learning Activities; Plan Multiple Strategies to Facilitate Critical Thinking about Electronic Information; Use Multiple Technologies to Support Learner-Centered Lessons to Meet Diverse Needs of Students; and Use technology to Facilitate Effective Assessment and Evaluation Strategies.

There are two parts to each of the six items on the form. First, respondents were asked to rate their level of professional knowledge proficiency. The "Levels of Knowledge Proficiency" were represented in the following five areas:

1. Converse about the content in general ways
2. Relate the content to broader non-technical issues
3. Give explanations about critical concepts
4. Apply knowledge to challenging practical problems
5. Give expert advice.

Second, on each of the "Levels of Knowledge Proficiency," respondents were asked to rate the "Extent of Professional Knowledge" they had on a Likert type scale from 1-7 where 1 indicates "Not at all" and 7 indicates "A Great Extent."

The survey was administered during the spring 2001 semester to a convenience sample of 36 teacher education students from several colleges and universities in the Midwest. The results show that for each of the six items, the "Level of Knowledge Proficiency" was greatest in their ability to "converse in general ways about the topic" and least in "giving expert advice." This indicates that preservice teachers in the sample have a general knowledge of classroom technology tools, but are not yet comfortable giving expert advice to someone else in any of the six areas. In addition, the "Extent of Knowledge Proficiency" as measured by the Likert scale is highest in "basic communication tools" and least in "planning multiple strategies to facilitate critical thinking about electronic information." In general, the extent of the knowledge proficiency was greatest regarding technology tools, and least regarding issues of planning and assessment. The data was analyzed for each of our research questions by using SAS.

The Findings

Figure 1 outlines the mean scores in each of the six ISTE Standard areas. The students rated themselves fairly high in all areas in their ability to converse about the content in general ways. In each of the succeeding competency levels, however, the student's ratings of their level of competency went down. This indicates that they had a broad surface knowledge of the content, but the are still lacking in their ability to explain it, apply it, or give expert advice about it.

Another observation is that the students appear to feel fairly competent regarding basic operations and communications tools, but less competent in the areas of planning learning activities, critical thinking strategies, supporting learner-centered activities, and in the area of assessment. What it appears is that while the students are literate in technology, they do not feel competent in using technology in the classroom.

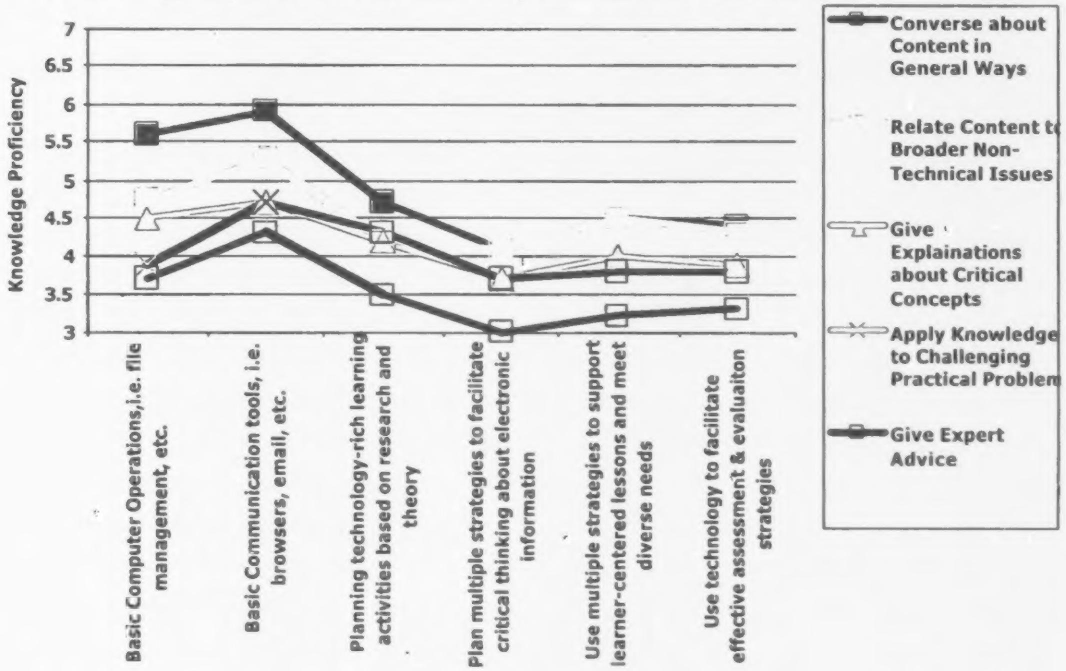

Figure 1: Composite Graph of all ISTE Standard Areas

It might appear, therefore, that the reason for this is that students are not being shown in the methods classes how to use technology as part of an instructional strategy.

The Conclusion

In conclusion, we must begin to rethink the concept of "school" in our technology rich world. We must not think in terms of seat time, and textbooks, and in school libraries. We must add to our thinking learner-centered collaborative activities that give students the tools and the freedom to explore their world and the tools they need to improve their own learning and develop their knowledge base. In addition, we need to better understand the ways in

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which technology-supported education represents a melding of the learner and the discipline as framed by inquiry-based learning.

You know, when Sony built the Walkman, they weren't satisfied with being second best. They began to look for ways that they could daily improve their product. Their hard work gave the consumer access to new technology and features. Sony set the standard for portable sound. Just as Sony didn't quit, we as educators should not quit. We should be asking ourselves this question, "What can I do today that will help the students to learn just a little bit better?" It doesn't have to be a big change, but if we do this each day, we will, like Sony, begin to set new standards for education and better prepare our students to live in the 21st century.

Schools in the 21st century must begin to prepare students for a world rooted in information and technology. Such a world calls for students with the kinds of skills and understandings that enable them to function within and contribute to this emerging world. Students must have opportunities to participate in problem-oriented learning activities that are relevant to their interests and worthy of their investment of time and effort. Improving student learning must depend on more than symbol manipulation, generalized learning, pure mentation, and individual cognition. It must lead to competence acquired through authentic activity presented in an environment that encourages collaboration. Students have the right to expect that the knowledge and technology commonplace in their homes and communities are accessible in their schools. They have the right to a learning environment rich with resources both printed and retrievable from the World Wide Web.

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Using Visualization to Make Connections Between Math and Science in High School Classrooms

Delwyn L. Harnisch, Teachers College, University of Nebraska, Lincoln, United States, harnisch@unl.edu

Jim R. Polzin, Hinsdale District 86 Administration Center, United States, polzin@district86.k12.il.us

John Brunsting, Hinsdale Central High School, United States, jbrunsti@district86.k12.il.us

Susan Camasta, Hinsdale South High School, United States, scamasta@district86.k12.il.us

Heddi Pfister, Hinsdale South High School, United States, hpfister@district86.k12.il.us

Bob Mueller, Hinsdale Central High School, United States, rmueller@district86.k12.il.us

Kris Frees, Hinsdale Central High School, United States, kfrees@district86.k12.il.us

Kathleen Gabric, Hinsdale Central High School, United States, kgabric@district86.k12.il.us

Ronald J. Shope, Assessment and Institutional Research, Grace University, Omaha, United States
rshope@mail.graceu.edu

Abstract: Today's students are receiving "superficial" knowledge of math and science concepts. According to a report from the National Commission on Mathematics and Science Teaching for the 21st century, in science, students are not mastering the "big concepts," while in mathematics, they are given little information about "how" and "why." To address these concerns, connections need to be made between mathematics and science. Visualization combined with Problem Based Learning (PBL) is one teaching strategy that can be used to address these issues. This paper reviews the findings of a study conducted at two mid-western high schools that used visualization in math/science classrooms. The results revealed that students made meaningful connections between math and science data, connections between math and science language, and connections between math, science and daily life experience.

According to the report from The National Commission on Mathematics and Science Teaching for the 21st Century (2000), entitled *Before It's Too late*, U.S. students are receiving only a superficial knowledge in today's classrooms. The report states, "In an age now driven by the relentless necessity of scientific and technological advance, the preparation our students receive in mathematics and science is, in a word, unacceptable. Despite our good intentions, their learning is too often superficial. Students' grasp of science as a process of discovery, and of mathematics as the language of scientific reasoning is often formulaic, fragile, or absent altogether" (p. 10). The report notes that the problem with current science education is that students are not required to master "big concepts that make science so powerful and fascinating" (The National Commission on Mathematics and Science Teaching for the 21st Century 2000). In mathematics, the content is limited to questions that answer "What" and get little content that addresses "How" and "Why should I care." These two issues could be addressed by making connections in the classroom between science and mathematics. These two subjects and the daily world are linked. Scientists generate data and use mathematics as a tool for data analysis. Yet, in our education system, students see these two subjects as separate and distinct because we have chosen to teach them separately giving students a dichotomous view of science and mathematics

One teaching strategy that could be used to make connections between science and mathematics is visualization. Combined with Problem-Based Learning, visualization uses classroom technology to help the learners create a visual picture of concepts and make connections between mathematics and science through discovery learning experiences.

According to the 1999 report, *How People Learn* (Bransford, Brown, & Cocking 1999), from the National Research Council, technology can be used to help supply five key conditions for learning. These conditions are central to the success of visualization. They include real-world contexts for learning; connections to outside experts; visualization and analysis tools; scaffolds for problem solving; and opportunities for feedback, reflection and revision.

First, technology can support real world context for learning by using simulations, which can form the basis for Project Based Learning. Project Based Learning uses in class projects that are used to cover course content and fulfill certain course objectives. Students have the opportunity to work on the project as teams and report their results to the entire class. One way to do this is through the use of simulation. Simulation exposes students to real-world problems to which they must find solutions. They are looking for answers that are "situation specific" rather than the "right answer" from a textbook (Teaching and Learning 2001).

Second, technology can connect students with outside experts. Through the Internet, students can have access to experts in practically any field all over the globe. They can send e-mail to them and even "chat" with them online. In one of my own classes, the students became very excited when they were able to have their questions answered during a "chat" session with a well-known expert in education. Students can also download documents that are not available in the library, and they can keep up with the latest research.

Third, technology can provide visualization and analysis tools (Harnisch 2000). Rather than talking about concepts, teachers can use technology to visualize them. For example, schools that do not have microscopes can use advanced imaging technology to look at the parts of a flower rather then relying on textbook photos or drawings. Also, 3-D imaging allows chemistry students to construct a three-dimensional model of an atom and animate it so they can see it from all sides. In mathematics, graphing calculators can visually show students relationships between variables. Concept mapping using "Inspiration" software can help students visualize processes and relationships.

Fourth, technology can provide scaffolds for problem solving (Harnisch and Sato, 1990). In today's rapidly changing world students need to learn much more than the knowledge written in a textbook. They need to be able to examine complex situations and define solvable problems within them. They need to work with multiple sources and media, not just the single textbook. They need to become active learners, and to collaborate and understand the perspectives of others. What we are talking about is the ways in which students today need to learn how to learn; that is, they need to learn how to:

- Ask: find problems
- Investigate: multiple sources/media
- Create: engage actively in learning
- Discuss: collaborate; diverse views
- Reflect: learn how to learn

This shift to an inquiry-based mode of teaching and learning is now widely recognized (Bruce & Davidson 1996; Minstrell & Van Zee 2000; Shavelson & Towne 2002; Wells 2001). The National Science Foundation has asked for "research-validated models (i.e., extended inquiry, problems solving)." The Carnegie Foundation's Boyer Commission on Educating Undergraduates in the Research University (1998) has set its number one priority to make research-based learning the standard. The American Association for the Advancement of Science, in its Project 2061, has as its number one goal to have "science literacy for all high school graduates," by which they mean to develop the broad, critical perspective and habits of mind that develop through scientific inquiry.

Fifth, technology can provide collaboration between students, teachers, and outside experts that help students to solve problems. Through email, discussion boards, and web pages, students have access to educators, and to experts who can help them to think through problems. Also, technology can provide students with problem-solving experiences by developing "Inquiry Units." This is available to both teachers and students through a web site at the University of Illinois at Urbana-Champaign at http://inquiry.uiuc.edu/. The "Inquiry Page" is more than a web site. It's a dynamic virtual community where inquiry-based education can be discussed, resources and experiences shared, and innovative approaches explored in a collaborative environment. One example is "Web Quests" which will help them to develop problem solving skills. Based on John Dewey's philosophy that education begins with the curiosity of the learner, we use a spiral path of inquiry: asking questions, investigating solutions, creating new knowledge as we gather information, discussing our discoveries and experiences, and reflecting on our new-found knowledge. We invite you to visit the inquiry page. There are lessons on life that can be downloaded and adapted for use in your classroom. Also, you can place inquiry units on the page and access them from anywhere in the world. Your students can also develop units as part of a lesson and put them on the page to share with others. By doing this, you will become part of a world-video learning community.

The Study

The Visualization teaching/learning strategy was tested in two mathematics and science classrooms in a suburban high school during the 2000-2001 school year. In each school a math/science cohort of 25 learners was formed and a teaching team of math/science teachers. The learners consisted of Honors students taking Algebra II with Trigonometry /Honors Chemistry at one school, and "G" learners having a combination of Algebra II/Physics at the other school. The learners took math and science together as a group rather than changing classes. In addition, the teachers had the opportunity to observe each other's classes. The Project Based Learning (PBL) Coordinator, who was a teacher that specialized in PBL and was selected for the project, trained each teacher in PBL. In addition, the Associate Superintendent of Schools, and the Assistant Principal of each of the schools was kept informed of the progress of the project. This collaboration helped to form a foundation for a culture of learning in math and science at each school.

During the project, students had access to classroom technology including computers, software, web access, graphing calculators, and science laboratory equipment. The Honors class also had the opportunity to upload projects to a secure website for review.

The data for the project consisted of survey instruments, images of projects, field observations, student and teacher reflections, teacher portfolios, interviews with teachers and school administrators, and student focus group interviews. Some of this data was collected electronically using a secure website.

Findings

The use of visualization and the grouping of students into math/science cohorts and teachers into math/science teaching teams helped students make connections between math and science. Through visualization, which also facilitated collaborative learning, students and teachers built a math/science learning community that was formed through their shared classroom experiences. This is illustrated in Figure 1.

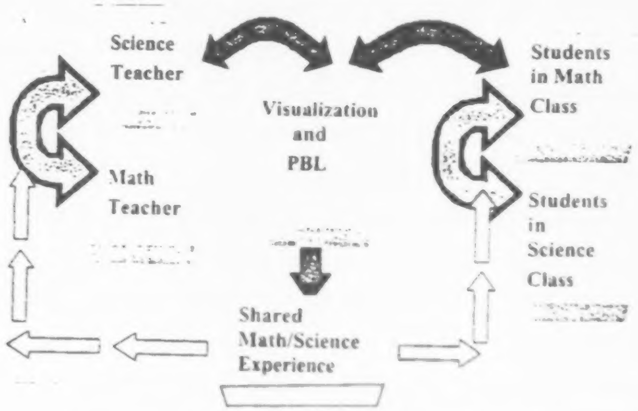

Figure 1: Math/Science Collaborative Learning Community

Visualization helped students and teachers make connections between math and science. There were three types of connections that were made. First, there was a "data" connection, second, there was a "language" connection," and finally, there was a "life" connection.

Data Connection

Students had the opportunity to make connections between math and science by using mathematical formulas and concepts to analyze and draw conclusions from data they had generated in a science class. For

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example, the students in one cohort spent the day in research teams throwing softballs at different angles and measured the angles and distance of each throw. The students then used vector concepts and formulas to determine which was the best angle to throw the ball to achieve the greatest distance. In their reflections, students remarked about the connections they saw between mathematics and science. A student wrote, "We created connections from Algebra 2 to chemistry in different ways. For example, when we were learning about log in Algebra 2, at the same time we were learning to determine the pH of different substances. We used 'log' in the equation."

Language Connection

Second, visualization helped students and teachers begin to form a common math/science language. One of the department heads associated with the project noted, "completely integrating a Math and Science course may not be feasible, but speaking a common language in all Math and Science classes would be very powerful." The advantage of a common language to the student is that now students began to see a common set of terms for a concept rather than two sets, one in math and one in science. Teachers also see this as a big advantage. One math teacher said that a common terminology would help the students make connections between the two disciplines because, although math and science have common concepts, they use different terms to describe them. One of the administrators also added that a common language would also serve to make the curriculum more cohesive.

Life Connection

Finally, the students in the project expressed that the teachers connected concepts in Math and science to daily life. One student remarked, "Well, for instance, sometimes when I had math it tended to be a little abstract and you might have wondered what you would use this for?" As result of this experience, however, students expressed they "experienced" a concept rather than just "reading" about it.

Another example was the "Roller Coaster Project." This project allowed students to see the "science" behind roller coasters. It culminated in a trip to a local amusement park. Students did research on roller coasters and then, during their visit to the park, they divided up into teams and collected data during their rides. They used this data to answer questions about the rides and what they experienced. A student in the project summarized it this way: "A teacher that uses technology teaches differently because they don't necessarily teach in the traditional teaching manner. They seem to bring more of the outside world into the school."

Conclusion

In conclusion, visualization is not an easy task. Technology, and access to technology, is an important component for developing visualization. Both students and teachers see visualization as a common link that helps all students have access to the concepts. The group work in the classroom also facilitates learning because it provides a support group and another means to help students learn. Students, who may just "tune out" during a lecture and may be "left behind" as a result, now have the opportunity to be actively engaged in the learning process through visualization and group work.

Technology is also important for teachers as part of their professional development. Teachers need to learn how to use current software packages in their fields and keep up with developments in their field. Technology is one of the factors that is fueling the changes we're seeing in the world by providing an expanded information base. No longer is information confined to physical libraries. The Internet provides access to libraries and resources worldwide. Students and teachers must learn to how to access and use the information that is available if they are to succeed.

While both teachers and students grew academically and professionally, teachers found that teachers who take on this challenge must be willing to view teaching just a little differently. They must be comfortable with restructuring the curriculum, trying different methods, tolerating just a little more "noise" in their classrooms and working through the frustration when the technology just didn't work. Students also faced the challenges associated with discovery learning that sometimes there might not be a "right" answer to a problem, and that the teacher may not have all the answers. Through visualization, students and teachers can learn together to develop shared knowledge that encourages students to develop a sound understanding of the "big concepts" in math and science and how math and science is related to their lives.

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Visualization and Collaborative Learning in Math/Science Classrooms

Delwyn, L. Harnisch, C&I, University of Nebraska, Lincoln, United States, harnisch@unl.edu

Ronald J. Shope, Assessment and Institutional Research, Grace University, Omaha, United States, rshope@mail.graceu.edu

Abstract: In many of today's math and science classrooms, learning today is highly "teacher directed." As a result, students often miss the "big concepts" and see little connection between math and science. In a study done at two high schools in the Midwest, math/science student cohorts, and math/science teaching teams, developed a collaborative learning environment that uses visualization and Problem-based learning which formed the foundation for collaboration between math and science teachers and students. Student collaboration took the form of student mentoring. Collaboration among teachers led to faculty mentoring, breaking down some of the walls between science and math, and better classroom help for students.

Introduction

A report from the National Commission on Mathematics and Science Teaching for the 21st Century entitled *Before it's Too Late*, underscores the poor performance of U.S. students compared to other nations in math and science. One reason for the decline in scores is the way that math and science are taught. According to the report, there are two major problems with current math and science teaching methods. First, "Seldom are students asked to master the "big" concepts that make science so powerful and fascinating." Second, the methods used to teach mathematics have "remained virtually unchanged in the last half-century."

In many classrooms, math and science learning is highly teacher directed and focuses on definitions, labels, teacher directed problem solving rather than on discovery learning that is student centered. What is needed is a student-centered learning environment. A student-centered learning environment is centered on eight key instructional and motivational factors. First, instruction must me made meaningful and relevant from the individual learner's perspective. When instruction is learner-centered it implies, according to Margaret Riel (2001) that the learner "is actively engaged in the process of knowledge construction." This means that learning is anything but "boring." In a learner-centered environment, the learners take part in setting the goals, which are then guided by the teacher.

Second, instruction must provide appropriate learning challenges and standards. Classrooms in our technology rich world can no longer reduce learning to memory exercises. While there are areas that require extensive memorization, students must be taught to think and apply that knowledge. In addition, standards of student performance must be established so that students will know what is expected of them. Riel (2001) calls this being "Assessment Centered." Teachers must know "what students are learning and what they need to know. This means that the curriculum needs to be matched to the classroom assessments. The assessments should flow out of the curriculum. A major focus should be on criterion referenced, rather than norm-referenced. One problem with norm-referenced testing is the temptation to "teach to the test." When this is done, the test, rather than the curriculum drives the learning process. In addition to tests, teachers need to find other methods of assessment such as student portfolios to determine the quality of student work.

In addition, the teachers must be what Riel (2001) terms "Knowledge Centered." Teachers must have the knowledge base to be able to evaluate the essential skills and knowledge that students need in a particular discipline. Third, instruction must accommodate needs and be supported in critical thinking and learning skills. This is also related to being "Assessment Centered" Critical thinking involves skills and dispositions. Dispositions are attitudes regarding higher-level knowledge. Tishman et al. (1995) has identified four ways to help students develop higher order knowledge. These are to use real world examples; make comparisons across disciplines; encourage interaction by engaging students in problem solving activities or inquiry; finally, give positive feedback to students when they demonstrate the appropriate use of higher order knowledge that is relevant to the subject being studied.

Fourth, instruction should attend to the climate and context in which learning occurs. Recent brain research suggests, "The richness of early learning experiences affects the physical development of the brain and may be a major cause of intellectual development. If these new theories linking learning experiences with brain development come to be accepted, the optimal match between characteristics of the learner and the learning environment, rather than parental genetic code, might be seen as responsible for school success" (Riel 2001). This means teachers must be concerned not only about children learning, but how they learn it. Teachers must crease an environment that targets a broad range of learning styles.

Fifth, instruction should honor individual needs for choice and control. This is another aspect of being "Learner Centered." McCombs (2000) notes that teachers must value the unique perspectives of the learner. For example, the student could be involved in classroom assessment of their work. Students could be asked to help design the rubric used in evaluation and then asked to apply it to their own work to determine the strengths and weaknesses of their work. They could then be given the opportunity to do the work again. Just as businesses are constantly looking for ways to continually improve their product, involving students in the assessment process not only gives them a measure of control over their work, but it helps them to know how to improve their work.

Sixth, instruction should support individual interests and creativity. The "learner-centered" teacher attempts to learn what interests the student have and allow them to work on projects or use classroom resources that target those interests. For example, students who are interested in drama may be able to use this interest as part of a project. Or, students who are interested in and have access to computer technology may be able to use this interest to make computer presentations.

Seventh, instruction should provide positive social interactions and personal relationships. This means that student-centered learning maximizes collaboration between students and between students and teachers.

Based on these eight factors, a student-centered learning environment must maximize collaboration and discovery learning. One instructional strategy that does this is Problem-Based Learning (PBL). Barbara Dutch of the University of Delaware, describes Problem Based Learning this way: "Problem-based learning (PBL) is an instructional method that challenges students to 'learn to learn,' working cooperatively in groups to seek solutions to real world problems. These problems are used to engage students' curiosity and initiate learning the subject matter. PBL prepares students to think critically and analytically, and to find and use appropriate learning resources" (Dutch http://www.udel.edu/pbl/).

The PBL approach requires teachers to become "facilitators" rather than the primary means of delivery for instruction. As facilitators, teachers structure the situation, make technology and data resources available to the students to solve the problem, and offer advice. The approach is visual, hands on, and student centered, rather than teacher driven. For example, one teacher I know created a PBL situation by accident. While preparing for a biology class she set beakers with various liquids in them and set them aside without labeling them. When the students arrived for class, she realized that she had forgotten what was in the beakers. Instead of throwing the liquids out and starting over, she turned her mistake into a learning opportunity for the students. After she explained to the students what had happened, she said that they were to design tests to see if they could figure out what was in each of the beakers. She said that the students took this as a personal challenge and were very engaged in their work! After about two days, they discovered what was in the beakers! Not only did they learn a lot about science, but, they had an opportunity to solve the problem themselves.

PBL can be enhanced by using visualization. Visualization uses technology to help students "visualize" math and science concepts rather than relying on lecture as the primary classroom delivery system. Visualization enhances PBL because it provides tools such as computer software, the Internet, calculators, and laboratory to help students solve problems. When students learn through PBL and Visualization, both students and teacher generate shared experience because the process is interactive and mediated by technology.

Another form of collaboration that could be built is collaboration between teachers and students in math and science. Collaborative learning between these disciplines would enable students and teachers to make conceptual and practical connections between the two disciplines. This would help students to get what the Glenn Report describes as the "Big Picture."

This could be accomplished by forming math science teaching teams and math/science student cohorts. Teaching teams would enable classroom teachers would be able to share ideas and identify the relationships between their two disciplines and then through visualization allow students to see for themselves these relationships.

Students could also be teamed. Rather than taking math and science separately, math/science cohorts could be created. Students would then be able to learn in an environment that favors the development of group cohesion. Cohesive groups would facilitate interaction, which should result in students feeling more free to share information with one another. This process is illustrated in Figure 1.

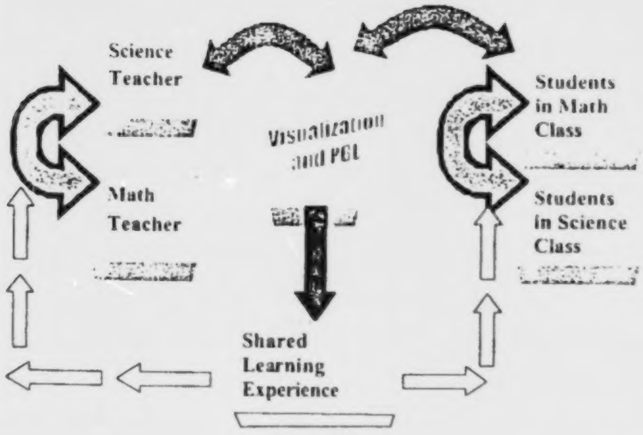

Figure 1: Visualization with Math/Science Teaching Teams

The Study

For the past two years, I've been conducting a research project based on the visualization model using math/science student cohorts and math/science teaching teams. The research was conducted in two high schools to determine the way in which visualization and PBL facilitates collaborative learning in math and science classrooms. The study also explored the problems associated with this approach to learning, the changes in classroom dynamics, and the professional benefits to teachers of this approach.

In each school a science teacher was teamed with a math teacher. One teacher on each team was experienced with at least 10 years of teaching in that field, while the other was a young teacher with less than five years of experience. Each member of the team had teaching credentials in math and science and advanced degrees in their field. In addition to the teams of math science teachers, a teacher was appointed PBL Coordinator for the project. The coordinator helped each of the teachers develop PBL activities for their classrooms.

During the school year, the teachers were given time to visit each other's classrooms and to plan as a team. Periodic visits were made to each school by the primary researcher to observe each class, and hold interviews with the teachers. A website for the project was created to collect survey data, and as a place for students to post projects. Teachers also submitted periodic reflection reports to the web site.

Students at each school were selected to participate in the math/science cohorts. The student cohorts took both math and science classes together for the entire school year Students in the cohorts had a variety of career interests and learning styles. One cohort was composed of Honor Students and the other was "general" learners. At one school the cohort met in different rooms for math and science, while at the other, they met in the same room.

Both quantitative and qualitative data from a variety of sources was gathered for this project. Some of this data was collected and stored at a web-site that was developed for this project. The data includes faculty and school and district administration interviews, student focus groups, surveys, faculty portfolios, faculty journals, faculty and department chair reflections, images of classroom activities and projects, and direct classroom observations.

Findings

There were two major areas of collaboration. There was collaboration between math and science teachers and collaboration between math and science students.

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Collaboration Between Math and Science Teachers

Collaboration between math and science teachers was forged through the team approach to teaching. Both math and science teachers spent time in each other's classrooms. There are three advantages of collaboration between math and science teachers. First, math and science teachers learn about each other's discipline. One of the science teachers described his experience with the project as "enlightening" because he had the opportunity to "see how the other side lives." He observed that while math people may know the answer to a problem, science people may not have a single answer to a problem. Also data in science must be generated and is not supplied like the data in Math problems. This is an important difference between the two disciplines. One solution to this problem proposed by one of the science teachers was to find ways to generate data from science projects that could be used in Math Classes. To maximize the collaborative effort teachers must have the time to work, plan, and reflect on how their two subjects come together and how they can conceptually support each other.

A second advantage of collaboration is that teachers were able to provide better help to students in the classroom. While some were a bit nervous with having two teachers present all the time, nearly all students agreed that having two teachers helped them in the learning process. As one student put it they can "help each other." If there was a question about an area that one teacher couldn't answer, the other teacher was there to answer the question.

A third advantage is that collaboration can begin to break down the walls between the two disciplines by providing a platform for teachers to share their experiences with other faculty members in their department and in the district. By sharing these concepts, a team of teachers who are familiar with visualization and PBL can be built.

Finally, collaboration also facilitates faculty mentoring. In each team, the young teacher reported that they had learned a great deal from the experienced teacher. One of the young math teachers for example said that he had begun to think more "visually." In addition, one of the teams said that by working together they had a better idea of what their students were learning.

Collaboration Between Math and Science Students

Collaboration between math and science students took place during the classroom group activities. Heddi Pfister characterized this collaboration between students as a "support group." Generally, students at both High Schools involved in the project liked being together as a group. Many students said that they felt they could get to know others in their class better because they were together for two periods in a row.

This "student" mentoring was an important part of the experience. The students began to see persons in the class they could call on for help. One student wrote, "Since we had the same kids in both of the classes, it let us know what are the kids' strong points and weak points." In addition, some students felt that a peer in the class could explain a concept better than the teacher. A student remarked, "Sometimes you have the teacher explain it and some kids do not understand what they mean by it. So, they ask something else and they explain it in easier terms."

Conclusion

The results of the collaboration between students and teachers mediated by visualization was the development of maturing minds. For teachers, there was professional growth. Teachers experienced growth in learning new methods, restructuring the curriculum and experimenting with new technology and classroom environments.

Students grew in their level of maturity in their conceptual understanding of math and science. In a reflection about one of the classroom projects, a student wrote, "It required me to think in new ways and to work on my own without a lot of help from a teacher. This made it different from any other project I have ever done. You made you decision based on your information, data observations, and personal knowledge on the subject; which means there is no "wrong" answer as long as you have information to support your idea. Because you did it mostly on your own, it was satisfying and rewarding to see how much progress you were making and how much knowledge you were acquiring on your own."

This is what education is all about. It isn't easy. It will take many teachers and students out of their "comfort levels." But, through collaborative learning, students will be developing skills that will be even more valuable than the knowledge in a particular subject. They will experience the joy and frustrations of how to think, reason, and work together in partnership to make decisions.

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Using Technology to Reduce Mathematics Anxiety in Preservice Elementary Teachers

Nicholas A. Holodick
Education Division
King's College
United States
nahholodi@kings.edu

Denise M. Reboli
Mathematics Department
King's College
United States
dmreboli@kings.edu

Abstract: The National Council of Teachers of Mathematics in its 1991 publication *Professional Standards for Teaching Mathematics* (NCTM, 1991) and the current *Mathematics Program Standards* for the National Council for Accreditation of Teacher Education (NCATE, 1998) stresses the importance of the disposition of the classroom teacher towards mathematics. Unfortunately, research has reported that many preservice elementary teachers have negative attitudes toward mathematics, are not confident in their own mathematics ability, and claim to have a high level of anxiety towards mathematics. The Education and Mathematics Departments of King's College recognize the phobic attitudes towards mathematics displayed by preservice elementary teachers and have collaborated to establish a plan to hopefully reverse this negative disposition. This paper reviews current strategies implemented and future techniques planned to overcome the negativity and promote a more positive disposition.

Introduction

The National Council of Teachers of Mathematics in its 1991 publication *Professional Standards for Teaching Mathematics* (NCTM, 1991) and the current *Mathematics Program Standards* for the National Council for Accreditation of Teacher Education (NCATE, 1998) stress the importance of the disposition of the classroom teacher towards mathematics. They maintain that if K-12 students are to develop a disposition to do mathematics, it is essential that the teacher communicate a positive attitude towards mathematics. Additionally, teachers need to establish a supportive classroom learning environment that fosters the confidence of students to learn mathematics. Unfortunately, research has reported that many preservice elementary teachers have negative attitudes toward mathematics, are not confident in their own mathematics ability, and claim to have a high level of anxiety towards mathematics (Harper & Daane, 1998; Tooke & Lindstrom, 1998).

The Education and Mathematics Departments of King's College recognize the phobic attitudes towards mathematics displayed by preservice elementary teachers and have collaborated to establish a plan to hopefully reverse this negative disposition. This paper will review current strategies implemented and future techniques planned to overcome the negativity and promote a more positive disposition.

Fall, 2001: Initial Implementations

During the fall semester, the mathematics methods course was taught by a mathematician for the first time. This was done with the hope that someone who actively teaches the subject and is confident in her own ability to do mathematics would model a positive attitude towards mathematics. The methods course is taken after our elementary education majors have taken three math courses. In light of the change of instructor for the methods course, we are reviewing the curricula of the math courses to be sure that they are in line with the techniques that are being stressed in the methods course.

In conjunction with the mathematics methods course, our students participate in a pre-professional field experience. This gives our students an opportunity to observe an elementary classroom, as well as present lessons. The more site-based experiences our students have prior to student teaching, the more confident they become in their ability to teach. Included in this experience is an opportunity to discuss with their classmates the lessons presented and strategies for solving problems encountered in the K-6 schools.

Additionally, we have started to collect information from our students to better understand their attitudes and backgrounds in mathematics. The initial assignment in the methods course was for the student to write his/her mathematical autobiography. This gave us a better idea of how their attitudes were shaped and the concerns they have about teaching. At the end of the semester, we issued the MARS-R to assess the mathematics anxiety that our students still have at the end of the pre-professional semester and to provide a baseline to test how future initiatives influence mathematics anxiety.

Spring and Summer, 2002: Planned Implementations:

At the beginning of the semester, we will again use the mathematical autobiography for an informal assessment of their attitudes towards mathematics. We will also use the MARS-R as both a pre-test and post-test to measure their mathematics anxiety.

We will also be constructing a web site available to students participating in the pre-professional semester and student teaching. This site will include lesson plans that our students developed during previous pre-professional semesters and links to other sites that contain lesson plans. We will be including an S.O.S. button to email the mathematics methods instructor for advice or help. The web site will also contain tips for dealing with mathematics anxiety.

During the summer, we will examine various tutorials that are commercially available to help our students review concepts, as needed, while taking the mathematics courses that are required for the major. These tutorials should also be available to students who wish to use them while in a classroom setting.

Conclusions

The Education and Mathematics Departments recognize the critical need to prepare elementary teachers with a positive disposition towards mathematics. Both departments work collaboratively in designing and evaluating the most effective math curricula for our students. We have begun appropriate interventions to ease the mathematics anxiety of our students and will continue to assess the strategies we employ. Hopefully, our efforts will help prepare teachers who can effectively teach their students mathematics in a positive learning environment.

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Interactivate Your Math Students

Bethany Hudnutt, Shodor Education Foundation, US

Project Interactivate is mathematics courseware developed by the Shodor Education Foundation in collaboration with classroom teachers, content experts, curriculum designers, and education technologists. *Interactivate* has been described by the National Council of Teachers of Mathematics (NCTM) as setting "a new standard for on-line support for math teachers" (see reference, below). The project contains more than 80 classroom-tested interactive activities and tools. Suggested lesson plans and discussions based on various concepts contained in the activities help support standards-based approaches to mathematics education. Supplemental materials for the activities and lesson plans exist in the form of help files, worksheets, open-ended explorations, a dictionary, and links from those pages to related NCTM, NCEE, and DoDEA, standards.
Interactivate runs on any computing platform with any browser that supports Java and can be freely accessed on Shodor's website, http://www.shodor.org/interactivate.

The poster session will center on *Project Interactivate*. After the session, participants will be able to navigate through the site and be inspired to use *Project Interactivate* in their own classrooms. Participants will also learn about the Shodor Education Foundation as a non-profit organization dedicated to integrating computational science and modeling and visualization tools at all levels of education. Bethany Hudnutt, a former high school math teacher and currently the *Project Interactivate* manager, will present.

The presentation will suggest multiple ways of utilizing the courseware in the mathematics curriculum at all grade levels. Also, the usefulness of modeling and visualization to enhancing student understanding of math and science concepts will be discussed.

Shodor's philosophy on the role of technology in the classroom will be an integral part of the presentation. Technology should be used when the computing power of a computer will either make a task less time consuming or make a task which was impossible to complete using other means possible. For example, demonstrating the difference between empirical probability and theoretical probability using dice can be time consuming and uninteresting to students. Asking a student to roll a die one hundred times and keep track of results is a dull and time consuming task where no learning can take place until the experiment is complete. Even then, one hundred times may not be enough rolls for the empirical probability to approximate the theoretical. A computer can be programmed to simulate rolling a die thousands of times and keep track of the results in seconds. *Interactivate* activities are designed with this type of technology use in mind.

Interactivate has received wide-spread recognition and numerous awards including:

- Eisenhower National Clearinghouse Digital Dozen award (twice):
  http://www.enc.org/resources/records/full/0,1240,012956,00.shtm
  http://www.enc.org/resources/records/full/0,1240,018591,00.shtm
- National Council on Teachers of Mathematics' Illuminations:
  http://illuminations.nctm.org/webresources/pinteractive.html
- Forbes Magazine's Best of the Web:
  http://www.forbes.com/bow/b2c/category.jhtml?id=142

Interactivate originated with the Presidential Technology Initiative in partnership with the US Department of Defense Education Activity (DoDEA) with the goal of producing high-quality interactive activities to support a variety of middle-school math texts. Since its inception, *Interactivate* resources have been linked through tables of contents of various standards-based texts, including *Math Thematics, Middle Grade Mathematics, Interactive Mathematics,* and *Mathematics in Action*. *Interactivate* is in DoDEA schools around the world and in many schools and homes in the US, with more than 25,000 documented users per month.

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PDA's: The Swiss Army Knife of Handheld Technology for Mathematics Classrooms

Elliott Ostler
Teacher Education Department
University of Nebraska at Omaha
United States
elliottostler@mail.unomaha.edu

Neal Grandgenett
Teacher Education Department
University of Nebraska at Omaha
United States
ngrandgenett@mail.unomaha.edu

Abstract: This paper provides an overview of software applications and peripheral devices designed for the Personal Digital Assistant (PDA) that can act as powerful tools in a technology enhanced mathematics curriculum. PDA applications are being introduced at a time when mathematics education reform movements are accentuating the need for functional pedagogical technologies. Attention has been focused on including applications that tend to support traditional curriculum in non-traditional ways. Excerpts from field tests have also been included.

Introduction

The willingness to embrace new technologies as tools for learning can only be justified to the extent that teachers are also willing to embrace, alter, or adapt the curriculum that supports efficient learning through these technologies. Mathematics teachers in general have been fairly willing to experiment with technology applications in an enrichment context, but perhaps less so when it comes down to engaging students in traditional textbook-based topics. Teachers of mathematics commonly report that the most productive technology-based learning environments are those in which students are actively engaged in dynamic mathematical problems involving modeling and problem solving, yet difficulties with management and assessment still have appeared to limit the commitment to creating these learning environments. Unfortunately, special efforts to utilize technology in the traditional mathematics curriculum have often resulted in little more than a series of isolated exercises done on desktop computers, and have ultimately failed to justify why technology was even needed. The Internet has certainly provided new opportunities to learn and express mathematical ideas, and perhaps more importantly created a medium for mathematical discourse. Curricular arguments involving technology however, continue to dissolved into a struggle to justify cost, availability, and time versus the proverbial "payoff" in terms of what students have learned, or at least how well they score on standardized tests. For many mathematics teachers, the solution lies somewhere in the promise that reasonable continuity can be established within and between mathematical topics, and that thoughtful productive learning occurs because of *requisite* technology rather than having technology use appear forced or contrived.

Although the primary factors for effective classroom technology use remain curricular, emerging technologies for education have demonstrated that availability and cost are much less a factor than even three years ago. The Personal Digital Assistant or PDA is a classic illustration of this point. PDA's, which are still considered by many to be day planners, have captured the attention of educators at all levels, largely because of the recent availability of software and peripheral applications. Because PDA's are handheld devices smaller than most graphing calculators, and in many cases costing about the same, they provide students an opportunity to view mathematical ideas in a variety of ways just as graphing calculators do. The many applications now available for PDA's however add a much greater dimension of realism to the mathematics curriculum than is possible with a graphing calculator, and much greater portability than is possible with a desktop computer. The PDA is in essence a kind of Swiss Army Knife approach to handheld computing where one very small device can act as many different tools. Much of the power of these devices rests in the simplicity with which students can switch back and forth between applications within a single lesson. A lesson might include students collecting data on water samples with probe devices that can feed information directly into the PDA, organizing the data in a database application, calculating and graphing levels of impurities using spreadsheets or graphing calculators, and writing up lab results using a word processing application. The most amazing aspect of this activity would almost certainly have to be that the students could do all of these things while standing ankle deep in the water where they took the sample.

The scenario described above would certainly be possible given the right circumstances, as would many other scenarios, given the right software and hardware applications, and most importantly, an imaginative teacher. The next two sections of this paper provide an overview of a few software applications as well as some interesting peripheral devices that with appropriate curricular considerations can be used in some very powerful ways to support traditional mathematics curriculum.

Software Applications

In addition to the standard tools of the PDA (i.e. calendar, calculator, memo pad, "to do" list, etc.), a mountain of software as emerged virtually overnight that will allow students to seamlessly navigate through activities which require them to use data from one application to complete tasks in another. Much of this software is free and can be easily accessed through various web sites. Other software is available at nominal fees.

Graphing Calculators

Perhaps the most widely used technology to date in the mathematics classroom is the graphing calculator. Most graphing calculator models run between \$70-\$120 and require a significant amount of classroom time to learn the basic functions and to confidently navigate through the menus. Although these tools have a great deal of potential, students can get lost in a sequence of button pushing that may detract from the innate message of the lesson being taught. Conversely, the graphing calculator applications designed for the PDA run about \$30-\$50 and have a very short learning curve. Most students can have basic functions mastered in a matter of minutes. Many of these applications include the ability to view standard functions and parametric graphs, as well as allowing the user to simultaneously graph multiple equations. Graphs are managed through various types of equation "managers" and can even utilize a number of built-in functions. Functions can be explored through a series of table values as well as the standard graphing mode. One particularly powerful advantage is the zoom feature that allows the user to use the stylus to drag over an area of interest to better examine graphical properties. This includes being able to calculate values for individual points on the highlighted area of the graph which make exercises such as finding points of intersection easy to do. Most standard graphing calculators require these tasks to be managed through a series of menus. Several of these PDA graphing calculators allow users to create their own custom worksheets using the fully integrated equation solvers. These equation solver applications use a pop-up input screen that allows a user to enter a virtually unlimited number of equations and then solve for any desired value or variable. Common built in functions include those for advanced algebra, trigonometry, computer science, physics, chemistry, statistics, Boolean logic and engineering.

Animation

Free applications such as Sketchy (available at hi-ce.eecs.umich.edu) allow users to create a series of pictures that can be animated in such a way as to demonstrate geometric, algebraic, or recursive processes. Tools include basic geometric figures, lines, shading, and freehand stylus drawing. Pages can be easily duplicated and edited as well. In field tests, this program has been particularly powerful in reinforcing concepts in a tutorial setting when students need extra help but are unable to get help from the teacher. The PDA actually acts as the teacher, allowing students to view a specific procedure and stop the animation at any point they deem necessary. Methods courses at the University of Nebraska at Omaha have included instruction in Sketchy for the purpose of re-teaching processes in mathematics, and also to help illustrate how science and mathematical topics can be better integrated in meaningful ways. Reactions from pre-service teachers of mathematics and science have been very positive. In one case an elementary teacher used Sketchy to help teach the algorithm for long division. However, instead of having Sketchy demonstrate division problems, the teacher had students build an animation showing how long division is done. The students were so motivated and excited that they finished the division unit and tested ten days earlier and scored better on the unit test than the other three classes in the school at the same grade level.

Simulations

Although simulation software is still a relatively new venture in the mathematics classroom, free programs such as Cooties (available at hi-ce.eecs.umich.edu) allow for the study of probability and mathematical modeling in the context of the spread of infectious diseases. The application uses the PDA's beaming feature to have students "meet" each other. Starting with one or more *infected* Individuals, the Cooties spread to other PDAs thus providing students with the opportunity to observe and create mathematical models for predicting how long it will take for everyone to be infected, and to pinpoint where the Cooties originated. Other simulation programs support more traditional textbook topics by allowing the students to adjust variables such as gravity coefficients and then examine the resulting effect on falling objects.

Spreadsheets

One of the more common tools used in mathematics dassrooms is the spreadsheet. Both free and nominally priced spreadsheet packages are available on-line and tend to vary in power. The more expensive versions run approximately $50 and have nearly as much power as common desktop versions. These applications also have the ability to dump data directly into spreadsheets such as Excel or MS Works. Even some of the free versions of PDA spreadsheets have graphing and logic capabilities, which make them an attractive option for linking textbook topics and problem solving. Curriculum designed for spreadsheet use on desktop computers would require very little modification and could be assigned as homework, allowing for more productive use of class time. Secondary level mathematics methods students were encouraged by the ease of which they were able to learn and use a free version spreadsheet, as well as to develop some simple curriculum related to amortization tables. These students were a bit concerned that free versions of spreadsheets tended to be limited in the number functions currently available. Trigonometric, statistical, and logic functions were routinely omitted by the free versions.

Games

In addition to the common drill and practice games, free game applications such as Code Cracker allow students to have fun in a mathematical modeling and problem-solving environment. Secondary level mathematics methods students at the University of Nebraska at Omaha competed in a contest to see who could develop the most efficient algorithm for cracking a four-digit code. Ensuing discussions among class members yielded some interesting revelations about how an effective mathematics curriculum should look. From a methods standpoint, the code cracker activity had some very productive pedagogical byproducts. Other strategy games such as Backgammon, checkers, and various card games are also extremely abundant, but have yet to show any real curricular potential past enrichment.

Peripheral Utilities

One of the most exciting aspects of the PDA is the availability of peripheral devices, which have so much potential for mathematics and science education. It is becoming more and more clear that the manner in which students collect data in the mathematics classroom can be a very motivating force for learning. PDA's now have peripheral devices including Global Positioning System (GPS), digital cameras, digital voice recorders, a whole line of probes for temperature, turbidity, acidity, sound level, etc., and even robots that can be controlled with various program applications. All of these peripheral devices are attached directly to the PDA using the same pin connector as is used in the HotSync cradle. Managing software is included with each device, and in many cases works in unison with other PDA applications. The probes, used primarily for science activities, are still somewhat costly but allow for dynamic field experiences that would otherwise be impossible using traditional desktop computers. These probes are similar to the probes used for graphing calculators but provide greater flexibility in the collection and interpretation of data. The camera and voice recorder devices are relatively small and are primarily used as qualitative data collection instruments. Free software is available at hi-ce.eecs.umich.edu that allows pictures taken with the PDA camera to be annotated. Finally, with robotics being so pervasive in fields such as manufacturing, law enforcement, and medicine, programming robots in the classroom could provide some interesting avenues for students to investigate mathematical topics. Robot kits are currently available for use with the PDA and cost about $260. Once built, different software applications allow students to steer the robot using the stylus or even to examine how a robot *learns* using sensor technology. The applications for supporting traditional curriculum in the area of robotics are certainly limited, yet innovative teachers may see these as opportunities to motivate students in a more exciting way than ever before in an otherwise dry subject discipline.

Conclusion

With so many possible features yet unexplored, PDA's can almost certainly be though of as a kind of 21st century Swiss Army knife for classroom technology. The utility and power of these devices goes far beyond any type of technology that has been used in mathematics classrooms to date. No longer will technology based activities need to be contrived, or forced to fit within the parameters of traditional textbook curriculum, but rather they will be supported and made more efficient by a type of technology that allows for seamless transfer of data from one type of application to another and from one subject discipline to another. One would speculate that with appropriate consideration of curriculum, we have begun to tap a source that will revolutionize mathematics education in America.

Using Online Discussion Forums to Develop Teachers' Understanding of Students' Mathematical Thinking

Jeffrey C. Shih
Department of Curriculum and Instruction
University of Nevada, Las Vegas
United States
jshih@unlv.edu

Abstract: This paper is a report of the findings in a study of the development of online discussion forums to help create learning communities that provide professional development for pre- and inservice elementary school teachers in mathematics. With the support of a PT3 mini-grant, this study was designed to create opportunities for pre- and inservice teachers to build their understanding of number, number sense, computation, problem solving and mathematical communication, as they engaged with their colleagues in both monthly and on-line workgroup meetings. Three findings from this study are: sufficient time is necessary to establish a learning community, technology issues are a potential constraint in the successful development of a learning community, and specific mathematical tasks are better suited for the on-line discussion format.

Introduction

As part of the *Principles and Standards for School Mathematics* (NCTM, 2000), the standard for the responsibilities of colleges and universities includes the need for mathematics education faculty to be a part of school-based mathematics communities. "Teacher educators, mathematicians, and practicing teachers working together can create a rich intellectual environment that will promote veteran teachers' growth and demonstrate to new teachers the value of learning communities." (NCTM, 2000) Until recently, the development of these learning communities was accomplished through face-to-face interaction. This paper will describe the use of online discussion forums to help create learning communities that provide professional development for pre- and inservice elementary school teachers in both content and pedagogy reflected in the Principles and Standards for School Mathematics of the National Council of Teachers of Mathematics. With the support of a PT3 mini-grant, this study was designed to create opportunities for pre- and inservice teachers to build their understanding of number, number sense, computation, problem solving and mathematical communication, as they engaged with their colleagues in both monthly and on-line workgroup meetings.

The Study

Twenty inservice elementary school teachers from an urban, at-risk school participated in the study. The Hispanic population of the school is forty-two percent, while twenty-seven percent of the students participate in English as a Second Language curriculum. Forty-seven percent of the families are in the low-income bracket. Sixty percent of the students fall in the below average or overage group in ability level in mathematics. 35 pre-service teachers enrolled in undergraduate mathematics methods classes also participated in the project.

Each month the participating pre- and in-service teachers were given a problem to pose to their class in preparation for the in-person workgroup meeting. The problem provided mathematical focus, an opportunity to examine trajectories of students' understanding, a challenge to teachers' expectations and a way to talk about details of mathematical thinking. Having a problem to pose to their students also immediately engaged the teachers in thinking about the relationship between their children's mathematical thinking and their classroom practice. Posing the problem led teachers to see that their classrooms could be a place that they could learn with their students.

Concurrently, the inservice teachers used digital cameras to upload examples of their student work to a private web site. As part of their elementary mathematics methods course, preservice teachers examined the students' solution strategies and related them to the NCTM Standards and research-based frameworks of the development of student understanding (Carpenter, et. al., 1999).

Threaded on-line discussions between preservice teachers, inservice teachers, a mathematics education professor, a mathematics professor and the principal of the school took place on the web site, focusing on both content and pedagogical issues. These experiences, in addition to visits to inservice teachers' classrooms, enhanced the preservice teachers' undergraduate training and focused them on "real" student work and student learning.

All of the participants attended monthly one and a half-hour workgroup meetings. The teachers began the workgroup meeting by filling out a reflection sheet that asked focused questions about their own student work or the examples provided on-line. Discussion of the student work followed for approximately one hour. The discussions were centered on the mathematical strategies evident in the student work. The range of strategies was documented and the discussion focused on how the strategies were mathematically similar or different from one another. The existing research documents the effectiveness of using students' mathematical work to support teacher learning (Franke, Carpenter, Fennema, Ansell & Behrend, 1998; Lehrer & Schauble, 1998; Sherin, 1997). Pedagogical issues were also discussed as they were raised in the workgroups. Each meeting concluded with the teachers summarizing verbally and on paper what they learned during the conversation. As the pre- and inservice teachers developed content knowledge, appropriate pedagogical strategies addressing the process standards of problem solving and mathematical communication within the context of the teachers' classrooms were also modeled.

Findings

There are three main findings that come from the current study of the development of on-line learning communities: sufficient time is necessary to establish a learning community, technology issues are a potential constraint in the successful development of a learning community, and specific mathematical tasks are better suited for the on-line discussion format.

The first finding is common to all professional development projects: sufficient time is necessary to establish a learning community. Even with the best of intentions, instantaneous familiarity between pre-service teachers, in-service teachers, administrators, education professors and mathematics professors is not possible; "sustained, intensive professional development" is very difficult to achieve in one academic year. While things are moving in the right direction at the host school, more time is necessary for change to occur. Fortunately, the current project has been extended for another year.

Though effort was made to facilitate the use of technology in the study, logistical constraints made on-going threaded discussions difficult. The initial workgroup meetings and technology orientation sessions took place in the computer lab of the host elementary school. While the pre-service teachers were regular contributors to the threaded discussion boards, in-service teacher participation was sporadic. At first, the assumption was made that this was because of familiarity with the technology. However, after examining the computers in the in-service teachers' classrooms, the discovery that the discussion board software required 4.5 browsers provided an explanation for the lack of participation: 4.0 browsers were found on all of the classroom computers. The in-service teachers assumed that their computers were simply slow. For them to effectively participate in the discussion boards, they would have to log on either in the computer lab or in the teachers' lounge. The continuity of the threaded discussions was affected by availability of the technology.

Finally, certain mathematical tasks are better suited for the on-line discussion format. There are a limited amount of tasks that can be shared among pre- and inservice teachers that truly serve both populations. Posing a word problem to use as a context for the discussion of the development of children's mathematical thinking is effective for one continuous group of pre- and in-service teachers. In the ongoing study, a new class of pre-service teachers begins in the spring semester. The new pre-service teachers require a shift in the on-line discussions, since they have neither the experience nor the familiarity with the research frameworks on the development of student thinking. Contrast this to the beginning of the project when the pre-service teachers were more familiar with the research-based frameworks and offered these perspectives to the in-service teachers.

Discussion

On-line discussion forums are promising in the context of professional development and creating on-line learning communities. As with other forms of professional development, there are both logistical and methodological concerns about their success. Time and access to technology are two fundamental concerns in the development of on-line learning communities. Clearly, further study is necessary to better understand the interplay between the use of technology and participation in a learning community.

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Technological Dilemmas:
A Guide to Selecting and Implementing Resources for Secondary Mathematics Instruction

Tobin White
Stanford University
twhite@stanford.edu

The NCTM *Principles and Standards Vision for School Mathematics* (2000) posits classrooms where all students have access to computer and calculator technologies, and where those technologies play an essential role in instruction. Examples of the effective integration of such tools into the teaching and learning of mathematics appear throughout the document. But any well-intending teacher or school inspired by this vision and equipped with a budget for such resources, on turning to the array of software titles and calculator resources on the market, faces a daunting pair of questions: How does one know what to buy? Trickier still, once the purchase orders are signed, the calculators removed from their packaging, or the software installed, how will these new tools be best used?

This paper emerged from an effort to provide preservice mathematics teachers with a framework to guide the selection and implementation of new technologies in the classroom. I propose a framework that actively engages teachers in the process of navigating the contested ideological and pedagogical waters of decision-making about technology. I argue that the complexity for practitioners of identifying the most appropriate technological resources for their students' needs, and incorporating those resources into instruction, is organized around several fundamental dilemmas for secondary math instruction. Many authors offer compelling sets of general principles and criteria by which to judge new technologies (e.g., NCTM 2000, Rubin 1999, Linn et al 2000, Nickerson 1995), each representing a clear and coherent vision of the best of contemporary insights into the teaching of mathematics. By virtue of their generality, however, they inevitably fall short of firm answers to many complex questions that can at best only be answered within the highly localized, diverse, and shifting contexts of particular classrooms.

Larry Cuban has distinguished between the "tame" and "wicked" problems faced by educational practitioners (Cuban, 2001). Problems classified as tame are generally resolvable when given proper time, research, discussion, or resources. Wicked problems, or "dilemmas", on the other hand, prove far more intractable. Such dilemmas, rather than ever achieving elegant resolution, demand difficult choices and sacrifices in order to patch together working compromises. More pointedly, while the thorniest dilemmas might be resolved in principle through the application of lofty guidelines, in the reality of school practice they are generally impossible to overcome without giving up at least some principled ground. To address this challenge, I frame the decision-making process for teachers in terms of tensions between competing poles, approaches, and outcomes, each of which potentially represent dilemmas of this sort for selecting and implementing technology. These dilemmas include: developing students' procedural skills versus teaching for understanding; using technology to promote equity versus widening the technological divide; individualizing instruction versus fostering cooperative learning; and informed use of tools versus dependence on tools.

These four sets of tensions reflect the major concerns behind many of the principles and criteria cited above as they apply to technology in math education. They are also intended to evoke some of the research that has framed and the rhetoric that has polarized debate over secondary math instruction in recent years (Battista, 1999; Becker & Jacob, 2000). The scope of these dilemmas is by no means exhaustive, but they do crucially frame many of the decisions teachers must make as they seek to draw technological resources into their practice. Lampert (1985) has argued that the key for teachers selecting between the alternatives forced by dilemmas lies in not choosing at all; in her framework such problems that emerge from practice can only be resolved in practice, through temporary, *ad hoc*, and improvisational moves that depend on the context of a particular classroom and the instincts of a particular teacher. Drawing on the insights offered by exploring these dilemmas, I offer a model for generating technology evaluation frameworks that balance the goals of principle against the necessities of practice. Using a common tool from the contemporary classroom, namely an assessment rubric, I locate the software evaluation process within the bounds of teacher assessment practice in order to highlight the ways technological dilemmas might best be resolved in practice.

Dilemmas

Procedure versus Understanding. A recurring theme in the accounts of computer-supported learning reviewed above is that the ideal contributions of instructional technology should be those which lead to deeper student understanding of mathematical concepts. Many authors make the argument even more strongly, stressing as Andee Rubin (2000) does that new technologies which simply replicate old pedagogies, even by making them more efficient or otherwise more effective, are not worth developing, given the importance of finding ways, technological or otherwise, to improve instruction through radical change and the potential of computer technologies to support such changes. As one author puts it, "given our sorry record of teaching mathematics and science, it is clear that changes in kind are needed. Changes in degree, helpful though they may be, simply are not sufficient" (Perkins et al., 1995).

But what does this mean for a teacher who, for example, believes drill-and-practice software program might shore up crucial skill deficiencies and enhance performance on high-stakes standardized tests for some or all of her students? Should she, say, embrace occasional or even regular use of a computer resource that targets procedural skill development through repetitive multiple-choice problems, and provides tutorial support only through textbook-style lessons? Or should she restrict her use of computer-based technologies to those resources (provided she can find and afford them) which emphasize higher-order reasoning, discovery learning or open-ended problem solving? The kind of procedurally oriented programs this teacher might seek emerge from a lineage grounded in behaviorist learning theory and process-product models of educational research. Such software has evolved over four decades from routine and repetitive exercise delivery that characterized the early use of computers in math instruction to contemporary efforts at intelligent computer-assisted instruction, and still thrives in a variety of more and less sophisticated forms today (Scott et al 1992).

In a comprehensive review of literature on the cultural context of computers in education, Scott, Cole, and Engel (1992) worry that while drill-and-practice programs may be of some value, they are too often used in the absence or at the expense of developing higher-order reasoning and concepts. More recent research and innovation point to a variety of alternative approaches to software-based instruction which promise to engage students in more meaningful learning. Enumerating examples of more effective uses, various authors laud the power of software to facilitate discovery learning for deeper understanding (Nickerson, 1995); to encourage students' moves from conjecture and hypothesis to abstraction and proof (Schwartz, 1995); to embed mathematical concepts in data, simulations and other real-world contexts (NCTM 2000, Rubin 1999); and to mediate students' developing understanding of concepts such as functions through multiple representations (Goldenberg, 1995). These and other alternatives to tutorial and drill-and-practice software certainly show revolutionary promise grounded in learning theory and increasingly supported by examples of successful practice (Bransford et al, 2000). But the idealized learning scenarios envisioned by the proponents of these technological innovations don't necessarily come ready-made for incorporation into the classroom as many teachers know it; they may require corresponding curricular, pedagogical and even institutional revolutions in order to be fully realized in many schools. For many teachers, the massive effort required to bring about such changes may be at cross-purposes with their need to keep up with the daily challenges of a relentless job. And even granted the value of these technological innovations for student learning, they may not erase the challenges for our teacher struggling under district and administrative pressure to raise test scores or solidify basic skills.

Equity: Technological Solutions versus the Technological Divide. While 'Equity' and 'Technology' are listed separately among the NCTM's principles (2000), the elaboration of the equity principle articulates a vision through which "technology can help achieve equity in the classroom" by widening the range of learners to whom high-level mathematics can be made accessible and engaging. Of course, technology cannot increase all students' access to mathematics unless all students have access to technology. Indeed, this claim in the 2000 NCTM standards builds upon a call made by the same organization a decade earlier for calculators and computers to be made available to every student, and for the presence of a computer for demonstration purposes in every classroom (NCTM, 1989). The overlap in NCTM's principles is hardly surprising; technological issues are often difficult to separate from economic ones. Financial resources are a necessary precursor to access to computer technologies, and technological skills arguably enhance students' future access to financial resources by qualifying them for high-paying jobs (Office of technology Assessment, 1988; Stone, 1998). We must endeavor to incorporate technology into instruction in ways that interrupt rather than replicate this closed circuit.

Any truly equitable vision of technological implementation should ideally begin with the assumption that all students have equal access to the technology in question. Such a starting point, sadly, is far removed from reality. While wealthy or well-funded schools might purchase graphing calculators for every student, and maintain large computer labs, schools in poorer districts may not be so lucky. School resources aside, students from middle and upper class families can more easily afford their own graphing calculators and computers at home, while students from lower income families may only have access to such tools in the classroom, if at all. This disparity means that those students with easier access to calculators and computers will likely feel more at ease and have greater facility working with such tools. Hence, when a socioeconomically diverse group of students encounters instruction with such technologies, those tools may only exacerbate the consequences of unequal access and the resulting disparity in technical skill and comfort among students (Bromley, 1998).

Given this context and the prohibitions imposed by the cost not only of purchasing instructional technologies but also of training teachers in their effective implemention, innovative computer programs risk enhancing the learning only of certain students, namely those students sufficiently privileged to access them. Likewise, even when all students have equal classroom access to software or other tools, socioeconomic or other disparities may mean that some students will benefit more extensively from using those resources than others. Indeed, in an open software market, the more exotic, sophisticated, innovative, and unique the technology, likely the more expensive, and thus quite possibly the more likely it will only land at the fingertips of a select few students.

If computer software and calculators are to help ameliorate rather than accentuate these overlapping technological and mathematical divides, they must be adopted strategically, and often in ways that specifically target the needs of disadvantaged students. The NCTM equity principle emphasizes the power and the potential of technology to remedy equity concerns by making mathematical ideas and representations more accessible, more engaging, and more easily shared by a wide range of learners. Still, such potential never resides in the technology itself, but rather in the form of its implementation, and the most equitable ways to implement technology are no more easily deduced than the most equitable ways to teach mathematics. To return to the problem posed in the previous section, some authors have recently suggested that, by making the codes of the classroom and the rules for successful mathematical performance explicit, instruction which emphasizes repetition of algorithms and procedures may actually be more equitable than pedagogical strategies geared toward more open-ended problem solving and reasoning (Lubienski 2000). Boaler (2001) counters that these arguments, in highlighting the ways students might fail to achieve in classrooms that emphasize open-ended work, overlook the more crucial question of how educators might implement alternatives to procedural instruction more equitably. Seeking support for low SES students in procedurally-oriented software also may lead to a situation in which, as Scott et al (1992) caution on the basis of a 1984 Center for the Social Organization of Schools study, "wealthy and poor schools have equal numbers of computers but poor children spend their time on drill-and-practice exercises while better-off students spend their time in more meaningful activities."

Individual versus Collaborative Instruction. Just as efforts have been made in recent reforms of math curricula to shift focus from procedural or skills-based forms of mathematics instruction to those emphasizing reasoning and open-ended inquiry, those same reforms have likewise noted the value of complementing individual student work with group classroom activities (NCTM 1989). Rather than suggesting that instruction should be organized only around individuals or only around groups, calls for math education reform generally stress the importance of appropriately balancing these different pedagogical strategies (NCTM 1989; NCTM 2000). A recent volume summarizing research in learning points to studies indicating that problem-solving and reasoning strategies may be more effectively developed when students work in groups than individually, but cautions that group work may also inhibit learning in certain contexts as well, especially in early grades. Ultimately, the authors conclude that many questions about the relative benefits of group and individual work in various instructional contexts require further research (Bransford, et al 2000).

The 1989 NCTM standards take a similarly balanced view to these instructional approaches as they apply to the use of computer-based resources, simply stressing that "every student should have access to a computer for individual and group work" (p. 8). But some research suggests a stronger stance on this instructional divide. Scott, Cole, and Engel (1992) cite two early studies which indicate that given the potential benefits of pair and small-group work on computers, the optimal student-to-computer ratio may be higher than one, and that the use of individually oriented software such as drill-and-practice programs is likely to be out of synch with the goals of sophisticated and effective teaching practice. On the other hand, computers are designed primarily for single-user interface, and challenges ranging from the tendency of many software programs to target single users to negotiations over who gets to type at the keyboard or handle the mouse make group work on computers potentially difficult to implement in practice. More practically, implementing computers into both collaborative and individual work will likely require multiple software packages, and will certainly require multiple schemes for integration into instruction. And of course, while one computer per student may be ideal, financial limitations often stop the achievement of that ideal far short of reality. Once again, teachers are faced with the endlessly complex challenges of resolving different, though potentially complementary, instructional practices against practical constraints.

Dependable Tools versus Tool Dependence. One of the most distinctive new features of the secondary math classroom over the last two decades has been the increasingly widespread use of calculators and computers as problem-solving tools. In addition to those software programs which facilitate either drill-and-practice, adaptive tutoring, or more open-ended exploration of concepts, teachers have made extensive instructional use out of software and graphing calculator features which allow for the exploration of functions, data, and equations through graphical utilities, spreadsheets, probe devices, and symbolic manipulators. These technologies not only facilitate new forms of teacher-led multimedia demonstrations and exploratory activities for students, but also place at students' fingertips the power to easily solve most problems from the pre-calculator and computer high school math curriculum with a few keystrokes. Many advocates of curricular reform see the advent of these technologies as a tremendous opportunity to push classroom activity toward more sophisticated mathematics and deeper student understanding. They argue that working with calculators and computers can foster powerful learning in the context of real data and meaningful models, increase the availability of students' attention for higher-order thinking by reducing the need for rote procedures, and provide students with essential skills for an increasingly technical world (NCTM 1989, 2000). Other educators and policy makers disagree, however, cautioning that scientific and graphing calculators and computer algebra systems may encourage tool dependence rather than skill mastery or sophisticated thinking (California State Board of Education, 2000).

Solutions

Some of these dilemmas may ring in our ears with more authenticity than others depending on the classroom contexts with which we are best acquainted, and that is precisely my point—the dilemmas themselves are as situational and emergent as their solutions. To that end, the approach I propose to educators for navigating these dilemmas as they attempt to make decisions about technology involves categorizing aspects of mathematics instruction that may be addressed by computer-based resources, and that attend to the concerns raised in the preceding section. In keeping with my theme of locating problems in practice, I borrow an educational practitioner's tool, the assessment rubric, to provide evaluative descriptors for a range of potential 'performances' for a given software package. In the sample rubric shown here (Fig. 1), criteria are provided for evaluating two different axes of performance keyed to the features different computer resources might variously emphasize: collaborative learning and individualized instruction. Other useful categories within which to consider software in a complete rubric might include skills and procedures, real-world connections, multiple representations and learning styles, problem solving, interactivity, assessment features, flexibility, and so on.

	Unsatisfactory	Satisfactory	Exemplary
Collaborative Learning	Designed exclusively for use by a single student per computer with no instructionally useful avenues for student-to-student interaction	Includes some lessons or activities which may encourage cooperative investigation or stimulate meaningful discussion among two or more students	Includes many lessons and activities that encourage cooperative investigation by two or more students through networked or multi-user frameworks, stimulating meaningful discussion and shared problem-solving
Individualized instruction	Organizes lessons and work into a highly linear or inflexible structure, offers little freedom for navigating, self-pacing	Offers some curricular flexibility, allows students to work at their own pace and repeat or skip lessons as needed	Features highly flexible, adaptive curriculum which can be tailored to individual student needs, facilitates self-paced work, accommodates a wide array of learning objectives

Figure 1: Sample software assessment rubric

The crucial features are that each category should reflect the various and potentially competing priorities that compose the dilemmas of technology selection, and that educators should have the freedom to select and prioritize these categories in accordance with their instructional goals and school or classroom constraints. In this way, rather than constraining teachers or forcing them into dilemmas, a software evaluation rubric designed

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in accordance with global principles and research results should free them to select and implement resources in ways that are most appropriate for their students. To take the opposing poles of one of my dilemmas as an example, collaborative learning and individualized instruction are now posed not as competing alternatives in the quest for the 'best' uses of technology in instruction, but rather and more simply as distinct axes of software performance. Two different teachers might decide to emphasize one or the other of these uses, respectively, in evaluating software, and thus place higher priority on reviewing one category or the other, while a third teacher interested in both collaborative and individualized uses of software might focus on evaluating a package's performance in both categories while perhaps placing less weight on the effectiveness of other features.

One of the keys to the reliability of a rubric is that it be tested against a large sample by multiple judges; the sample here is still only in the earliest stages of such development (Wiggins, 1998). But with continued refinement, a rubric of this sort might serve at least two powerful purposes. By making performance standards explicit along a range of instructional categories, this evaluative mechanism should serve not only as a flexible tool for technological decision making for educators, but also as a guide to software designers that might help them to better account for the realities of the classrooms into which they might insert their products. Just as assessment rubrics in the classroom provide students and teachers with a common frame of reference for exemplary performance standards, the same assessment tool might be used in technology evaluation to raise the bar for design and instructional implementation alike.

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SECTION EDITOR:
Sara McNeil, University of Houston

Recently, I received an email called "Just a hundred years ago." In the message, the writer used historical facts and data to recount what life was like 100 years ago. It was informative and often surprising to realize that everyday products such as crossword puzzles, canned beer, and iced tea hadn't been invented in 1902. In contrast, marijuana, heroin, & morphine were all available over the counter at corner drugstores. The average life expectancy in the United States in was 47 years, and only 14 % of homes had a bathtub. Only 8 % of the homes had a telephone, and a three-minute call from Denver to New York City cost $11.00 at a time when the average wage in the US was 22 cents an hour. In the United States there were 8,000 cars, 144 miles of paved roads, and the maximum speed limit in most cities was 10 mph. The writer ended with the question, "Wonder how much it will change between now & the year 2102?"

That article was the catalyst for this introduction to the papers accepted for the New Media Section of the 2002 SITE Proceedings. I shortened the timeline to a decade since technology changes so rapidly and asked, "What was new media like when the third annual conference for SITE was held in 1992?"

1992: The Beginning of the New Media Explosion

The Internet

Although Tim Berners-Lee wrote the initial prototype for the World Wide Web in 1990, a graphical interface was just a vision in 1992. At the University of Minnesota, a team led by computer programmer Mark MaCahill released "gopher," the first point-and-click way of navigating the files of the Internet in 1991. MaCahill called it "the first Internet application my mom can use." Also in 1991 Tim Berners-Lee, working at CERN in Switzerland, posts the first computer code of the World Wide Web in a relatively innocuous newsgroup, "alt.hypertext." Many computer programmers were excited by the potential to combine words, pictures, and sounds on Web pages, and they saw the potential for publishing information on the Internet in a way that can be as easy as using a word processor. And the rumble begins.... .

In 1992, the term "Surfing the Internet" is coined by Jean Armour Polly http://www.netmom.com/about/surfing10.shtml, and Brendan Kehoe published *Zen and the Art of the Internet: A Beginner's Guide to the Internet* http://www.cs.indiana.edu/docproject/zen/zen-1.0_toc.html.

In 1992, the number of host computers on the Internet passed the 1 million mark, and there were about fifty World Wide Web servers. In December 2001, the number of web servers is estimated to be over 36 million. In 1993, students and staff at the University of Illinois' National Center for Supercomputing Applications created a graphical user interface for Internet navigation called NCSA Mosaic. It's not until 1994 that Jim Clark and Marc Andreesen found Netscape Communications, and the first Netscape browser becomes available.

Personal Computers

Speed has always been an issue, but in 1992, the Pentium chip was just a dream. The standard was Intel's i486 and iPSC/860. In late 1991, Apple released its first generation of PowerBooks that were an instant success. The PowerBook 145 had a CPU speed of 25 Mhz and maximum RAM of 8 MB. In contrast, the 2001 PowerBook G4 has a CPU speed of 667 Mhz with a maximum RAM of 1 GB.

Personal Digital Assistants

Although the Sharp Wizard with a small LCD screen and a tiny keyboard was developed in 1988, the term "personal digital assistant" or "PDA" was first coined by Apple CEO John Sculley who drove the development of the Apple Newton. The Newton was the first organizer to include a touchscreen and handwriting recognition software. In April 1996, a small company called Palm Computing took the idea of the Newton, shrunk it, made it more functional, and halved Newton's price to produce the first modern PDA, the Palm Pilot.

Computer Viruses

The first computer virus, known as the Brain virus, was created in 1986, and many other viruses with strange and exotic names such as *Dark Avenger* and *Frodo* followed. In 1992 the Michelangelo virus created mass hysteria; *United Press International* filed a newswire saying "hundreds of thousands of computers around the world" might fall victim to Michelangelo on March 6. But contrary to media hype, the virus did not cause significant damage. In 2002, there are over 57,000 virus definitions listed on the Symantec web site and topics such as "The Economics of Information Warfare" are posted across the Web. http://securityresponse.symantec.com/

Programming and Software Development

In 1992 Microsoft introduces Windows 3.1, and more than 1 million copies are sold within the first two months of its release. Bill Gates is the second richest man in the United States, with a net worth estimated at more than $4 billion. Word 5.0 is released in 1992 and featured a built-in grammar checker; a drawing window for simple graphics, and search-and-replace formatting.

Adobe Photoshop 1.0 was shipped in February 1990 after 10 months of development by Thomas and John Knoll. In 1993, Version 2.5.1 and the first release of a Windows version of Photoshop dazzled users. It is not until 1994 that Version 3.0 ships with the "layers" capability.

In 1992, the company, Authorware, created by one of the developers of PLATO, Dr. Michael Allen, merged with the Macromind company. The merger resulted in the formation of a new company called Macromedia. Because Macromind was already an established producer of multimedia tools, the merger helped solidify Authorware's place in the interactive multimedia market.

Video

In 1992 the first audio and video broadcasts took place over a portion of the Internet known as the "MBONE." Two years later, in 1994, the Rolling Stones broadcast the Voodoo Lounge tour over the M-Bone. The camcorder reached its voyeuristic heights on March 3, 1991, when George Holliday caught a trio of Los Angeles policemen beating a motorist named Rodney King. The resulting furor prompted police departments across the country to install video cameras in their patrol cars and consumers to start using camcorders to record civil disturbances. As the quality of the footage produced by camcorders increased, many shoe-string cable organizations started to employ camcorders instead of professional video equipment. In 1992, Sharp became the first company to build in a color LCD screen to replace the conventional viewfinder..

E-Commerce

Until 1991, corporations wishing to use the Internet face had faced a serious problem: commercial network traffic was banned from the National Science Foundation's NSFNET, the backbone of the Internet. In 1991 the NSF lifts the restriction on commercial use, clearing the way for the age of electronic commerce. In 2002, e-commerce is projected to exceed $1 trillion in the next few years.

The New Media Section of the 2002 SITE Annual

The topics of the papers accepted for the New Media section of the 2002 SITE Annual reflect these changes in the software and hardware capabilities and features, but overall they reflect the same concerns and search for innovations that were discussed in the 1992 Annual. Several papers such as the *Adaptive Profiling Tool for Teacher Education, the Web-based SMIL Tutorial,* and *Using Advanced Screen Capture in Support of Educational Technology Instruction* grapple with creating new software applications to enhance learning. Others such as *More Than a Movie: Using Animation to Promote Learning of Complex Subject Matter, MediaMakers Produce CareerCommercials: The Softer Side of Technology,* and *The Benefits of Streaming Media in E-Learning* wrestle with using new media effectively to promote learning.

If you are interested in learning more about where we've been, try

Hobbes' Internet Timeline http://www.zakon.org/robert/internet/timeline/

Goff, L. J. (October 18, 1999). Technology flashback— 1990: The way the Web was won. Computerworld Available: http://www.computerworld.com/cwi/story/0,1199,NAV47_STO37294,00.html

Digital America 2001 US. Consumer Electronic Industry http://www.ce.org/digitalamerica/history/

From Darkroom to Desktop— How Photoshop Came to Light by Derrick Story
http://www.storyphoto.com/multimedia/multimedia_photoshop.html

The worldwide Michelangelo virus scare of 1992 http://www.vmyths.com/fas/fas_inc/inc1.cfm

Towards Digital equality: The US. Government Working Group on Electronic Commerce 2nd Annual Report, 1999 http://www.ecommerce.gov/annrpt.htm

Sara McNeil is an Associate Professor in the Instructional Technology Program at the University of Houston.
Email: smcneil@uh.edu

Virtual Reality in Education:Exploring QTVR as a Tool for Teaching and Learning

Naglaa Ali, University Of Florida, US
Richard Ferdig, University Of FLorida, US
Gail Ring, University Of Florida, US

One of the reasons multimedia has been so successful in education is the dual coding aspect of information processing theory (Bagui, 1998). According to this theory, humans take in information from the environment through their sense organs: the eyes, ears, taste buds and nerves in the skin. This information then goes into short-term memory and is eventually processed into long-term memory, becoming the person's knowledge base. The more senses involved in the learning process, the better the learning experiences. VR (Virtual Reality), a technology that encompasses numerous media, evokes multiple senses as opposed to more traditional methods of learning that generally involve the use of a single sense, such as sight (Rodriguez, 2001).

Researchers are now beginning to explore various learning opportunities through virtual reality. For instance, "VR in the Schools", a quarterly publication of the Virtual Reality and Educational Lab has recognized the impact and potential of VR and has begun to research new medium for incorporating VR productively into the learning process.

Others have also defined many benefits of using VR in the teaching and learning process. Follows (1999) suggested four such benefits:

- Provides the students with context for the learning process to take place.
- Allow students to control the learning process.
- Makes learning a personal experience for the student.
- Accommodate a wide range of student learning styles.

Technologists have considered the potential of using VR in the classroom, and many projects are currently exploring the educational uses of VR:

- **The Virtual Reality Skeleton Project** (Rodriguez, 2001) at http://www.lib.uiowa.edu/commons/skullvr/background.html is a computer-based tutorial to help students learn the anatomy of the human skull.
- **TerraQuest's Virtual Galapagos** at http://www.terraquest.com/galapagos allows a visitor to study the ecology, wildlife, history and geology of the Galapagos Islands.
- **Wright State University's Anatomy Department** at http://www.anatomy.wright.edu/QTVR/qtvr.html) have suggested that advantages of VR include a) allowing students to visual abstract concepts, and b) allowing students to interact with events that distance, time, and/or safety factors make unavailable.

QuickTime Virtual Reality (QTVR) is a technology that allows users to explore virtual reality. QTVR developers can create and display 360-degree views of objects or panoramic scenes that can be manipulated and navigated. With this technology, it is possible for teachers and students to share classroom projects that others can rotate and examine. It is also possible for users to look at various environments (a classroom, a different country, outer space, etc.) without the need to actually be there. QTVR software allows designers to construct three-dimensional representations of objects from two-dimensional photographs. QTVR is a wide reaching educational tool that can be used not only in a large variety of locations, but also in a large variety of situations to attain multiple educational goals.

This workshop will introduce attendees to VR, and specifically QTVR. After completing the workshop attendees will be able to:

- Explain how QTVR works.
- Produce QTVR movies (panorama and objects).
- Determine ways in which they can use QTVR at school.

Tutorial Description:

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Phase I – Whole group session

In Phase I we will address the basic principles of Virtual Reality. We will discuss the hardware and software that are required to produce VR, as well as some of the design principles associated with developing virtual realities. Participants will be introduced to a number of current projects in virtual reality. During these initial phases, we will also introduce QTVR, and describe the creation of QTVR objects and panoramic scenes. Participants will be exposed to the complete process of developing QTVR products. For instance, the audience will participate in the process of planning the scene to be shot and the shooting process.

Phase II- the production process (Two participants for one computer)

Participants will have the opportunity to create their own QTVR production. The participants will be given images (to make a QTVR panoramic movie and QTVR object movie as well). The steps they will go through will include: "pre-production and planning", "production", and "post production". In this Phase, participants will:

- Familiarize themselves with the nuances of QTVR development.
- Develop a QTVR panorama.
- Develop a QTVR three-dimensional object movie.

Phase III – Whole group evaluation:

After the groups have completed their individual tasks, they will come back together to discuss the following:

- Identify ways in which VR and QTVR can be utilized in the classroom.
- Utilize applications and web sites that support VR & QTVR.
- Incorporate the many uses of VR & QTVR into their lessons.
- Evaluate the effectiveness of VR & QTVR as a learning tool.
- The participants will have the opportunity to present and share their QTVR movies.

Abstract:

Virtual Reality (VR) is an extremely useful and easy to use tool for classroom settings, because of its ability to show situations that would not otherwise be easy to imagine. This characteristic of VR enables a large variety of topics to be taught to students, who would otherwise struggle to visualize the information being presented. VR is also very useful in settings where student experience with technology is not advanced. QTVR, one example of VR, will be demonstrated. In this workshop we will give the attendees general ideas about VR and QTVR, have them brainstorm ideas about the applications of QTVR in their field. We will then have them take pictures and create QTVR movies (panorama and object). After finishing this workshop will give the attendees a survey about their perceptions of how they will incorporate QTVR movies in the teaching and learning process.

Hardware and Software for QTVR

Digital Images: Pictures for QTVR production may come from digital cameras, scanned pictures, video cameras, or Kodak PhotoCD (camera film processed on CD-ROM discs). In the workshop we will use Digital Cameras to produce the pictures needed for the producing of QTVR.

Computer: A Power Macintosh with enough RAM memory.

Software: Several choices exist currently. Most QTVR creation software is fairly easy to use. We will use VR Worx v2.0.

Tripod

References:

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Why not Virtual Reality?:
The Barriers of Using Virtual Reality in Education

Naglaa Ali
University of Florida
United States
naglaa@ufl.edu
Dr. Richard Ferdig
University of Florida
United States
rferdig@coe.ufl.edu

Abstract: In the near future, distance education has the potential not only to effectively deliver instruction than is done today, but also to bring people more closely together than traditional classroom education (VanderVen, 1994). Virtual Reality (VR) brings to distance education exciting possibilities that were once considered science fiction (Rigole, 1996). It has been used for years in military, government, medicine, psychology, industry, and networked entertainment programs, but it is fairly a new concept in education (Montfort, 2000). This paper explores various aspects of Virtual Reality including its definition, inception, current capabilities and future possibilities. This paper will also describe barriers of using VR in education and suggest new ways for integrating VR into teaching and learning. First, the paper will define the concept of Virtual Reality and its different types. In order to understand the implications of this technology, one must first understand the concept. Second the paper will address the benefits of using VR. I will describe what makes a good virtual environment, what prevents teachers from using this technology in their classrooms, and what recommendations exist for facilitating VR in classrooms. Finally, an example from education will be described highlighting the use of VR in teaching and learning.

Virtual Reality (VR) can be described as a multi-sensory highly interactive computer based environment, where the user becomes an active participant in a virtually real world. Freedom of navigation and interaction are essential for a computer environment to be characterized, as a VR environment system must offer an extension of our normal experiences, thus allowing as many degrees of freedom as possible to perform a given task (Whitelock, 2000). There are many types of VR systems, which are generally classified according to the types of technology employed to implement the system. Those systems include simulators and emulators, telepresence systems, CAVE systems, fully immersive systems, augmented systems and desktop and Internet VR systems (text-based VR and graphic- based VR). Depending on the level of the user's participation and interaction with the virtual environment, VR applications are also subdivided into passive (learners have minimal control over the training event), explorative (enables students to explore and construct their own learning) or interactive environments (allows the learners to immerse themselves in the subject matter)(Whitelock, 2000). For purposes of this paper, the definition of VR is limited to the desktop and Internet graphic based VR. There are two types of desktop and Internet graphic-based VR:

1) VRML: (Virtual Reality Modeling Language) is a language for describing three-dimensional (3-D) image sequences and possible user interactions to go with them. Using VRML, you can build a sequence of visual images into Web settings with which a user can interact by viewing, moving, rotating, and otherwise interacting with an apparently 3-D scene. For example, you can view a room and use controls to move about the room, as you would experience it if you were walking through it in real space. Here are some websites that can give you more clear ideas about VRML while exploring some environments by yourself:
    - http://caad.arch.ethz.ch/~dave/heritage/world.wrl
    - http://www.finearts.art.vcu.edu/VRML/vrmlaniintro.html
2) QTVR: QuickTime Virtual Reality (QTVR) is an Apple technology that allows users to explore virtual reality. QTVR developers can create and display 360-degree views of objects or panoramic scenes that can be manipulated and navigated. With this technology, it is possible for teachers and students to share classroom projects they can rotate and examine. It is also possible for users to look at various environments (e.g. a classroom, a different country, outer space.) without the need to actually be there. Check theses website for more clear idea about the QTVR concept.
    - o http://www.lib.uiowa.edu/commons/skullvr/background.html
    - o http://www.terraquest.com/galapagos

Both types are important in education and serve as powerful tools for teaching and learning. Using the capabilities of VR technology allows people to expand their conceptions of the real world in ways that were previously impossible (McLellan, 1998). This power of VR technology provides several possible ways in which it can facilitate learning. It allows students to:

- Visualize abstract concepts.
- Observe events at atomic or planetary scales.
- Visit environment and interact with events that distance, time or safety factors make unavailable.
- Master, retain, and generalize new knowledge when they are actively involved in constructing that knowledge in learning by doing situation.

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- Develop participatory environments and activities that can only exist as computer generated worlds (thin gs and places with altered qualities).
- Interact with a model that is as motivating or more motivating than interacting with a real thing. (Whitelock, 2000)

With all the benefits of VR technology, still there is still limited classroom use. Busy classroom teachers resist another instructional tool without appropriate provisions for training, preparation, implementation, and so forth (Auld, 1999). Teachers must understand the VR implications, and formulate a vision of where they want to go with it to enrich their own curriculum and their students' learning. School administrators must figure out the optimal application of virtual reality for each situation, while at the same time not falling into the trap of buying new technology for the sake of having new technology. Full of promise and excitement, using virtual reality in schools is a great challenge, but one that must be pursued (Sykes, 1999).

Even though teachers and administrators should learn the value of VR in classrooms, there are many reasons that limited the use of it:

- ➢ Teachers do not know how to implement the VR applications in their classrooms.
- ➢ The considerable gulf between educators and those who create the software and hardware they use.
- ➢ The cost of the VR hardware and software.
- ➢ The shortage of training workshops that train teachers how to create and use the new technologies in their classrooms.

Although these reasons limit the use of Virtual Reality in the classrooms, they are not impossible to overcome.

Creating a simple VR environment is not a hard job. To create a VR environment:

1) Teachers must know what make a good virtual environment. A good Virtual Reality environment, is the environment that can (Follows, 1999):

- Provide the learner with a reason to learn.
- Provide the learner with context for the learning process to take place.
- Allow the learner to control the learning process.
- Develop the learner's ability to solve high-level problems.
- Make learning a personal experience for the learner.
- Model the complexities and uncertainty of working in the real world.
- Accommodate a wide range of learning styles.

2) Select between the available types of VR systems that match their needs and capabilities and have a good impact in teaching and learning.

There are many ways that teachers can build a VR environment without the need of the expensive hardware and software. One of these ways is Using QTVR. QTVR software allows teachers and students to construct three-dimensional representations of objects from two-dimensional photographs. QTVR is a wide reaching educational tool that can be used not only in a large variety of locations, but also in a large variety of situations to attain multiple educational goals. Teachers can create their own VR environments that match the objectives, the curriculum, and their students' learning styles. Teachers can create these VR environments with their students. In this case the students can learn while engaging in the developing process. One example of the development of virtual reality in education is the creation of the Educational Technology Department at University of Florida. Using QTVR, we created an online source for students, faculty, and visitors to explore the Educational Technology Department. The goal was to create an interactive web site that would allow users to view the department, and get information about it. One of the unique features of the virtual visit is the use of VR. Using a map, the user can click a VR location and explore it. We found motivation and learner interest increased using realistic, navigable VR environments. The low cost of creation and playback, as well as the broad installed user base of quick time, makes video-based QTVR technology a reasonable choice for education and training materials (Mohler, 2000).

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Web-Based SMIL Tutorial

Barbara Beccue, Ph.D.
Department of Applied Computer Science
Illinois State University
United States
bbeccue@ilstu.edu

Joaquin Vila, Ph.D.
Department of Applied Computer Science
Illinois State University
United States
javila@ilstu.edu

Abstract: This paper describes a web-based *Synchronized Multimedia Integration Language* (SMIL) Tutorial that provides an interactive online guide which uses a learning-by-example approach to teach SMIL programming. It includes thoroughly explained sample code segments and a comprehensive example that integrates many of the media components that can be synchronized using SMIL. These components are illustrated graphically and by the code.

Introduction

This paper describes a web-based Synchronized Multimedia Integration Language (SMIL) Tutorial that provides an interactive online guide for SMIL programming. SMIL is a markup language that lets you control the location, timing and sequence of still images, video, and sound for use in web-based applications. It was developed by the World Wide Web Consortium (W3C) and enables Web developers to create multimedia content for delivery over the Internet. Typical uses of SMIL include applications such as Intranet/Internet training, marketing, real estate house tours, and distance learning.

This tutorial uses a learning-by-example approach to teach the SMIL specification. All the sample code segments written in SMIL are thoroughly explained. In addition there is a comprehensive example that integrates many of the media components that can be synchronized using SMIL. These components are illustrated graphically and by the code. Although the tutorial is considered to be a SMIL tutorial it covers more than just the coding. There are major portions of the tutorial that address the issues of capturing various types of media that one can include in a SMIL presentation.

The address of the SMIL Tutorial is http://138.87.169.67/smil . This tutorial is intended to provide an easy-to-follow, step-by-step tutorial for novice SMIL programmers. The SMIL Tutorial introduces SMIL syntax and the basics of SMIL programming. Using an interactive style, this tutorial provides fully commented easy to follow examples, and programming techniques. Both linear and random navigation are provided on every page so the user can easily find topics of interest.

Contents of the Tutorial

The SMIL Tutorial consists primarily of textual content explaining the basics of SMIL programming. SMIL is based on the eXtensible Markup Language (XML) and consists of files and streams of audio, video, text, or image content. These media elements are transmitted separately over the Internet providing more economical and efficient use of resources. Yet they are presented as an apparent seamless multimedia stream to the viewer.

The SMIL specification consists of XML tags that allow the definition of windows, multimedia elements, and their synchronization in time when displayed in a SMIL capable browser. There are a variety of applications that support the SMIL specification. One of the most popular is the RealPlayer by RealNetworks, which is the default player for this tutorial. SMIL requires a number of specific file types in order to support multimedia in the RealPlayer. These file types are thoroughly addressed in the tutorial and include the following: .rm (real media), .rp (real pix), .rv (real video), .rt (real text), and .smil (synchronized multimedia integration language).

A developer must devote the time to learn the language. In order to assist interested developers, this tutorial has been structured to not only address the syntax of the language but also to discuss other development issues. Some of the topics covered in the tutorial include:

- Acquiring media resources
- Converting various media elements to streaming media.

- Learning SMIL syntax
  - Adding text to a SMIL application
  - Adding audio to a SMIL application
  - Adding video to a SMIL application
  - Exemplifying the use of SMIL tags
- Putting it all together to create a multimedia presentation

The sections about acquiring media resources discuss creating visual and sound elements. The section about visual elements covers acquiring/creating pictures, animation, video and colors. Within this framework, there is information about creating the visual elements with a still camera and scanner, a digital camera, a video camera, or graphics programs. The section about sound elements covers acquiring/recording voice and music. It addresses the process of creating the accompanying sound elements by recording voice transcripts with a microphone and sound card, adding background music, or creating synthetic sound.

One section of the tutorial is devoted to the explanation of the process of converting traditional media files into streaming media files using Real Producer. The next section introduces/exemplifies SMIL syntax and provides numerous demos that showcase the capabilities of SMIL (See Figure 1). Finally, the major contribution of the tutorial is the section, which explains and demonstrates in detail the process of creating a SMIL application. This section presents a planning methodology, discusses the issue of bandwidth considerations, depicts the components of a SMIL application including all media resources and code, and demos the completed application.

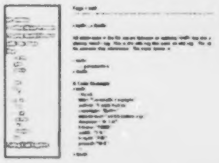

Figure 1: Tutorial Example Of The Use Of Tags

Tutorial Design

The Tutorial is partitioned into the following 6 main sections: Introduction, Creating Visual Elements, Creating Sound Elements, SMIL File Types, Tags, and Putting It All Together. As the user proceeds through the Tutorial, these 6 choices are always available on the navigation panel at the left side of the screen. With the exception of the Introduction, each section has subtopics that show on the navigation panel when the user is in that section. Additionally, there is a menu bar at the top right side of the screen that offers the user the option of seeking supporting information. Specifically, the choices are as follows: Introduction (to the tutorial), a Site Map (for the tutorial), a Search function, a Glossary, Links to related sites, and Demos that are used in the tutorial (See Figure 2).

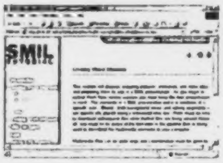

Figure 2: Interface of the Web-Based SMIL Tutorial

The final section presents a SMIL application that has been segmented into its various components. In order to provide easy access to the files and media resources, an image map has been included. This map gives the tutorial user an overview of the application components and provides an opportunity to examine each component in detail (See Figure 3). This SMIL application is also included as a demo. The user can invoke this demo on demand to visualize the synchronization of the different components (See Figure 4).

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http://service.real.com/help/library/guides/realtext/realtext.htm

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http://service.real.com/help/library/guides/realpix/realpix.htm

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Acknowledgments

The authors wish to acknowledge the work done by Ralph Bellas, Jr. during the implementation phase of the *SMIL Tutorial*.

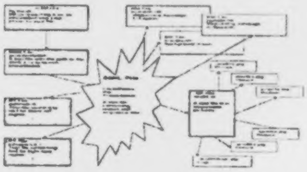

Figure 3: Components of the SMIL Application Demo

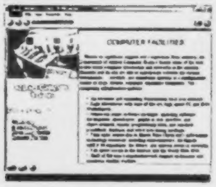

Figure 4: SMIL Application Demo

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Enhancing the Classroom Through Video Technologies

A Proposal for a Video Festival Presentation

Submitted by Bob Boston

Since the invention of the motion picture, film and video have found a place in every classroom from Kindergarten to the doctoral graduate class. Most of us can remember the chatter of the 16mm projector in the back of the room, or taking a turn narrating a filmstrip. We all have memories of our favorite – and least favorite - educational presentations. Film and video have found a place as an effective tool used to supplement classroom instruction.

Today's technology offers teachers and student great versatility and creative opportunity. We can still watch pre-produced documents, but with the availability of quality and increasingly inexpensive video production tools, we can take that experience a step further. Teachers and students alike can create customized, sophisticated presentations with limited experience and funds.

This video presentation will show clips used in elementary schools, special education, and university distance education courses to demonstrate the effectiveness and advantages of using video in the classroom. This format can excite and invigorate your lessons. Watch how students involve themselves in group activities, demonstrate teamwork and problem solving as they produce their own music video or record their class plays for prosperity. See examples from our own studios of effective presentation styles and techniques used in reaching students at distant locations. All of this can be accomplished with a home video camera, computer, and a little imagination.

Educational video has taken a step into the future and it stars you, the teacher, or the student, or the principal.

Using Advanced Screen Capture in Support of Educational Technology Instruction

John Bryner, Southern Utah University, US
Matthew Nickerson, Southern Utah University, US

Abstract

Among the many burgeoning "support" applications that can enhance the technology training of preservice teachers there is new group of simple and inexpensive "advanced screen capture" programs that should not be overlooked. Also referred to as video screen capture or moving screen capture they perform a rather simple yet powerful service. Like "older" screen capture applications, video screen capture can record whatever is displayed on a computer monitor but instead of a single "screen dump" video screen capture allows the user to record the monitor's image over time and create, as the name implies, a movie of what is happening on the screen.

There are several advanced screen capture applications currently available with a wide range of pricing. Some of the more popular applications are:

1. HyperCam, **(Windows), Hyperionics, \$30.00**
2. SnagIt, **(Windows), TechSmith, \$39.95**
3. SnapzPro, **(Mac), Ambrosia Software, \$40.00**
4. ScreenCam, **Windows), Lotus, \$86.00**
5. Camtasia, **(Windows), TechSmith, \$149.95**

Southern Utah University's educational technology program uses Apple Macintosh computers reflecting the preference of the vast majority of public schools in Utah and so we use SnapzPro from Ambrosia Software. All of the applications mentioned above are relatively simple to operate and SnapzPro is no exception.

Software

SnapzPro® can be activated with a short cut command key at any time. The short cut immediately opens the SnapzPro® window offering a choice of four capture area options: 1) the entire screen, 2) a single window, 3) preselected items, or 4) a user defined area. In addition to the area option, the user may also set the file format with the Save As option. SnapzPro® offers a range of formats including: .gif, .jpg, .pict, .png, .tiff, and .mov. All but the last option support the capture of a single image. It is the .mov option allowing the user to record all screen actions over time that we are highlighting here.

When the .mov (movie) option is selected form the Save As pull down menu the user may then define other properties peculiar to movie capture such as frame rate, scale, sound capture (internal sounds), and microphone capture (narration). Once all the setting are in place the video capture is initiated with a command key and the application begins recording the desired screen actions. A repeat of the command key halts the recording and the capture file is saved to the desktop or other selected drive/folder.

Narrative

This interactive session will demonstrate our use of this software in support of our educational technology course. At present this tool is helping in three important areas: 1) it supports faculty and lab assistants in teaching the basic software applications required for information literacy, 2) it enables teacher candidates to create powerful artifacts for their electronic portfolios, and 3) it introduces a new tool for K-12 teachers.

Educational technology faculty first used SnapzPro® in support of basic software training. There are several software applications that are covered in all sections of the course and instructors are anxious for their students to master the basics as quickly as possible so the important issues of integrating technology into teaching/learning can be discussed and practiced.. As reported throughout the country and in the literature, students are coming to college with a wide range of information literacy and computer skills. While some arrive having already mastered many productivity and Internet applications there is still a significant percent that come with considerable reluctance where computers are concerned and with few or no computer skills.
In an effort to reduce class time devoted to software basics and to support intimidated or less prepared students the faculty have created small video vignettes using SnapzPro® that demonstrate basic operations for each of the principle software applications used throughout the course. These vignettes, or video tutorials, are saved as Quicktime® movies and made available to students through the Internet via online course syllabi. Students who are struggling or who just need a simple reminder can open the video tutorial whenever they need assistance. This is especially helpful when the teacher or lab assistant is not available. The tutorials open in a small display window and can be viewed simultaneously with the application they are learning for quick and easy reference. The Quicktime® format allows students to pause, reverse or fast forward the tutorial in order to view the exact process in question and to view it as many times and at what ever speed they wish.

Reports in the literature attest to the successful use of similar video vignettes to support classroom instruction in a variety of different disciplines. Their use in training teacher candidates is proving equally successful. The ISTE standards are a prime focus of our educational technology curriculum and as candidates progress through their course of study they not only learn and practice the use of technology in the classroom, they are also mastering the tools necessary for creating and maintaining an electronic professional portfolio. SnapzPro® is proving very useful in preparing artifacts for their portfolios that demonstrate competencies described in the ISTE standards. For example, a student can create a screen capture "movie" documenting their step by step creation of a PowerPoint® presentation. Because this advanced screen capture application includes a synchronized microphone capture option, candidates can narrate the process and add important pedagogical notes and/or personal reflection to their computer demonstrations that are destined for their portfolios. Even more powerful is the use of the microphone capture to record a candidate's lecture synchronized to the presentation slides demonstrating their skills of appropriate use of presentations in the classroom.

Every hardware, software, or Internet application introduced to our candidates is taught and practiced at four levels: 1) basic functions of the application is demonstrated by the instructor, 2) candidates demonstrate basic mastery through projects that require direct application to a teaching problem or situation, 3) use of the application in the classroom is modeled by the instructor, and 4) candidates demonstrate appropriate use of the application in the classroom via individual or group projects (most often these projects reflect their emphasis or major area of study.)

Educational technology faculty at Southern Utah University are pleased with the teaching/learning outcomes resulting from our ongoing use of SnapzPro as a part of our educational technology repertoire. Online tutorials, creating portfolios and modeling new teaching strategies make advanced screen capture software a very useful tool and we encourage educational technology faculty to consider this inexpensive and easy-to-use application as part of their instructional strategy.

eBooks for Education

Terence Cavanaugh, Ph.D. Curriculum and Instruction, University of North Florida, Jacksonville, FL USA.
tcavanau@unf.edu

Cathy Cavanaugh, Ph.D. Curriculum and Instruction, University of North Florida, Jacksonville, FL USA.
ccavanau@unf.edu

Abstract: An eBook is a form of publishing in a digital medium. Because reading is a basic component of most educational activities, providing alternative formats and supports for reading activities becomes necessary to reach all students, especially special need students and distance learning classes. Digital or electronic text offers options such as Text -to-Speech that provide users additional modalities for receiving the information. New tools now allow readers to interact with the text to the extent of taking notes, marking, highlighting, drawings, bookmarks, searching, and even interacting with associated dictionaries. With modern editors eBooks can be easily created from web or word-processed documents. By creating their own eBooks and using available online libraries, instructors can expand the accessibility and ease of use both for themselves and their students.

The eBook

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The ability of some eBooks to use Text -to-Speech programs offers users an additional modality for receiving the information. According to CAST (Center for Applied Special Technology), in order "to reach learners with disparate backgrounds, interests, styles, abilities, disabilities, and levels of expertise" educational materials should be flexible and adaptable for all learning styles (1998). Studies have found advantages of using electronic text technology applications with struggling readers because of the nature of electronic text over paper-based (McKenna, Reinking, Labbo, & Kieffer 1999). Anderson-Inman and Horney (1998) indicated that students benefit from the scaffolding advantages of voice output, online dictionaries, and note taking offered by electronic text to achieve success in learning. Standard print text can create a barrier for dyslexic and visually impaired students. Ebooks make information more accessible to students with disabilities. Material in digital form offers many advantages for students with or without disabilities.

Unique features

EBooks have features that traditional paper books do not – users can control the look and feel of the eBook, and also save notes, highlights, and drawings within the eBook. Another advantage is size; the amount of text in a book takes no additional space in an eBook, and the only limit on the number of books that can be stored is the memory available. A study conducted by Simmons College researchers found that the average weight of a backpack in middle school was twenty pounds, and that more than half of the participating students carried loads that were heavier than 15 percent of their body weight (Petracco 2001). Doctors suggest that to avoid injuring the body, never carry more than ten percent of bodyweight (ICPA 1998). The ability to carry many books, references, and resources electronically allows users to make better use of the information, with just-in-time educational advantages. According to one eBook company, using the PDF format a gigabyte of storage could contain over "200 illustrated college reference books, or 350 legal volumes, or about 2,500 600-page novels" (Munyan 1998). The eBook system allows users to have volumes of information either at their desktop or within their pocket. Distributing paper documents among colleagues or students traditionally requires expense in both time and money. EBook files can easily be sent through e-mail or made available on the web.

Education applications

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The future

The electronic book is by no means finished in its development. Hopefully in the future there will come a time when one content format is finally agreed upon. Currently companies are working on adding audio, video, and text-to-speech components for eBook software. Online bookstores are expanding their holdings of eBooks, with some of the college bookstore organizations including eBook forms of texts. As handheld computing devices continue to improve in their abilities and continue expand their market, it is expected that eBooks will expand with them.

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Building a Statewide K-12 Digital Library

Cellestine Cheeks, Towson University, US

A majority of academic and public libraries have formed partnerships and established some of the most dynamic networks in the history of libraries in the United States (Carver, 1999; Okerson, 1996; Uball, 1994). This major achievement has been accomplished in several states because of the concerted efforts exerted by librarians, educators, and legislators to provide equity for all students (Olsen, 2001). Colleges, universities and public libraries recognize the potential of being able to deliver access to research information to all clients upon demand (Pearlmutter, 1999; Walters, 1998). Libraries in K-12 schools should be considered essential to the success of any school, given mandated state proficiency tests in many states. Students need resources, and libraries are the places for these resources. This paper proposes to describe the process that is being used to build a strong statewide digital library collection.

The strategy used to design the planning for a statewide K-12 digital library system relied on the research conducted for college and university networks developed in the states of California, Illinois, Michigan, North Carolina and Wisconsin, and the state models involving school libraries existing in the states of Alabama, Ohio, Delaware, and Texas. The concept of defining a digital library, why it is needed as well as why a state network is necessary is presented. The role of the collection development team, technology support team, the political support, as well as the negotiations with vendors to put this project into action is detailed.

This paper presents the challenges faced by a collection development team in the process of building a statewide digital network in the K-12 community, as well as the positive impact of team collaboration to the success of the project. The goal of this project is to provide equity to all students at the K-12 level so that when they reach the college and university level they will be able to utilize digitized images, audio and video in existing network collections.

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MediaMakers Produce CareerCommercials: The Softer Side of Technology

Professor Joanne Clemente
School of Education
New York Institute of Technology
Marlene Natale
Sewanhaka School District
United States
jclement@nyit.edu

Abstract: What motivates a young woman to choose a particular career path? Are glass ceilings yet shattered? How can we use the allure of television commercials to interest the next generation of young women to expand their horizons, perhaps choose careers outside their visible range? This community service project focuses on the utilization of NewMedia skills to develop career "commercials" with auxiliary web content for display at a local Children's Hospital. This project, then serves three purposes: developing young women's awareness of career choices; developing young women's technology skills to encourage higher education and career choices in Science, Engineering and Technology; to provide community service and career counseling to an underserved population at the Hospital.

Research Background:

The Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development states, "As we enter the twenty-first century, U.S. jobs are growing most rapidly in areas that require knowledge and skills stemming from a strong grasp of science, engineering, and technology. In some quarters—primarily information technology—business leaders are warning of a critical shortage in skilled American workers that is threatening their ability to compete in the global marketplace. Yet, if women, underrepresented minorities, and persons with disabilities were represented in the U.S. science, engineering, and technology (SET) workforce in parity with their percentages in the total work force population, this shortage could largely be ameliorated. Now, more than ever, the nation needs to cultivate the scientific and technical talents of all its citizens, not just those from groups that have traditionally worked in SET fields. Women, minorities, and persons with disabilities currently constitute more than two-thirds of the U.S. workforce. It is apparent that just when the U.S. economy requires more SET workers, the largest pool of potential workers continues to be isolated from SET careers." The report goes on to say, "**Active discouragement and the dearth of out-of-school SET experiences and role models contribute to girls' lack of interest in SET careers**."

The report also cites another problem, "The public image of scientists, engineers, and technology workers is often both inaccurate and derogatory. In addition, women, underrepresented minorities, and persons with disabilities are not adequately portrayed by the media as participating in SET careers." **The commission offers many recommendations, including:**

- High School: "The Commission recommends the expansion and institutionalization of successful school-based and nonschool-based enrichment programs to (a) identify—through the use of authentic, nontraditional assessments that account for the differential experiences of students—potentially able students from underrepresented groups that have been plagued by inadequate educational opportunities; and (b) enroll them in accelerated academic preparation programs. Federal, state, and local partnerships should be established to identify and fund these intervention programs at an appropriate level."
- Financial Support: The Commission recommends that the federal and state governments significantly expand financial investment in support of underrepresented groups in SET higher education

In another, more recent, source, the Report from the Council of Economic Advisors Opportunities and Gender Pay Equity in New Economy Occupations of May 11, 2000, two problems are mentioned: employment gap and pay gap. "However, an important gender employment gap exists in these IT [information technology] occupations. Women are currently underrepresented, making up only 29 percent of these occupations, compared with 47 percent of the workforce in the general economy"...There is also a gender pay gap within IT occupations. A woman with median earnings in IT earns about 22 percent less than a man with median earnings....Part of this gap stems from differences in age, education, race, and occupational composition. Taking these factors into account lowers the gap to 12 percent—a gap similar to that estimated for the labor market more generally:.... The gender pay gap narrows sharply for women in IT who have higher levels of education."

The report further states, "**Policies that assist women in their career development, such as on-the-job training and mentoring, can also enhance women's investment in these occupational skills and their retention rates, and can thus be expected to help close the gender wage gap."**

Description of Project:

This proposal describes the collaboration between New York Institute of Technology, the Sewanhaka School District and Montefiore Childrens' Hospital. Through the collaborative efforts of undergraduate/graduate and high school girls, this project focuses on developing the skills necessary to produce non-broadcast television commercials and auxiliary web content on careers, including interviews, educational advice and expert mentors. These "CareerCommercials" and web sites will "air" at Montefiore Children's Hospital bedsides where there are installed, state-of-the-art, plasma screens at each bedside. Montefiore Children's Hospital services an underserved population. This project will address the need to encourage these young patients to pursue higher education, as well as to inform them of the many career choices currently not emphasized in minority communities. This project provides the important benefit of encouraging high school girls to pursue college educations, science and technology careers, and community service. Standards involving the integration of technology, using technology as a tool and research using technology are integral to this project. Rubrics will promote uniformity in evaluation and quality.

In their own words, the students involved in this program will virtually or physically present to the audience why they wanted to participate, what information they needed to know, and how they went about researching and presenting such information. Presenters will show documentation of their progress and report on their attitudes, skill development and career consciousness at each stage of the process. Using technology as a tool, young women seek to satisfy their own quests for information and produce a tangible result that will benefit other students, male or female as well as underserved hospitalized students. Additionally, since products are web-based, its continuous availability assures that hospitalized children, even when released, will have further access to the same content. Products from this project will be displayed and described.

Those attending this presentation will be encouraged to join this project in order to make this a national effort that reaches out to all high school students, to expand their knowledge of career choices, and in particular, encourages underserved populations to seek additional educational opportunities. While this project will initially focus on encouraging young women to acquire SET skills, any student will be encouraged to participate.

This program serves many objectives:

- High school girls will be exposed to college attendance, additional career choices and technology through their relationships with college students and professors and through their participation in this project.
- College Undergraduate/Graduate students will develop leadership as well as technology skills through their involvement in this project as mentors.
- Participants will gain experiences in the use of technology both as resource and as tool and will be better prepared for possible SET careers.
- Participants will gain professional skills and add to their "portfolio" of work, useful for future education or employment.
- The image of Science and Technology Professionals can be enhanced using the media to demonstrate Women in SET careers
- NETS standards are the guiding principles used to integrate technology into this project.
- Rubrics will guide additional participants to produce career commercial and auxiliary web content.

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The Internet Textbook: Change and Opportunity

Tim Collins, National-Louis University, US

Abstract

Textbooks in one form or another have been a part of education since the written tradition began. Nevertheless, textbooks have changed drastically over the years in response to technology and changing needs, and textbooks will continue to change as society redefines its needs and uses new technology to better achieve those needs. The Internet now offers the potential of remaking textbooks completely. Though it is certain that the Internet will change textbooks, it is difficult to predict exactly how they will evolve. Nevertheless, it is possible to discern factors that will influence their future direction and development. This paper focuses on three major factors that will drive the development and evolution of the textbook in the twenty-first century: (1) the scarcity model for publishing and information technology, which was the foundation of traditional print publishing and current copyright law, is no longer appropriate for Internet publishing; (2) interactive, Internet-delivered textbooks will truly honor multiple forms of discourse, in many cases forms of discourse that are not currently validated by the academy; and (3) the multiplicity of skills and content expertise required to create these textbooks will cause the roles and functions of author, editor, and so on to change.

In the words of Yoggi Berra, "Making predictions is hard, especially when they're about the future." This statement is especially true of the impact of technology on our lives. Though it is virtually certain that technology will change our lives, the outcomes are not yet clear. Hundreds of innovations, such as widely available hand-helds, new kinds of wireless connectivity, universal Internet access, and wide access to broadband connectivity, have the potential of transforming our lives in ways that many of us never imagined even a few years ago.

This paper focuses on the impact of technology on one key artifact of the educational system: the textbook. Textbooks in one form or another have been a part of education since the written tradition began. Nevertheless, textbooks have changed drastically over the years in response to technology and changing needs, and textbooks will continue to change as society redefines its needs and uses new technology to help better achieve those goals.

The comprehensive textbook, with illustrations, ancillaries (such as workbooks, study guides, audio programs, flash cards, manipulables), and teacher's editions, is a relatively modern invention. The earliest textbooks were probably scripture, since in most societies, scripture was the most universally accessible, if not the only accessible written text. Many subsequent early textbooks incorporated selections from scripture in them, too, since one of the most culturally important reasons for becoming literate was in order to be able to read scripture. The first graded, or multi-level, textbooks, such as the McGuffy's Readers series, emerged in response to universal public education, when industrial models began to be applied to mass education and children were expected to enter school at a certain age and progress though grades of instruction on an annual basis until they finished. The first comprehensive teacher's editions, which gave teachers detailed instructions on how to work through each page with students, were developed in the early 20th century by the first publishing company to focus exclusively on the educational market, Scott, Foresman and Company. This company's series of readers, including the Dick and Jane series, were the first true basal reading series with comprehensive teacher's editions published in the United States. This company's products set the standard for basal textbook publishing in all disciplines and were imitated by a host of competitors. In college textbook publishing, a similar series of developments took place, as companies developed textbooks for the major college courses and progressively added ancillaries for competitive reasons.

Technology played key steps in each stage of the development of the textbook. As printing and typesetting technology improved, companies found that they could produce books with added features such as full color illustrations. Development of sound recording made possible recorded audio programs, key ancillaries for foreign language and music series. Faster and cheaper ways of setting type (such as the demise of hot metal and its replacement with cold type and later with electronic typesetting and page composition) also dramatically lowered costs and time to market, which allowed for shorter production times and more up-to-date content. Companies also began introducing software supplements, such as test generators, computer simulations, drill-and-practice software for math, reading, and language arts, and even Internet sites.

Now the Internet has the potential of allowing us to remake textbooks completely. It is difficult to predict how textbooks will evolve, but it is possible to discern some of the factors that will influence their development. Three major trends will drive the development of the textbook in the twenty-first century.

1. The scarcity model for publishing and information technology will no longer be appropriate.
2. Textbooks will truly honor multiple forms of discourse.
3. The multiplicity of skills and content expertise required to create books will cause the roles and functions of author, editor, and so on to change.

First, traditional publishing has been based upon an information scarcity model that is not appropriate to Internet publishing. Copyright laws essentially grant a monopoly to the owners of intellectual property that allows them to charge as much as the market can bear for their products. This has ultimately created a vicious cycle in which, at least in the college market, price increases drive increases in used book sales, which drive further price increases and faster revision cycles, which in turn drive additional used book sales. In fact, statistics from the Association of American Publishers indicate that nowadays many students are failing to buy a book at all because of cost. Most other students keep their books only through the duration of the course and then sell them back to the bookstore, a sad statement of the value proposition college textbooks provide. In elementary and high school publishing, high prices drive many less affluent school districts to put off new book purchases for as long as possible, leading in some cases to situations such as one that happened a number of years ago in Texas, in which textbooks then in use indicated that the Soviet Union was still in existence, when in fact it had been dissolved for several years.

Clearly this is not a very desirable situation: as the price of information increases it becomes less valuable to acquire. An information abundance model, therefore, would provide more acceptable results: as information becomes more accessible its value increases. Take, for example, the case of on-line journal indexes with full-text access. The ease of use, including access from any computer anywhere, makes it much more likely students will use periodical resources in electronic formats than if they were to use paper copies of indexes such as the *Reader's Guide* and then go to the stacks to find paper copies of the articles or, in the case of the library at one school I attended, wait for a page to retrieve the requested volumes from the stacks. Other advantages are savings in library bindings of periodicals, costs for shelving and retrieving copies, costs associated with keeping track of checked out books, and so on. Clearly, in this example, everyone wins: access to information is cheaper and easier, which motivates people to use periodical resources more than they would have than in the past, and allows libraries to use their limited resources to acquire more materials. By applying the economies and speed to market offered by online delivery of textbooks, prices would go down. Students and school districts would be more motivated to buy them, professors would be able to assign additional books because the total bill would be more manageable, and students would be less motivated to buy used books because new books could be updated each semester or year. In this situation, everyone wins.

Second, technology will motivate textbooks, and the academy, to honor multiple forms of discourse. In the past, the bellwether of a serious academic text was page after page of dense type, broken up, if at all, only by graphs, tables, and charts. One of America's most respected serious literary magazines, *The New Yorker*, did not publish illustrative art in its articles at all until well into the 1990s. Textbooks nowadays have copious illustrations, but technology will enable many different forms of discourse to be added to textbooks, from sound files (such as quotations from historical figures in history and political science texts and speech samples in linguistics books), to streamed media, to animated illustrations. Imagine, for instance, how wonderful it would be if a biography of Shakespeare allowed us to see and hear actors performing, take a virtual walk through a multidimensional Elizabethan theater, hear Elizabethan music, and see films of places Shakespeare probably saw. The advantages of this type of learning tool over a two-dimensional, static printed page are multiple, and to the benefit of everyone.

Finally, technological change will cause the traditional tasks and roles of educational publishing to change. Already, the changing economy has caused similar changes in other sectors of the workforce. Doctors, for example, no longer make all decisions about managing patients' health care. Health maintenance organizations and insurers have taken over much of this responsibility. The functions of author, editor, and book designer will be redistributed, and new roles will be added such as that of instructional designer. The author will be less the architect of the pedagogy and more a content-matter expert, and the instructional designer will help the author tailor the delivery of the content to the technological resources available. The editor will deal with not only words and pictures, but also have to manage the creation of multimedia. The role of editor will become more akin to multimedia project manager and less a shaper of words, and the content editing may in fact be delegated to another person in charge just of this one small aspect of something has become a much larger process. Clearly, this change implies that roles and responsibilities will be debundled and rebundled, and individuals working in textbook publishing will have to brace themselves for considerable upheaval.

Ultimately, this change will also affect the very notion of authorship. The trope of single author-single text arose during the Romantic period, and is a notion that will diminish in importance as the collaborative, team-based approach necessitated by technology takes hold. There will be more "managed books," and publishers may need to find new ways to acknowledge all of the different collaborators in a publishing project.

Technology, then, promises to change textbook publishing in a number of key ways. First, it will obviate the scarcity model on which publishing had been traditionally based, and replace it with a model in which the value of information increases as it becomes more accessible. Second, technology will result in the creation and validation of multiple forms of discourse that will enrich the educational experience. Third, because of the variety of skills and expertise needed to build interactive textbooks, the notion of authorship will change and more collaborative development models will become the norm. The net result will be as fundamental a change to the production and notion of the textbook as the changes caused by the development of moveable type.

Teacher development through curriculum development – teachers' experiences in the field-trialling of on-line curriculum materials

Tony Fisher University of Nottingham School of Education, England tony.fisher@nottingham.ac.uk
Tim Denning Keele University School of Education, Keele, England t.j.denning@educ.keele.ac.uk

Abstract : This paper reports on the experiences of teachers participating in the field trials of new on-line curriculum materials and associated technologies in the UK. During the period January to July 2001, teachers in 60 secondary schools in England participated in the trialling of on-line curriculum materials in Mathematics, Japanese and Latin. The three subject projects differed in a number of respects, but overall the teacher response was extremely positive and revealed a number of consistent trends relating to aspects of teacher development that ran across the differing subject settings.

Background

Since the early 1970's a sequence of government initiatives can be identified, with the underlying aim of increasing the use made of computers in schools in the UK (see for instance Watson, 1997, for a summary). More recently we have seen the planning and development of the Inernet-supported 'National Grid for Learning' (NGfL) as part of a wider strategy which also includes training for new and serving teachers, and requirements for the use of information and communications technology (ICT) within the statutory framework of the National Curriculum. Of course, though aspects of the strategy are particular to the UK, the underlying purpose has also been recognised and is being addressed elsewhere.

"The aim of many policy-makers in the UK and around the world is to encourage evolution into a learning society... one in which all people are responsible for their own learning throughout their lives. Access to information and learning will often depend on new technologies as well as on an approach to teaching which supports collaborative professional development.

Governments in Europe and around the world have already recognised the need to review educational practices and incorporate new technologies. Their view is of a vocational imperative and one in which IT will increase the quality and efficiency of learning itself." (Somekh et al,1997)

Part of the NGfL strategy is to ensure that all secondary schools will have a high bandwidth Internet connection. This, together with internal networking in schools, will enable the use of Internet-delivered digital curriculum materials for learning and teaching within subject classrooms. It is within this developing context that the project reported here took place.

The KS3 Subjects Online Project

In 2000 the Government's Department for Education and Employment (DfEE) invited tenders for the development of technology-based subject courses for a year's worth of study in three subjects: mathematics, Latin and Japanese. The project sought to stimulate the development of "state of the art computer based programmes for teaching numeracy, classics and non-traditional languages; exploiting the full creative multimedia interactive potential of these technologies".

Three developers with experience in writing multimedia curriculum materials were contracted to develop materials in the three subjects and to set up field trials for the materials. The developers were under a contractual requirement to produce materials that met a number of criteria relating to technical and other aspects. Among these were that the materials should be sufficient for a year's worth of study and should be targeted at Year 7; further, the materials should be capable of both mediated and unmediated use by learners. A further requirement on the developers was that they should set up the use of the materials in twenty schools per subject, together with use by 'independent learners' working in unmediated contexts, so that the use of the materials could be evaluated in a variety of contexts. In the case of mediated use in schools, which is our focus in this paper, teacher-mediators might or might not have a specialism in the subject in question.

The three individual subject projects used differing approaches to the development, dissemination and support of their particular materials. In the case of Japanese, the materials were designed wholly for on-line delivery by means of existing technical resources and used a variety of animated cartoon characters and high quality audio to engage students in an 'immersive' approach to language development. This was complemented by on-line assessment activities. The materials required no particular input or mediating activity on the part of a teacher.

The mathematics materials were designed for delivery within an on-line 'managed service' framework, using dedicated hardware and an interactive whiteboard to support a wide variety of software-based learning activities. These were used to support whole class teaching designed to conform with the Key Stage 3 National Strategy for the development of numeracy, complemented by an on-line planning tool and mark book for teacher use, and student access to 'Sub Patrol', a Web area of mathematics activities and games. With the exception of the latter, a high level of teacher mediation was built into the approach adopted for mathematics.

The Latin project employed CD ROM technology to deliver local 'media rich' content and learning activities, including a large amount of video material, linked to on-line facilities for the management of content by the local teacher. There was also provision for electronic submission of written work to and from a designated 'e-tutor'.

The three subject projects also differed in their approach to training and support for the teachers involved in the school-based trials. In the case of the mathematics project, there were regular face-to-face training sessions for the whole group of project teachers, on-line community building and support, a help desk and regular school visits by the developers. In the case of Latin, there were two training events, technical support and visits to schools, in addition to on-line e-tutor support. In the case of Japanese, there was a launch event, regular electronic newsletters, a telephone help-desk and school visits.

Methodology and Data

The external evaluation employed an eclectic methodology including qualitative and quantitative aspects. Throughout the evaluation there was contact between the evaluators and the developers, with the evaluators providing formative feedback for later development cycles. There was also contact between the external evaluators and the internal evaluation being undertaken in each project. In addition, the evaluators were in regular dialogue with the project managers at British Educational Communications and Technology Agency (Becta), and with a project management group including representatives from the DfEE. The evaluation drew upon Robert Stake's responsive evaluation model (Stake, 1979), which makes use of a variety of methodologies as negotiated through and informed by discussion with key participants during the life of the project.

The research design made use of triangulation procedures, involving classroom observation of the materials in use by teachers and students, teacher interviews and postal questionnaires, and student interviews and questionnaires. Interviews followed a 'semi-structured' approach, and were recorded on digital mini-disk. Additional data about the background to the use of the materials, and responses to the materials themselves, were gathered by postal questionnaires completed by teachers and students. Information about the schools themselves was provided by the developers.

Interview data were collected from 44 separate school visits undertaken by the evaluators. These incorporated more than 60 staff interviews and group discussions with more than 250 students. Survey responses were received from 534 students and included nearly 500 individual comments about the resources. The main teacher questionnaire was completed by 43 teachers whilst the end of project survey was completed by 26. An established subject specialist also reviewed each of the subject resources.

The field recordings of interviews with teachers and students were subjected to content analysis. The questionnaires were subjected to quantitative analysis, supplemented by qualitative analysis of comments made in response to open questions. A final report covering the contracted evaluation aspects was produced and submitted to Becta for the DfEE.

During the field visits to schools for data collection, and through their contact with teachers, the evaluators became interested in the impact of the experience on the professional development of the teachers involved in the trials. Although this was not a major component of the contracted evaluation, it is upon this aspect of the project that we focus here.

Three illustrative 'vignettes'

Aspects of teachers' experience are illustrated by the following three vignettes, one from each of the three subjects, drawn from observations conducted during school visits. Though none is in a strict sense 'typical', these vignettes have been chosen to give an impression of the impact of involvement in the projects on the teachers involved. In each case the teacher is referred to by an alias.

> *Vignette 1*
> *Drew has three years' experience as a teacher of mathematics. He had not used an interactive whiteboard before becoming involved in the project, but had used powerful computers in a previous career. In the observed lesson he made extensive use of the interactive whiteboard (the only one in the school) both for direct teaching and for students to demonstrate their work. He set up a number of separate activities involving the use of three desktop workstations and a set of programmable graphical calculators. He commented that he had to invest a lot of time in preparation initially, as he was familiarising himself with the activities and the use of the technology, but he has become faster as he has become more familiar with the approach. He and his Head of Department are negotiating with the school for the purchase of another interactive whiteboard, as their evaluation of its impact as a tool to support teaching and learning in mathematics is so positive. He will train his colleagues in the mathematics department in technical and pedagogical aspects of its use. Other departments are also showing an interest.*

> *Vignette 2*
> *Kathy has been teaching English for five years. She describes herself as having been rather resistant to the use of new technologies before becoming involved in the Latin project. She has become a much more confident user of the technology. Kathy had to develop a productive working relationship with the school's ICT technical support in order to receive assistance and advice regarding local technical issues. As a trained English teacher Kathy has also had regular e-mail contact with a project 'e-tutor' who as a Latin specialist advises her on aspects of supporting learning in Latin. Kathy did not wish merely to supervise computer-based activity; rather, she saw her role as facilitator in terms of adding value pedagogically. She puts in a lot of preparation time at home on a portable computer provided by the project. Latin lessons with a volunteer group of students take place weekly after the end of the normal school day in a purpose-built computer room. In the observed session Kathy introduced the lesson and directed the students to relevant parts of the materials. Students then accessed a revision activity from among the materials which had been placed on the school's curriculum network server. Kathy concluded the lesson with a group debrief during which she used a data projector.*

> *Vignette 3*
> *Susie has five years experience as a teacher of Japanese. The observed lesson was a timetabled lesson in a school where Japanese is an established subject. Susie had tried to use the on-line materials with her whole class of 28 students, but the school's Internet connection was not of sufficient bandwidth for that number of simultaneous accesses to the materials, and download times became unacceptably slow. Susie had therefore developed an approach in which, after a whole class introduction to the lesson, she divided the group into two halves. Half stayed in the normal classroom undertaking teacher-initiated activities, whilst half went to a nearby computer room to use the on-line materials. Susie supervised activity in both locations, moving back and forth between the two. At the mid point of the lesson the two half-groups changed over, and the lesson concluded with all students in the computer room where Susie made use of an installed data projector to conduct a plenary session involving an adapted use of part of the on-line materials.*

Results

In general the project increased the participating teachers' use of new technologies, as illustrated by the vignettes. Previous use varied from a very low base in some cases, including no previous use in the teaching situation at all in the case of some teachers. This was as a result of one or both of two factors: a lack of pedagogical confidence in the use of new technologies in the teaching and learning situation, and a lack of ready access to the necessary technological resources for the subject concerned. In other cases individual participating teachers reported a relatively high base of pre-existing use of new technologies in the teaching situation. However, in each subject all teachers said that their teaching had benefited from the use of new technologies employed by the three subject courses, and most felt that their students are motivated by the use of computers.

In terms of the development of participating teachers, several trends may be discerned. All put in additional time for planning and preparation, as they became familiar with new materials and approaches. They were given no release from other commitments in order to support day-to-day participation, so the additional time was above and beyond a full teaching load. *"I've found it hard work this year and you have to put a lot of time aside for it... I wouldn't have taken it up if I didn't think it was worth it."* (Maths teacher, interview)

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In some cases teachers were supervising the project lessons outside normal timetabled lesson time, as this was the only time that access to the necessary computers could be arranged. This was not so in mathematics, where a dedicated, specially equipped project classroom was set up. However, in the case of the Latin and Japanese projects, many teachers found themselves competing for access to the necessary technologies. For instance, *"The Languages Department at my school does not have regular (or occasional) access to the ICT suite at present and so using ICT in my teaching is limited... I have therefore been piloting the project with a small group of after school Y8 and Y9 pupils."* (Japanese specialist teacher, teacher questionnaire)

In a majority of cases teachers had relatively problem-free experiences of using the technology, though in some cases initial technical difficulties had to be overcome. The developers provided technical support to address these issues. Some teachers reported becoming much more confident, developing their own use of new technologies: *"Use of this material has made me much happier to develop and experiment with other aspects of ICT."* (Latin specialist teacher, teacher questionnaire) In some cases the use and impact of specific technologies was identified, for instance *"If I had to choose one thing that would change my classroom it would be the interactive whiteboard. The effect of the whiteboard is immense."* (Maths teacher, interview) Where technical problems were experienced, some teachers were cautious about using technology-based approaches; for example, *"If our school network works all the time, this project will be really successful and I would like to use it for my normal lessons with Years 8 and 9 but at this moment, I cannot take a risk."* (Japanese specialist teacher, teacher questionnaire) No teachers reported a negative response to the general use of the technology; where reservations were expressed these were in the context of an overall positive response, and related to matters of detail.

Teachers in all subjects responded strongly to the new materials. This was equally the case with newly and recently qualified teachers, and those who were several years further on in their careers. *"In my career in teaching Mathematics this style has had the greatest impact upon learning and motivating students in maths as anything I have experienced."*(Maths teacher, 20+ years experience, teacher questionnaire.) In some cases experience with the project materials resulted in increased aspirations for work with other groups; for example, *"I'd just love to use this say once a week in my normal Y7 and Y8 Japanese lessons."* (Japanese specialist teacher, interview)

In some cases it was clear that exposure to technology-based approaches had prompted teachers to reflect on their own teaching and on how it could be supported or enhanced by the use of new technologies. For instance, *"What I think I would like to use it for in the future is ... to teach specific points while I'm teaching - just stop and ... like "now we're going to look at the website"... just using it as an exciting little thing that you do in the lesson."* (Japanese specialist teacher, interview)

In other cases teachers articulated a direct impact on their classroom practice:*"It's less of me having to draw things up on the board and that sort of thing and I've actually got more time to do the teaching and to wander round the room - I don't have to be the one controlling that* [interactive] *whiteboard...it changes the focus for me and it changes the focus for them."* (Maths specialist teacher, interview) *"My* [project] *lessons are much more structured than my normal lessons - the students are much more involved in discussing their work, strategies, misconceptions etc. The pace is much faster and interest and motivation has been higher."* (Maths specialist teacher, interview) *"There are some things on there that introduce it just as effectively as a teacher working with a group... they can practise really easily... and come back and teach the rest of the group what they've been practising."* (Japanese specialist teacher, interview)

For some teachers, involvement in the project had gone so far as to have been a transforming experience: "*I think it's been absolutely fantastic... I've enjoyed it, the students have obviously enjoyed it ... to start off with it was "I'm just trialling these materials for* [developer]*," and what it's actually become is, it's totally changed my way of teaching so it's actually been a development for me...*" (Mathematics teacher, 9+ years experience)

Discussion and conclusions

Though experiences varied between the three subjects, overall the teacher response was extremely positive. Teachers reported that the experience of being involved in the field trials of the materials had been a professionally developing experience. All had become more aware of the opportunities for using networked and other technologies to support teaching and learning. They had also become more confident and competent as users of the technology required by their particular subject project. In addition, a number of teachers had quickly become adaptive users of the project materials, particularly when local circumstances made this either necessary or possible. Their pedagogical confidence and pedagogical competence (Wild, 1995) in the use of new technologies developed through mutually reinforcing development processes. This was a powerful aspect of teachers' experience during the projects.

Much of teachers' learning over the course of the projects reflects notions of 'situated learning', where the activities resulting in the learning are embedded in the social and physical contexts where the learning is to be used (Brown et al, 1989) – in this case the teachers' own classes. This is related to the feed-back and feed-forward processes operating in the development of pedagogical confidence and competence described above.

There are indications that teachers involved in the projects are engaging to a greater extent in broady constructivist practices. Questionnaire responses show 'whole class teaching' to have been the dominant mode employed by teachers in all three subjects prior to their involvement in the project. Whilst it is not possible on the basis of the KS3 subjects on-line project to say that the use of new technologies has shifted teachers' practice in a constructivist direction, direct observation of, and discussion with, project teachers indicate the presence of what Becker and Reil (2000) refer to as 'constructivist compatible' practices involving the use of new technologies associated with the subject materials. The Teaching, Learning and Computers study (Becker 2001) demonstrated that teachers with a constructivist-oriented philosophy were more likely to use computers in their teaching, and also that their practices became more constructivist as a result. Further longitudinal study would reveal if that were to be the case with the teachers in the KS3 subjects on-line project.

Becker and Reil (2000) also identify a relationship between what they describe as 'professionally engaged' teachers (as opposed to 'private practice' teachers) and the use of computers. Again, there are indications of the same relationship in this study. The teachers in the KS3 subjects on-line project were willing to engage in the trialling of new curriculum materials at some considerable cost to themselves in terms of time and extra effort. They were willing to open their practice to outside scrutiny in what was for them a relatively high risk, experimental setting involving considerable innovation and task complexity. This fits with aspects of Becker and Reil's definition of being 'professionally engaged' and demonstrates aspects of what Hargreaves and Goodson (1996) describe as 'postmodern professionalism'.

The use in two of the three subject projects of portable computers by participating teachers, enabled them to undertake considerable self-training in terms of familiarisation with the materials at home, with the portability of the computer and access to the Internet enabling a "further blurring of the spatial distinction between home and school" (Fisher 1999). This use of portable computers to support self-driven teacher development is consistent with the findings of the earlier Multimedia Portables for Teachers Pilot. (Harrison et al, 1998)

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More Than A Movie: Using Animation to Promote Learning of Complex Subject Matter

Joseph Frantiska, Jr. Ed.D.
Visiting Lecturer
Computer Science Department
Fitchburg State College
USA
jfrantiska@aol.com

Abstract: The field of New Media allows for the examination and greater understanding of complex possibly arcane subject matter. One such type of subject matter is tornado formation. This area of scientific information is filled with misconceptions and myths. An animation is a means by which the internal mechanism of tornado formation can be explained. Through such an examination and manipulation of an animation it can be ascertained not only that there is a specific sequence of events of tornado formation but also that there exists distinct stages of the developmental process. The word "manipulation" is important since the learner can view the animation either as a flowing series of images or as distinct images each of which can be individually examined as to it's contribution to the process. This is a subtle yet important empowerment of the learner who is able to perform self directed learning within a structured environment.

Introduction

The stages of tornado formation are unveiled to be themselves as collections of subtle processes in a tremendously dynamic environment. In depth knowledge can be gleaned from each of the processes as individual phenomenon as well as contributors to the whole sequence. A constructivist approach can thus be used to understand this event. From a pedagogical standpoint, this can present the educator with both a unique teaching tool and a greater responsibility to fully understand and explain the phenomenon at both a macroscopic and microscopic level. The impact of this on the teaching process is also examined. The students were split into four groups based on their apparent misconceptions (internal formation process, external formation process, similar phenomenon, no misconceptions). Each group was instructed to enter the website where they saw images, sound files and text that presented counter-examples in a hope to reverse misconceptions and reinforce correct conceptions. All group members saw the animations last. All students were given pre and post-test where they wrote and drew their current understanding of tornado formation.

Theoretical Basis

Cognitive Flexibility Theory (CFT) forms the basis for this study. The main principles of CFT are that learning activities must provide multiple representations of content while instructional materials should avoid oversimplifying the content domain and support context-dependent knowledge. Instruction should be case-based and emphasize knowledge construction, not transmission of information. Knowledge sources should be highly interconnected rather than compartmentalized.

CFT supports the use of hypermedia for learning and provides several design prescriptions for hypermedia that seeks to promote flexible use of complex knowledge. Among these prescriptions are: a.) using case studies to learn abstract concepts instead of learning facts that are removed from their context., b.) presenting information from a variety of perspectives and representations; c.) stressing the complexity of knowledge over the isolation and decontextualization of knowledge, d.) stressing the network and relationships among knowledge; and e.)

involving the learner in the construction of new knowledge via problem-solving tasks rather than the recitation and memorization of facts and concepts.

In CFT, one learns akin to "criss-crossing conceptual landscapes". Issues involved are analyzed in different contexts and from different perspectives. The instructional medium makes such criss-crossing possible and knowledge representations reflect the "criss-crossing that occurred during learning". The criss-crossing nature leads to knowledge structures that can be likened to a web-like form. Hypermedia is particularly well suited as a means to impart these knowledge structures.

Hypermedia based on CFT fall under the constructivist psychological perspective. Constructivism calls for learners to actively participate in the shaping of their own knowledge structures rather than passively receiving facts and concepts. Differing perspectives on constructivism and student engagement range from mechanistic, exogenous views of dependent learners assimilating information given them to organismic endogenous views of independent learners who seek information on their own and accommodate it with pre-existing knowledge into personally relevant constructs.

Where CFT falls short of constructivism, according to Jacobson, et. al. (1996), is in the provision of social context and collaboration. At the center of the constructivist continuum lies the social, dialectical constructivist movement where interactions between the student, instructor, and environment provide the foundation for learning. According to Spiro et al. (1990), popular social constructivist approaches include cognitive apprenticeships and modeling, cooperative learning and reciprocal teaching, and scaffolded instruction in Vygotskian "zones of proximal development" as discussed by Berk, et. al. (1992).

Cognitive Flexibility-based hypermedia are computer based instructional programs that are born from CFT and are built to carry out its operations. The computer's ability to utilize the highly multi-dimensional and web-like structure in multiple ways describes this kind of an educational set-up with the term "random access instruction". According to Jacobson (1995), CFT asserts that students who develop "flexible representations of knowledge" will be able to adapt that knowledge to a wider variety of problem settings.

Website Construction and Animation Impact

The website developed to assess the usage of CFT for the promotion of learning of complex subject matter was composed of text, images, sound files and an animation. The students were divided into groups based upon their specific misconceptions or lack thereof. The animation was the last portion viewed by all groups. The animation is a critical piece in understanding the entire sequences of events that lead to tornado formation. While the previous portions of the treatments showed the student how a tornado forms it is only representative of the part that is directly observable. The animation shows that the formation of a tornado occurs in five distinct phases: a) criss-crossing wind currents, b) a horizontally rotating cylinder of air, c) updrafts which pull the cylinder into a vertical position, d) the transition from a cylinder to the familiar funnel shape and e) the eventual deterioration of the funnel. While of course the animation itself is a continuous sequence of images, this paper only shows the frames that depict the specific phases of formation.

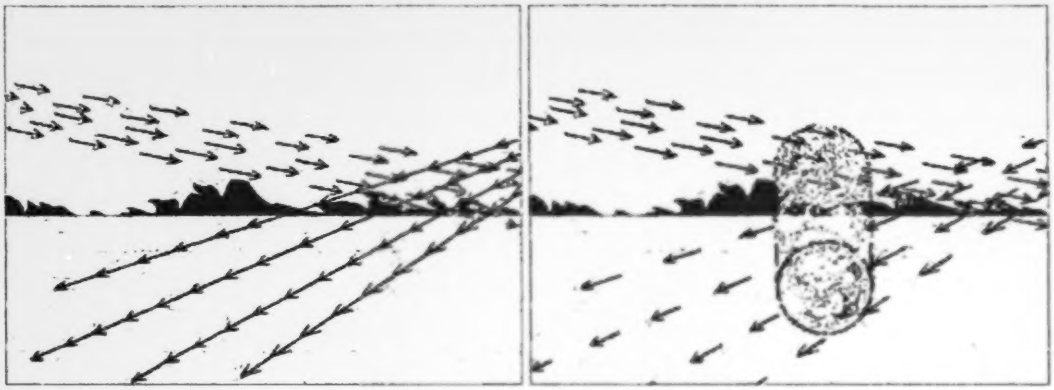

Figure 1 (left) The cross currents which start the rotation. Figure 2 (right) The cross currents form a horizontally rotating cylinder.

Figure 1 starts off the animation with lines that show the direction of criss crossing air currents. These air currents exert some friction on each other as they pass causing a swirling motion. Figure 2 depicts the result of this friction as a swirling horizontal cylinder of air. As momentum increases and the density of air in the cylinder becomes greater, the cylinder takes on a more substantial form. This phase also occurs in the clouds away from direct observation with the animation being the only vehicle by which to see this portion of the formation.

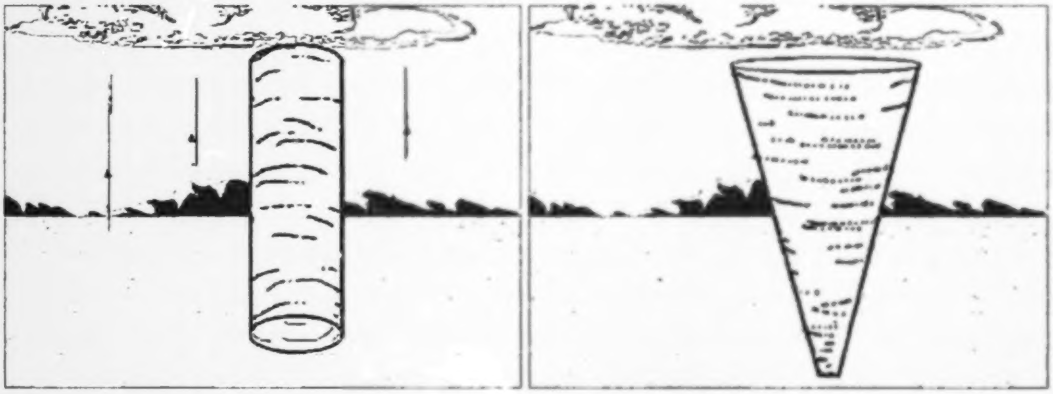

Figure 3 (left) The horizontal cylinder becomes vertical. Figure 4 (right) The creation of a funnel.

Figure 3 shows the updrafts beginning to raise the horizontal cylinder to the vertical. That allows the cylinder to drop to the ground and begin to pick up debris which adds to it's mass which makes the cylinder visible. Due to the conservation of angular momentum, figure 4 shows that the cylinder is taking on a more funnel-like shape. Since the air is filled with more material, the cylinder is more massive and the laws of physics dictate that it must spin faster.

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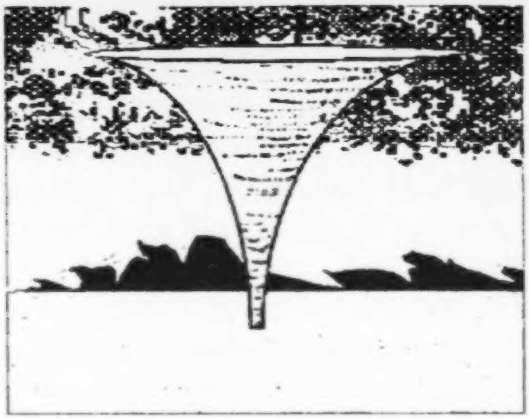

Figure 5 The mature funnel which eventually dissipates.

In figure 5 the tornado has reached a mature stage with a true funnel shape and reaching from cloud to ground. The last stage of dissipation will occur when either the atmospheric conditions fail to provide it with adequate energy or the amount of mass within itself decreases sufficiently.

The animation is itself a major factor and point of contention in the treatment. Specifically, does the addition of an animation with it's flowing graphics and eye-catching motion overpower and minimize the impact of the text and still graphics? Having the students draw the sequence on tornado formation as well as writing about it on both the pre-test and post-tests helped greatly in this respect. Most students displayed a marked improvement in their graphical representation of the sequence of events. Lai (1998) has found that still graphics and animations can increase the level of concept learning produced by computer-based learning. Lai implies that this enforces the dual-coding theory exposed by Paivio (1990). According to the dual-coding theory, two streams of stimuli are better than one. This is in alignment with CFT's criss-crossing landscape of multiple representations.

Results

The findings reveal that as expected the group with no misconceptions almost without exception maintained a correct understanding of the subject matter. Additionally, the students in the group who feel tornadoes were (incorrectly) similar to other weather phenomenon who start with a misconception and were not allowed to change their conceptual view of the phenomenon, showed a 100% occurrence of maintaining their incorrect understanding. This is in spite of the fact that like all other students they saw the currently accepted explanation and animation at the end of the treatment.

Conversely, the groups with misconceptions about the internal or external mechanics of tornadoes who also had initial misconceptions but were allowed to change their conceptual understanding relative to the material encountered had a 63% occurrence of changing from an incorrect to correct concept in the pilot phase of the study. The study proper portion of the study showed a similar propensity.

Conclusions and Recommendations for Further Research

This study has investigated the employment of CFT as a basis for attempting to bring about conceptual change for ill-structured, complex domains. This constructivist approach has used the students' prior misconception(s) of the subject matter as a baseline to guide treatments and to measure the degree of conceptual change.

Guiding the student's construction of the conclusion along thematic paths while allowing them to have a moderate amount of self-direction allows for the correction of false concepts as well as the reinforcement of

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proper ones. The use of multiple perspectives of a domain in a case-based environment aids this correction and reinforcement by giving the student a number of adequately sized pieces of information allowing for the accurate, rapid construction of correct concepts. Hypermedia allows the student to be guided to a correct answer while allowing the student to largely drive his or her own discovery of the material. Teacher-led instruction can present subject matter via various forms but it can't allow students to explore their own path to the information they need to understand by the very fact that it is teacher led.

In both the pilot and study proper phases, students were able to not only look at information and draw some conclusions but to construct the portions of information that they needed to understand the phenomenon. This building block approach that is integral to any constructivist type of instruction allowed the pilot students to achieve the main goal of understanding the main concept by first examining the various parts that make up the main concept. The students understood the main portions of tornado formation (wind shear, a rotating horizontal cylinder, turning vertical and narrowing) and were able to examine them separately when necessary. The animation allowed them to see the portions as contributing to an entire process.

Jacobson (1995) suggests "further research could collect data on the student's hypertext traversal patterns that could help clarify the relationship between epistemic beliefs, learning with hypertext, and knowledge transfer". Students with simple epistemic beliefs may be found to be struggling with complex hypertext environments as seems to be the case. Spiro, et. al. (1990) suggest that further research be conducted to "investigate how students with simple epistemic beliefs can be better prepared to use and learn from an instructional approach such as the Thematic Criss-Crossing Hypertext, which employs multiple knowledge representations and nonlinear linkages to demonstrate various knowledge component interrelationships". Also, more work needs to be done in understanding how to best combine the continuity of animations with the specific points made by images and text. Helping these different types of media to compliment each other will provide a strong yet flexible teaching and learning tool.

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Quality Metadata Scheme xQMS for an Improved Information Discovery Process for Scholar Work within the xFIND Environment

Christian Gütl
Institute for Information Processing and Computer supported new Media (IICM)
Infodelio Information Systems, Graz, Austria
GÜTL IT Research & Consulting, Graz, Austria
cguetl@acm.org

Maja Pivec
Information Design
University of Applied Sciences Graz, Austria
maja.pivec@fh-joanneum.at

Victor Manuel García Barrios
Institute for Information Processing and Computer supported new Media (IICM)
Graz University of Technology, Austria
vgarcia@iicm.edu

Abstract: Experiences showed that an advanced set of metadata has to be provided for discovery, retrieval and evaluation of Internet sources for scholar work. In this paper we describe the Quality Metadata Scheme and its implementation within the smart search system xFIND for scholar work. The proposed idea may be seen as a further step to a more semantic World Wide Web for the scholar community.

Motivation

At the IICM we had long-term experiences in the fields of web based learning systems, for example (Dietinger et al. 1998), hypermedia systems like (Hyperwave 2001), and knowledge discovery, as with (xFIND 2001). The praxis showed that common metadata fields and full-text search within the knowledge discovery process on the Internet do not meet users' needs. This led us to propose that one of the key issues of modern search systems is to provide and manage quality metadata for Internet sources.

A fast-growing number of users, applying the Internet for a variety of objectives is affected with a dramatic increase of information and services on the Internet. In consideration of that fact, shortcomings can be identified as follows: anyone can publish anything without quality control and accuracy, problem of misinformation, unauthorized users can change or even add new content on foreign Web sites, and missing meta-information about the authority and reliability of information and services. The problems stated so far have great impact at the users (students, teachers, librarians, scientists, etc.) of the scholar community.

To counteract the problems mentioned above, additional information has to be provided to improve the information discovery and retrieval process as well as the evaluation of Internet resources. We propose the compilation of descriptive and evaluative characteristics, which may describe the applicability and therefore the quality related to a particular information need. Thus, we call such a set of attributes a Quality Metadata Scheme (QMS). We advocate the opinion that in the field of scholar work a QMS has to provide – at least - information about the authority of information resource or services, the target audience, the expertise level (beginners, advanced or experts), and a standardized classification scheme. The quality metadata framework within the smart search service xFIND (xFIND 2001) is called xQMS.

xQMS: The Basic Idea and its Implementation within the xFIND Search System

The proposed framework allows managing the quality metadata physically separated from original information within the xFIND system. It is designed and implemented as a multi-level process. That means that at the first level authors, students, publishers and providers can add interesting material by submitting xQMS sets for an entire Web server, a Web area, a particular page or a section of a document. On the second level a "xQMS administrator" reviews the information submitted by the person of the first level and enables the resource to render them searchable. On a third level teachers, librarians and subject domain level experts can review the resources and its xQMS entities as well as add their own xQMS entities. Such an approach will allow building a growing system of relevant information for a particular lecture, a particular subject, etc. The system is designed in a distributed manner, which allows the co-operation of lectures, departments and even universities and scholar organizations. For example, authorities of lectures about national history of different universities can build up a reviewed repository of interesting Web resources for their students. Thus, the repository can be fed with interesting resources according to scholar work of students. They have to add interesting Web resources at the xQMS system and enlarge the information with a xQMS record. After the review process, other students can use the growing repository for their own scholar work. The novel idea is that existing web resources are indexed by an advanced search system (xFIND 2001) and in addition, varieties of quality aspects are assigned to the resources within a multi-level rating process. The document content as well as quality aspects can be used in combination to process queries.

xQMS enables to specify the quality of Internet resources for scholar work and consists of descriptive and evaluative characteristics. *Descriptive attributes* comprise information about the author, the organization and the publisher as well as information about the resource (title, keywords, description and language, type of resource). Related topics can be assigned by the usage of the Dewey Decimal Classification (DDC) code. In addition, a research community dependent classification code (e.g. ACM for computer science) allows specifying the related subjects more granular. Within the search process, either DDC or a community dependent classification code may be used to define the semantic scope of the search. *Evaluative attributes* comprise the diction of the resource, target audience (age of the audience, expertise level of audience), authority, depth of information and width of information. It is our opinion, that evaluative attributes represent subjective values just for a particular community (e.g. a high school, university, etc.). Thus, different communities have to be enabled to manage their own xQMS records. The xQMS framework enables to manage xQMS sets for different communities and allows to select a particular set for search requests.

To give an idea how powerful the system is, an example is stated as follows. A student can process a query to find information for beginners in computer science with easy diction and containing "mySQL database" in headings of the documents. Furthermore, the students can also be supported within their browsing process by being supplied with xQMS information related to the Internet resources (a first prototype is implemented for Netscape 6.x exploiting XUL functionality).

The solution introduced will improve the search process as well as help to evaluate chunks of information within the process of browsing. Scholar workers are enabled to specify query terms containing descriptive and evaluative aspects. Furthermore, the scholar community will get a useful tool to build up and maintain their meta-knowledge of online resources according to their needs.

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Preparing for Digital Story Telling

Ellen Brinkley
Robert Leneway
Allen Webb
Western Michigan University
Corey Harbaugh
Gobles High School
Gobles, Michigan
United States
Ellen.Brinkley@wmich.edu

Abstract: Internet II is about to become commonly available to many educational users. As Internet I turned many of us into text editors, Internet II will cry out for many of to become video producers. How do we prepare both our student and ourselves, especially those preparing to become teachers for this brave new world of digital video? How do we prepare for a world of viewers that will expect and demand of us high impact video communications? At Western Michigan University, with much help from the K-12 community, and the Center for Digital Storytelling, we are beginning to explore how to combine the video digital technology with the ancient art of story telling to better prepare pre-service students to meet the rigors of first year teaching and veteran teachers to better prepare and share digital media of their reflective experiences as teachers.

Introduction

In five minutes L___[female] and C___[male] describe what it's like to work as first-year teachers in the same small Michigan school district where they were once students. In five minutes R___[female] and L___[female] demonstrate for pre-service teachers and others how they call upon the power of place to teach students in different rural communities to take ownership of both their writings and the places they live. In five minutes P___[female] tells the story of her lifelong journey to name herself "writer" and the impact that journey has had on teaching and learning in her high school English classroom. These teachers, all of whom serve as classroom mentors for pre-service teachers, were able to create their five-minute stories during an institute last July on the campus of Western Michigan University in Kalamazoo, MI, using a process called *digital storytelling*; the process combines the timeless art of storytelling with new and powerful digital multimedia tools. For these teachers, and for others who have experienced digital storytelling, it is the technology application that finally delivers to their teaching practice the real power of a computer as a teaching and learning tool.

To an audience a finished digital story looks something like a short autobiographical, documentary film. Storytellers begin the process by writing and recording a personal narrative script, which becomes a spoken-text "voiceover" for the visual (and other auditory) elements of the piece. Then, storytellers use software to layer their voiceovers with any images that help tell the story: still photos, video clips, artifacts, text and non-text animation, soundtrack, and video and audio effects. To the storyteller, a digital story is a highly personal and densely packed exploration of a topic through story. But the real power of digital storytelling is something that happens between audience and storyteller, in how the experience of digital story can bring people together for conversations about the subjects and topics a story explores and suggests. To bring audience and storyteller together, a digital story can be stored and played on any computer application that supports the software to run it: personal computers can be used for individual viewers, data projectors work for a room full of viewers, and for the world, digital stories can be carried over the internet and played on media players like QuickTime and Real Player.

From Berkeley to Kalamazoo

The Digital Storytelling Institute came to Kalamazoo when Gobles, Michigan, high school teacher and mentor teacher Corey Harbaugh made a promise in Berkeley, California, the summer before. He went out to Berkeley in the summer of 2000 at the invitation of the National Writing Project (NWP) to make a digital story about his work in the Rural Voices, Country Schools project—an initiative of the Annenberg Rural Schools and Community Trust and the National Writing Project—that documented and celebrated the success of America's small-town schools. He had never heard of digital storytelling before accepting the invitation, but at the end of his week in California he was so transformed by it that he promised Caleb Paull, the Education Programs Director at the Center for Digital Storytelling, that he would find the resources to bring him to Michigan as soon as he could to share the power of digital storytelling with others back home.

Several of his teaching partners on the Michigan Rural Voices, Country Schools team immediately recognized themselves and their work in his five-minute personal story, and they wept and laughed all over again when they heard and saw the story being played. Team mentor Dr. Ellen Brinkley, a WMU English Education professor and Director of the Third Coast Writing Project, recognized its power as a professional development tool for teachers and for pre-service teachers, and enlisted the support of Dr. Allen Webb, a Western Michigan University PT3 College of Arts and Sciences Coordinator and English Education professor.

The Institute

The Institute was held during a hot July week of 2001. Though the institute was scheduled to end at five each evening, most nights participants didn't leave Rood Hall until giving in to fatigue and hunger between eight and nine p.m. Participants were glued to their computers and the other tools of the story-making process: scanners, digital cameras, audio and video equipment, and the Internet. On Thursday night, permission was secured from the university for the institute to lock up when they left, and teaching veterans of thirty years pulled something like all-nighters to finish their stories before the institute was scheduled to end the next day. Several of the teams took more than forty hours to produce those five-minute stories.

On the last day of the institute a screening of stories was held at a campus reception for more than one hundred friends and family members, teaching colleagues and school administrators, guests and supporters from the university, and members of the media and legislative communities. Teachers briefly introduced themselves and their pieces to the group, and then let the finished stories have their say. When the lights came on again some forty minutes later, people got off their feet and started having conversations with the storytellers and with each other that had been raised by the work: about teaching and technology, about standards in education, about professional development, about best practice, and about why and how teachers do what they do. The conversations lasted all afternoon.

Conclusion

At Western Michigan University, work continues to explore digital storytelling as a teaching and learning tool in the PT3-supported teacher preparation program. With additional support from the PT3 project, Allen Webb, Ellen Brinkley, and another colleague, Jonathan Bush, are teaching pre-service teachers in a wireless lab and integrating digital storytelling into their class requirements for English education students. They plan to invite faculty colleagues who work with pre-service teachers to participate in a seminar during the summer of 2002 in order to extend digital storytelling into other pre-service and technology preparation coursework.

Since last summer's institute Corey has shown digital stories and presented on the institute to hundreds of people from across the country. He reports that each time he puts the work in front of a new audience, he experiences again the energy and excitement of digital storytelling that he felt when he was introduced to it in the summer of 2000. Audiences respond both to the power of personal narrative, and to the multimedia format storytellers have used to layer and condense each individual piece. At every conference and forum, people introduced to digital storytelling want to know how they can do it themselves, or how to bring a mentor to their site to lead a workshop.

We have learned at WMU that it takes a powerful application to get mentor teachers and faculty—especially veterans—to want to integrate technology into the classroom. They have to experience the power of technology before they will believe in it enough to use it. Yet so many technology-training programs get the most important relationship backwards, making the technology more important than the learning it supports. Digital storytelling does not make this mistake. It immerses storytellers into the process—to condense their lives and teacher stories into five-minute pieces, teachers have to learn how to use the tools of technology—so in the end there is no difference between the technology and the learning that takes place. This result is precisely the goal of PT3 teacher preparation in the hands of learners who have experienced the combined power of technology and meaningful work: Teaching and learning can be fundamentally changed.

Acknowledgements

COREY HARBAUGH is a high school English teacher at Gobles High School (MI), and a teacher consultant for the Third Coast Writing Project at Western Michigan University.

ELLEN BRINKLEY is a Professor of English education at Western Michigan University and Director of the Third Coast Writing Project at Western Michigan University

ALLEN WEBB is an Associate Professor and the Preparing Tomorrow's Teachers to Use Technology (PT3) Coordinator of Arts and Science Project at Western Michigan University

ROBERT LENEWAY is Director of the Preparing Tomorrow's Teachers to Use Technology (PT3) at Western Michigan University

The Benefits of Streaming Media in E-learning

Rich Mavrogeanes, VBrick Systems, US

From students in an elementary school classroom to executives in a corporation, innovations in technology, particularly the introduction of streaming media in the learning environment, have made it possible for learning to be more convenient, more exciting and more interactive. For schools, streaming media has makes it possible for students to learn about and understand the importance of technology, while using a new and exciting method of teaching. In universities, streaming media makes it possible for more students to take classes without incurring the cost of building new space to cater to a larger amount of students. It also makes it more convenient for students to take classes, by being able to learn from their computer, at a remote location. Finally, in the case of corporations, streaming media used for e-learning offers businesses a cost-effective and easy to implement method of training employees, which has become increasingly important in today's chilly economic climate.

Interactive computer-based technology in EFL

Alexandra McCormack

Interactive multimedia provides students with highly motivating educational environments and enhanced learning contexts. This computer-based technology allows learners to interact with a variety of multimedia elements as well as to take an active participation in their own learning process. The observation of both students' poor language competence and lack of motivation in reading comprehension courses led to the design of an interactive multimedia program: *Interactive English*. The objective of this work is to present this interactive computer-based program for teaching reading comprehension to foreign language learners of English.

Recently, the popularity of the use of multimedia application in education has highly increased. The development of this educational tool has led to a redefinition of the roles of the teacher and student, has intensified teacher training in the area of computer assisted education and has also promoted the analysis of the advantages and limitations of the use of new technologies as an instruction medium. Major changes are widely observed in the utilization of multimedia programs in classroom contexts. While students become responsible of their own learning process, educators play the role of a guide in the learning process by helping students potentiate the use of technology in the process of knowledge construction.

Within this scenario, where students play a major role, it is possible to emphasize certain capacities so that students can face real life learning situations by developing ways of "learning to learn". Thus, instead of assimilating specific concepts, students are prepared to utilize information, enlarge and process it in a variety of contexts that respond to their own interests and motivation. In this process of active knowledge construction, students are supported by computer-based technologies that provide them with opportunities for developing skills for formulating questions rather than for obtaining responses, thus arousing exploration and discovery. Moreover when students use multimedia or interactive multimedia, they must take more decisions as regards how to guide their learning, and as a result become organizers of their own process.

The development of multimedia technologies in education provide potentialities and capacities on the basis of specific technological concepts. In the development and use of multimedia applications both educators and students are encouraged to have an understanding of the concepts underlying multimedia so as to attain an appropriate selection, design and utilization of such technologies. Traditional media such as textbooks, pictures, or analog video have been used by teachers alternatively with the objective of motivating students and enhancing learning contexts. The combination of these technological media by means of computer programming results in the development of a multimedia application. Currently, computer-based technology combines all those elements or part of them in a single application allowing for direct student intervention. This focus on students' active participation enhances their opportunities not only for knowledge construction but also for reflection on their own learning process.

This interactive multimedia application, *Interactive English*, has been designed on the basis of the functional approach to reading and includes functions, vocabulary and grammar contextualized in the scientific and technical field. The target audience for this program is composed of undergraduate students enrolled in Teacher Training and Reading Comprehension courses, at the Universidad Nacional de Rio Cuarto, Argentina. The audience has a high degree of extrinsic motivation as regards:

- accessing bibliography of the students' specific field.
- achieving objectives through a non time-consuming program.
- exercising individual user control and pacing
- providing immediate feedback and response.
- allowing for different styles of learners.

The program allows for interactive practice that ensures the attainment of the instructional objectives. A non linear approach to instruction provides suitable format to attain the objectives proposed. A storyboard shows an individualized language environment, in which students are able to interact with written texts provided by the program, as well as to receive immediate feedback. The screen layout shows navigation buttons that allow students to choose which section to access: *Instruction*, *Practice* or *Feedback*. Each instruction section is connected to a practice section that provides a variety of activities, depending on the content and instructional objectives. From both instruction and practice sections, feedback is made available, once students have fulfilled the activities. Instructional objectives can be attained by students working at their own pace. All instructional objectives require quick accessed feedback and navigational responses. The display of this presentation exemplifies different aspects of the program taking into consideration that:

- The content of the program is mainly text -based. The use of short, readable texts makes the program easily and effectively delivered.
- The program allows for easy delivery of graphics and animation.
- Content items may be accessed in a non linear format, thus giving control to the user.
- The program provides the user editing tools and the possibility of updating information immediately.
- The program provides interactive feedback in the combination of instruction and practice.
- The program allows for alternative "hints" in the practice sections if the user needs them.

Navigation is presented through screen sequencing, starting with introductory page in which many-colored words attract the users' attention. Next, the title page *Interactive English*, opens up showing an "introduction" button that familiarizes the user with the main objective of the program, the intended audience, as well as with the form and function of the program. On this page there is also a "help" button that acquaints the user with the navigation buttons and other features required to move through the different sections. On the title page, a "next" button, takes the learner to the next page, containing the main menu. The main menu consists of seven text fields: Defining, Describing, Classifying, Asking/Answering, Suggesting, Narrating and Predicting. The student may click on any of these text fields and is automatically taken to a submenu providing the specific content items for instruction. Each of these content items is connected to a page containing the instruction (explanation, rule, definition or construction) and displays the context (text or graphic) to which the instruction is related. For the sake of facilitating comprehension, one text may be used as a context for instruction of different language functions, i. e. it may be shared by several other content items. Each instruction section is connected to a practice section that provides a variety of activities, such as: multiple choice, true-false, ordering, matching, completing, or drag and drop, depending on the content and instructional objectives.

Feedback is provided, once the students have fulfilled the practice activities, by showing reinforcement prompts or hints depending on whether the user provided a correct or incorrect answer. Individual scores are saved by a record-keeping feature, which can accessed from the main menu. The student is allowed back into the sub menu or main menu from any of the sections, by clicking on "menu" button. Finally, navigation buttons provide different choices, as: next, back, quit, menu. These allow the user to choose which section the user prefers. The screen layout will show small icons to help the student differentiate among the main sections: Instruction, Practice and Feedback. Other reminders of the users' navigation movements are also provided. Furthermore, multimedia elements, such as: text, images, sound icons and animation as well as hyperlinks, buttons or other clickable objects, which relate to interactive multimedia in a computer-based application are displayed.

Interactive English is available under a PC format and runs with Toolbook 4, by Asymetrix, or in a runtime version. The program can be run under Microsoft Windows and has quick access to common features of the Windows environment. The program can be accessed on a runtime version for users who do not have the full version of the program.

Adaptive Profiling Tool for Teacher Education

Miikka Miettinen[1], Petri Nokelainen[1], Jaakko Kurhila[2], Tomi Silander[1], Henry Tirri[1]

firstname.lastname@helsinki.fi

[1] Helsinki Institute for Information Technology
Complex Systems Computation Group
P.O. Box 9800, 02015 HUT, Finland
Tel: + 358 9 850 11576, Fax: + 358 9 694 9768

[2] University of Helsinki
Department of Computer Science
P.O. Box 26, 00014 Univ. of Helsinki, Finland
Tel: + 358 9 1911, Fax: + 358 9 191 44441

Abstract: In this paper we introduce EDUFORM, an adaptive questionnaire designed for profiling students in various educational contexts. The idea is to build a probabilistic model from previously gathered data, and use it for profiling other people more efficiently. EDUFORM selects the questions presented to each individual adaptively in order to minimize the number of answers needed for reliable prediction of the profile. Empirical evaluations suggest that 85-90% accuracy can be achieved, while the number of questions is reduced by 30-50%.

Introduction

The information needs involved in organizing effective education are significant. Accurate knowledge of interests, preferences, and motivation aspects is important both for the daily activities of educational institutions and for longer-term research and development efforts. In addition, computer technology enables such information to be used for the immediate benefit of the students. Self-assessment tools can be developed to offer analyses of for example learning styles or metacognitive skills, and adaptive systems to adjust the content or presentation of the material to individual needs. The problem is that nearly all of the interesting and useful information has to be provided explicitly by the students, which easily leads to excessive use of questionnaires. Besides being undesirable in itself, the tedious and sometimes frustrating answering process associated with long questionnaires is likely to reduce the validity of the acquired data.

In order to address this problem, we have developed EDUFORM, an adaptive on-line questionnaire. The idea behind EDUFORM is to build a model from previously gathered data and use it for profiling other students on the basis of a subset of the propositions in the original questionnaire. Furthermore, the propositions and the order in which they are presented are chosen on the basis of the previous answers of a particular individual. Preliminary empirical evaluations suggest that good profiling accuracy can be achieved with a significantly reduced number of propositions.

Modeling approach

The development of EDUFORM was motivated primarily by an observed need to profile students in various educational contexts. Although such profiles can in principle be derived in a theory-driven manner and coded manually, we have adopted a data-driven viewpoint, which means that the profiles are constructed from data gathered previously with similar questionnaires. This leads to the distinction of two phases in the use of EDUFORM: the *Profile creation phase*, where characteristic groups of students are identified, and the *Query phase*, where the constructed profiles are used for predicting the answers of other individuals to the same questionnaire. The design is generic and allows the application of any kind of predictive modules suitable for the task. We have adopted the Bayesian approach (Bernardo and Smith, 2000) and use the language of probability distributions to describe the profiles.

If Q denotes the filled-in questionnaire, each group G_i can be described as a mechanism that assigns a probability $P(Q \mid G_i)$ to the questionnaire. The set of groups $G = (G_1, G_2, \ldots, G_K)$, together with their relative sizes $s = (s_1, s_2, \ldots, s_K)$, define a finite mixture (Titterington et al. 1985) that can be treated as a probability model $P(Q \mid G, s) = s_1 P(Q \mid G_1) + s_2 P(Q \mid G_2) + \ldots + s_K P(Q \mid G_K)$.

As the adaptive questionnaire is being completed, the probabilities are updated to reflect the new information gained from the answers. The model is used for calculating the probabilities of possible answers to the yet unanswered questions (Q_U) on the basis of the answered questions (Q_A):

$$P(Q_U \mid Q_A, G, s) \propto P(Q_U, Q_A \mid G, s) = P(Q \mid G, s).$$

We can also keep track of the probability that the person belongs to a particular group G_i. If we denote by g the event that the person belongs to the group G_g,

$$P(g \mid Q_A, G, s) \propto P(g, Q_A \mid G, s) = P(g \mid G, s)\, P(Q_A \mid g, G, s) = s_g\, P(Q_A \mid G_g)$$

The two calculations above let us try to adapt the order of the questions so that we can predict the answers of the unanswered questions confidently enough and/or be confident about the group membership of the student based on as few answered questions as possible. Johnson and Albert (1999, 191) have proposed an alternative approach based on the estimation of item specific model parameters.

Construction of finite mixtures from data is described in (Kontkanen et al. 1996) and (Tirri et al. 1996). The underlying intuitive idea is to describe the data vectors with respect to a set of prototypes, so that the description of an individual vector consists of the index of the closest prototype and a list of differences between the expected and observed values. Alternative definitions of the prototypes can be evaluated on the basis of the amount of information needed to describe the entire data set: the more representative our prototypes are, the fewer differences there are between the data vectors and their associated prototypes. In addition to being of significant interest in itself, the resultant model is suitable for the kind of prediction needed in the *Query phase.*

EDUFORM

Even though EDUFORM is an electronic questionnaire on-line, it resembles traditional questionnaires on paper (Fig. 1). A few multiple-choice questions are presented at a time, with the possibility of adding comments. The navigation bar is at the bottom. The arrows on the right allow the user to move to the next or previous set of questions. Clicking the button with the pie chart icon shows the current profile. When the profile of the user is known with sufficient certainty, the user can quit filling in the questionnaire before all questions have been asked by clicking the 'cross' button on the navigation bar. On the left, there is a progress indicator showing an estimate of the amount of questions left. Because of the simplicity of the interface, there has been no need for a separate help screen. The meanings of the buttons are shown as tool tips (in Fig. 1, the word "Next" above the mouse pointer).

Adaptation in EDUFORM

In the *Query phase,* we want to find out the profile of the student as efficiently as possible. The profile is represented by a probability distribution over the groups identified in the *Profile creation phase.* As the student answers the questions, some of the groups become much more likely than others, and one of them often reaches almost 100% probability reasonably quickly. EDUFORM takes advantage of this characteristic pattern by optimizing the order in which the questions are presented, and offering the student an opportunity to quit once sufficient certainty about his profile has been achieved.

At any point in time, the most informative set of questions to ask next is the one that changes the profile distribution most. EDUFORM searches for this set by maximizing the expected *Kullback-Leibler distance* (Cover and Thomas 1991) between the current distribution and the distribution that would result if answers to a particular set of additional questions were received. The first questions are the same for everybody, but after that the selection depends on the previous answers of each individual. Therefore, adaptation in EDUFORM is based on continuous assessment of the expected information gain, rather than being limited to a small number of hard-coded paths.

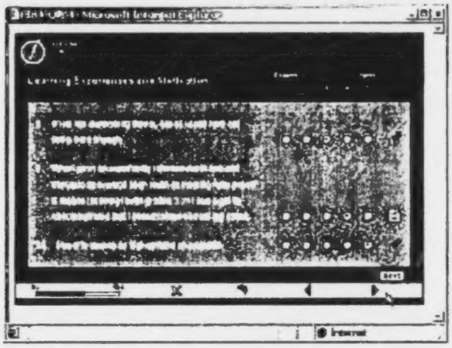

Figure 1: The user interface of EDUFORM.

The purpose of this technique is to minimize the amount of questions needed to find out the student's profile. Additional questions can be omitted entirely once a sufficient degree of certainty has been achieved. In the current experimental version of EDUFORM, the termination criterion is defined by setting a limit, which the most probable group in the profile has to exceed. A limit of 75% to 85% seems to be a suitable range in most cases. It is also possible to specify an additional requirement regarding the stability of the profile. For example, it may be stated that the most probable group has to stay above the limit for two successive sets of answers.

Figure 2 shows the format in which the data is saved. The first column identifies the person. In this particular case, a unique identification string has been created from the questionnaire name ("demo") and a counter. The questions appear in the same order as they were presented to the user. Question numbers are in the second column. The remaining columns contain the probabilities of the alternative answers. If the user has actually answered the question, one of the probabilities is 1 and the rest are 0. Probability

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distributions for the omitted questions are calculated by the model and saved in the same file. In Figure 2, the first four questions have been answered by the user, and the last two rows are predictions. Additional data include comments, the final profile, and a log of mouse clicks. The main purpose of the log is to record the time used for answering various parts of the questionnaire, but it may also turn out to be helpful in identifying ambiguous questions or making detailed analyses of differences between groups.

```
demo-1  33    0.0     1.0     0.0     0.0     0.0
demo-1  15    0.0     1.0     0.0     0.0     0.0
demo-1  10    0.0     0.0     0.0     1.0     0.0
demo-1  27    0.0     0.0     0.0     1.0     0.0
demo-1  5     0.0149  0.0292  0.1225  0.2392  0.5939
demo-1  11    0.0084  0.0086  0.0422  0.2451  0.6954
```

Figure 2: Format of the saved data.

Empirical results

Perhaps the most important question to ask when judging the value of EDUFORM is whether or not it actually works. The number of answers needed for reliable profiling should be significantly smaller than the total number of propositions in the questionnaire. We would also like the users to benefit from adaptivity and quit when they are offered a chance to do so.

In order to evaluate the predictive performance of EDUFORM, we simulated the operation of the adaptive questionnaire using complete data. The models were constructed from 200 randomly selected cases in each data set, and the remaining test cases were supplied to the models exactly as they would have been received during the course of adaptive questioning. The number of answers given before the fulfillment of the termination criteria was recorded, and the group predicted at that point was compared to the group assigned at the end of the questionnaire. If the predicted group did not match the final group, an error was recorded.

Table 1 shows the main results of the simulation. Two different data sets were available from a questionnaire (Ruohotie 2001) with four sections: "Learning and motivation" (Motiv in Tab. 1), "Study habits" (Habits), "The quality of teaching" (Teaching), and "The effects and outcomes of education" (Effects). Although the sections measure complementary aspects of the same educational setting, they are in the present context best thought of as separate questionnaires. The last data set (Motprof) is from a questionnaire designed for identifying motivational profiles. The second and third columns contain the number of groups defined during model construction and the total number of questions in the questionnaire. The average proportion of questions needed for predicting the group of a test case is in the column labelled "Questions asked". The next two columns contain the standard deviation of questions asked and the proportion of test cases for which the final group differed from the group predicted upon the fulfilment of the termination criteria.

Data set	Groups	Number of questions	Questions asked	Standard dev. of quest. asked	Errors	Number of test cases
Motiv 1	4	28	62%	22%	10%	260
Motiv 2	4	28	65%	22%	15%	357
Habits 1	5	40	62%	22%	15%	260
Habits 2	5	40	48%	21%	13%	357
Teaching 1	5	23	67%	21%	13%	260
Teaching 2	5	23	53%	24%	15%	357
Effects 1	5	25	61%	22%	14%	260
Effects 2	5	25	45%	23%	14%	357
Motprof	6	34	70%	21%	15%	498

Table 1: Predictive performance of EDUFORM.

As can be seen in Table 1, an average of 50-70% of the questions had to be asked to achieve an error rate of 10-15%. Every data set contained a few exceptional cases for which 100% or only 15-30% of the answers were needed, but the standard deviations were consistently within 20-25% of the total number of questions in the questionnaire.

The trade-off between questions and errors can be altered by adjusting the termination criteria. The more uncertainty we accept in the profile, the fewer questions need to be asked. Figure 3 shows the effect of additional answers in the Motprof data set. On the horizontal axis we have the number of answers given, and on the vertical axis the average Kullback-Leibler distance between the predicted and the final profile. By setting the termination criteria to appropriate values, questioning can be stopped approximately at the desired point along the line.

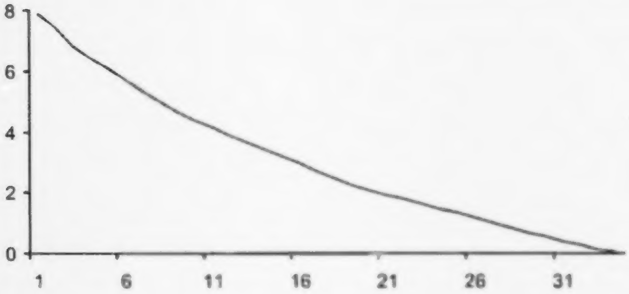

Figure 3: Reduction in the distance between the predicted and the final profile.

At the time of writing, two data sets had been gathered with the adaptive version of EDUFORM. The same sets of questions were used as in the simulation study described above. Of particular interest for the present purpose is the attitude of the users towards prediction. When their predicted profile satisfied the termination criteria, they were asked if they want to quit or refine the profile by answering the remaining questions. They could also quit after answering only some of the additional questions. The decision to quit or continue can be seen as a reflection of the user's opinion about the usefulness of adaptation in EDUFORM.

The results are summarized in Table 2. The first four questionnaires were parts of the same study, and were completed sequentially during one session. The subjects were students from a teacher training programme in the Finnish Polytechnic Institute. In the other study ("Motprof"), motivational characteristics of engineering students from Helsinki University of Technology were examined. The second column contains the proportion of users who quitted before answering all questions. Unfortunately, it seems that adaptivity was not appreciated as much as we thought. The third column shows the number of questions answered by the students who did take advantage of the adaptivity. The second part of the first study ("Habits") was the longest one with 40 propositions. The proportion of answered questions is high because many students gave a few more answers after they had the first chance to quit, but got tired before the end.

Questionnaire	Allowed prediction	Questions answered	Total number of cases
Motiv	11%	64%	66
Habits	35%	82%	66
Teaching	20%	61%	66
Effects	17%	68%	66
Motprof	26%	61%	478

Table 2: The adaptivity of EDUFORM in real use.

Conclusions

EDUFORM is a tool to provide questionnaires with reduced sets of questions. The operation (i.e. the adaptation of the amount of questions) is independent from the questionnaire content. This domain-independence of the adaptation mechanism opens up the possibility to use EDUFORM for more than just a single purpose. For example, EDUFORM can be used in assessing individual differences on-line to support studying in a virtual or traditional campus university. Suitable support material for student self-evaluation could be a questionnaire that provides information of how to study efficiently.

A questionnaire in EDFORM can also be used as a test for students. Testing the students' knowledge on the basis of adaptive questioning is not a novel idea. However, the standard approach is that the system adapts directly to the knowledge of the student. When using EDUFORM as a test, adaptation means the optimization of the length of the test. In other words, the goal is to provide the teacher or evaluator enough information about the students' progress with as few questions as possible.

Because of the particular approach to adaptation, EDUFORM can also be used as a tool for creating user profiles for adaptive educational systems. Sufficient knowledge of the characteristics of the user is a necessary prerequisite for effective adaptation. Some systems are able to accumulate useful data during the course of the interaction, but additional input must almost always be provided explicitly by the user (Brusilovsky 2001). EDUFORM can be employed to gather this information efficiently and create probabilistic user profiles for direct application in the adaptive educational system.

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Learning about Learning Objects with Learning Objects

Sandy Mills
AliveTek, Inc.
Seminole, Florida
United States
sandy@alivetek.com

Abstract: The term "Learning Object" has been getting a bit of attention in the world of online education lately, but very few completely understand what a learning object is. There are many definitions out there, but because text is used as the medium, the true meaning is often missed. This paper has been written to further define the term, and to serve as a compliment to an interactive session that will allow participants the opportunity to investigate various learning objects. Since learning objects are usually designed for active learning, this interactive session will allow for participants to see, hear, and interact with learning objects of varying educational levels and subjects. Samples will include objects created with Flash, Director, Shockwave, and interactive databases. Issues such as developmental skill level, funding and organizing learning objects will be discussed. Resources include some of the latest research on learning objects, as well as URL's for online repositories that can be shared with teachers from around the globe.

Introduction and Definition

Many have attempted to define the term, "learning object," but with the rapid pace of technological advancements and web-based learning theory evolution, the definition is still taking shape. There are many commonalities among the prominent definitions provided by leading researchers, but the exactness of what constitutes a learning object is still being discussed. In many instances, the technical specifications are close to becoming defined as many standards-setting organizations attempt to organize and standardized digital content (Saad, Uskov), but often in these definitions the educational dimensions are barely touched upon or ignored all together.

There are some rather enticing grants offered by educational organizations such as the National Science Foundation (https://www.fastlane.nsf.gov/servlet/A6QueryList) to further advance research in this area but most studies are focused on the technical parameters for the purpose of tagging and storing objects and are in early stages of research. As well, the training and development industry is also attempting to leverage the power of reusable and portable learning objects to further strengthen the argument for designing and developing such items. Organizational leaders such as Cisco, Honeywell, and American Express have all implemented learning object approaches to increase the effectiveness of their learning materials.

Longmire attempts to combine both technical elements with educational elements when he cites "flexibility, ease of updates, searches and content management, customization, interoperability, facilitation of competency-based learning, increased value of content" as advantages of designing and using learning objects. Barron cited Longmire when he wrote, "A new model for digital learning—one in which learning content is free from proprietary 'containers,' can flow among different systems and be mixed, reused, and updated continuously is inching closer to reality. At the center of this new model is the learning object, the modular building block that allows such a dynamic approach to managing elearning content." WBT Systems Ltd. is very focused on providing a learning objects library infrastructure, and wrote in the company's 2001 white paper, "At its simplest level, learning objects are re-usable building blocks of learning" and points out that it is rather difficult "to quantify how big or small a given Learning Object should be.....because the appropriate definition of size depends on many factors such as: subject being covered, instructional design philosophy applied, and media tools being applied."

Another definition reads, "You can think of learning objects as knowledge granules created by specialists throughout an organization and that are accessible to many others in the organization." Clark breaks the term into two classes—1)information or knowledge objects and 2)instructional objects, where the first is the information needed to learn, and the second is the activity or practice exercise that reinforces the first. Learning objects share common characteristics based on the above definitions and current research.

INVALID GRAPHIC OR TEXT

The Use of Internet2-based Videoconferencing in Teacher Education

Betul Ozkan
Curriculum and Instruction Department
Iowa State University
United States of America
betul@iastate.edu

Clyciane Kossatz Michelini
Curriculum and Instruction Department
Iowa State University
United States of America
clyciane@iastate.edu

Abstract: Internet2 has a great potential for high quality videoconferencing. Although over 180 American universities collaborate with each other through Internet2, it is still a blurred concept for many teacher educators. In this study we have interviewed teacher educators who are using Internet2 in their teacher preparation courses, and asked them its pros and cons as well as their projections for K-12 schools.

In recent years one of the most popular terms in technological world is Internet2 even though many do not know what exactly it is and what it does or can do. "Internet2 is, basically, a collaboration of over 180 United States universities, teamed up with industry and government, to develop advanced Internet technology and applications for high-end academic experimenting and research" (CNet, 2001).

At the first sight, Internet2 looks very similar to the actual Internet: the data may be seen in a web browser and it is just a bigger pipeline to transfer data. However, Internet2 has some key qualities, which might have critical implications for instruction. It is *faster*, with data transfer rates in gigabits, and it is *more reliable*, because it has safeguards to make sure data packets are delivered. One important point we need to emphasize is that Internet2 uses Internet Protocol version 6 (IPv6) instead of current Internet Protocol (IPv4). The advantage of IPv6 is that it incorporates native multi-casting, high reliability and high capacity. It also allows applications requiring high bandwidth to coexist with each other simultaneously. These qualities also remind us requirements/needs of high quality Internet applications such as videoconferencing systems.

Although Internet2 is only available to a restrict number of institutions, it is expected that the technology will be available to everyone in the near future. This means that the use of Internet2 will expand to schools, community colleges, museums and libraries giving the chance of streaming videoconferencing and other applications. These also means that adapting these applications to the needs of K-12 institutions will require some work, not only in technical or financial terms but pedagogical too. The International Society for

Technology in Education (ISTE), the Consortium for School Networking, and Educause are a few of the groups involved in several educational projects for Internet2.

Although Internet2 is a high-speed network primarily reserved for research institutions, there is a big need about its use in educational settings. In this study we have videotaped teacher educators from Center for Technology in Learning and Teaching (CTLT) at Iowa State University to illustrate its use at university level. Since the CTLT is being the leader of advanced technologies and their use in teacher education we have found it as a great opportunity to apply our study. The selected teacher educators of CTLT are primarily using Internet2 for videoconferencing with other universities to collaborate in research projects as well as to put together students from different universities to share knowledge and to collaborate in various courses' activities. These teacher educators are also using the Internet2 videoconferencing capabilities to share their expertise with other institutions as well as bring experts from other universities to their classroom environment. Their opinions about advantages and disadvantages of this powerful technology and their projections for K12 schools are also discussed.

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Higher Education and the Internet 2 Project: implications for educational practices

Roberto G. Pérez Galluccio
Florida State University
307 Stone Bldg.
Tallahassee, FL 32306
rgpg@technologist.com

Abstract: This short paper is geared towards those higher education professionals engaged in the design, development, implementation or management of internet-based resources and activities. The Internet 2 Project, a collaborative, cooperative effort carried out by higher education institutions in the United States, is set to revolutionize the way we look at educational communications and technologies. Current design constraints will change radically, forcing higher education professionals to redefine their practices, e.g., their web design strategies, as well as their use of the Internet. This paper provides a heads up on the potential offered, as well as the problems posed by, this cutting-edge technology.

Introduction

Those professionals in higher education who have been involved in the design, development, implementation or management of internet-based materials and activities, have surely more that once heard expressions like: "There's not enough bandwidth", or "The net is clogged", or simply "It can't be done". What's more, some of those professionals might have found themselves using those same expressions, when they tried to incorporate sound or even video to support teaching/learning experiences over the Internet.

Those times seem to be changing fast, mainly thanks to the Internet 2 project, the high speed, next generation academic network that is ready to boost multimedia applications delivered to remote locations.

The Internet 2

This project dates back to 1996, when a group of university and corporate researchers in America [1] started working full time in what has come to be known as the Internet 2 Project [2]. Members of the project have been doing what they know better: academics have been developing instructional content and applications, corporate members have been working on the software and hardware needed to support those applications.

The basis of the Internet 2 is its high speed -hundreds of times the actual speed- which will allow for the delivery of interactive, real-time instruction between remote computers; the sharing of digital (video, audio) libraries; the use of shared virtual reality environments, and every other research and learning activity professionals in the field may think of.

This is of special importance to the areas of web-based training and distance education, which are constantly increasing both in popularity and in technological advances.

The web-applications educators work with will then be delivered through the Abilene Network [3], the backbone of this new superhighway, that already runs from coast to coast in the United States, linking universities nationwide [4]. Unlike the current Internet, only academic and research centers can be part of this new network, which is seamlessly connected to the present-day Internet. This means that (a) both the current Internet and Internet 2 coexist and work together, but (b) only universities connected to the Abilene Network benefit from this high speed, and (c) only universities can create content for the Internet 2, making it a purely academic network (i.e. no e-commerce will exist there).

Those higher education professionals involved in distance education, for example, who have faced problems while working with multimedia applications delivered to remote locations, will now find that their technological constraints will be changed dramatically (in a positive way) by this new network.

Some problems

As far as the field of distance education is concerned, it is to be noted that distance learners at home will not benefit from this high speed. However, those attending classes at participating Internet 2 universities will be able to engage in collaborative, interactive activities that will overcome the limitations of audio and video broadcast over the current Internet.

There are, thus, some limitations for those outside campus, or in non-university settings: they will need to be on-campus if they want to take advantage of Internet 2. Also, for those universities outside the United States, the Internet 2 will not be available, until they create a local high-speed backbone (similar to Abilene), and connect it to similar backbones in other countries.

However, things are moving ahead quickly, and there are a number of Internet companies from around the world [5] already lined-up to work with the Internet 2 project.

Thus, as soon as the international academic world is interconnected, there will be real possibilities for distance educators in university settings to design and implement Internet 2-related teaching/learning experiences worldwide.

Conclusion

As professionals in the field of education committed to using new technologies to improve the quality and the effectiveness of our teaching activities, the Internet 2 has direct implications for us. The description of the Internet 2 project included in this paper, together with the reflections on its advantages and disadvantages, its potential and its shortcomings, acquire special importance given the constant development of Internet-based applications and technologies in recent years. It is to the advantage of higher education professionals to update their knowledge on the development of the Internet, so as to be able to redefine current strategies, methodologies and procedures when designing web-based instruction or Internet-based activities. Hopefully, this paper will serve as a trigger to motivate the reader to contact their local Internet 2 groups in their institutions, in order to get involved and take a proactive role in the use of this new medium.

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Teaching Teachers to Teach Internet Health

Frederik Tautz
ECC Online Relations GmbH
Germany
f.tautz@pobox.com

Abstract: Health-related websites are among the most frequently accessed resources on the Internet. Most young people have already researched the Internet for health matters, more than a third have even changed their behavior because of the information found. But, to some extent, the health contents on the Internet are misleading or even "quacky"– and chances are good that false information will prevail on the Internet: regulation or quality-checking of health-related contents is not very likely within the next few years. Therefore the assessment of quality is for now left to the individual. This paper is a call for action for teachers and offers practical advice on how teachers can start immunizing their students against misleading health information found on the Internet

Introduction to Young Online Health Seekers

For years now websites providing health information have been among the most frequently accessed Internet resources in the US (GVU 1998). Topics published on these websites cover every aspect of health ranging from anecdotal directions for a healthy life-style to well researched clinical guidelines. The information found on the Net not only influences people's health beliefs but also their medical decision making (for a more thorough discussion of this topic, see Tautz 2002). This behavior can also be seen in young online users as reported by a recent representative survey by the Kaiser Family Foundation (Kaiser 2001): About 90% of all young people aged 15-24 in the US are online today, 75% of them have already used the Internet to look up health-related information – compared to 60% of adults online (Pew 2001). What the young find on the Net appears very useful to them (39%, only 6% not so useful), and often so striking that they change their behavior on the basis of the information they have found online (39%). According to their answers young people get as much health information from the Internet as they get from friends or magazines. While parents, teachers and doctors are the primary and most respected sources for health-related information, many young people rely as much on Internet information as on knowledge obtained from peers or printed magazines. In addition young people say it is better to look up information on the Internet than to ask teachers (young online 58%: 41%, young online health seekers 63%:37%)and friends or to turn to the mass media. So "the time has clearly come to focus more attention on the role of the Internet as a health educator. Additional research (...) would be helpful, including the quality of online health information for young people ..." (Kaiser 2001).

The Quality Issue and a Possible Solution: The Informed Prosumer

As the Internet is a mass medium open to contribution from everyone without any peer-reviewing or independent editorial control, the quality of health-related information on the Internet is often doubtful (i.e. Pandolfini et al. 2000). An official body that effectively assesses the quality of online health information on a large scale is far from being realistic (Tautz 2002), the only ad hoc feasible way to protect people from the effects of bad information is to help the information-consumer to evolve to the stage of the informed prosumer. But to assess the quality of the information, consumers must have access to effective yet easy to use tools and must be educated to use these tools. As the Internet is now a tool as well as a teaching topic in most schools, teachers are in the best position to help young people to become informed prosumers. Teaching them to assess quality is one of the most important issues because: "[i]ncreased access to health information could create a more informed and healthful youth. On the other hand, if the quality of online information is not high or the source unknown, increased reliance on the Internet could lead to greater misinformation and skepticism." (Kaiser 2001). Teachers train their students to use the Internet. But do they train them to use its contents?

What Teachers can do to immunize Students against Misleading Health Information?

Make it a topic in class: General Internet classes , science classes or even English classes might be suitable for discussing the topic with your students. To introduce the topic i.e. in an *English class* you will find a service called "Hitting the Headlines" a valuable resource (http://www.nelh.nhs.uk/hth/archive.asp). This is a service provided by the The National Electronic Library for Health (which itself is a contribution by the British Health Authority). In "Hitting the Headlines" you will find summaries of health stories recently published in national newspapers together with a complete assessment of the story written by medical experts. Using the assessments you can demonstrate how misleading information can develop "by accident" from simply making up a news story for lay media using medical information. For an *Internet* or *science class* you might want to introduce the topic by asking your students to do simple research on the Internet in order to advise parents how to deal with children's coughs. The same Internet research was done by medical experts who assessed the results for general quality, accuracy and reliability. As their method, the medical background and the findings are very well documented (see Pandolfini 2000; full text accessible online) you can just let your students take whatever they found on the Net and assess its quality by comparing it to the article.

Introduce the proper assessment tools: There are two top sources for obtaining information on assessing the quality of a medical website. One is the Health on the Net foundation (http://www.hon.ch), which offers a "Code of Conduct" for the provision of medical information on the web. The other – more practically oriented website is DISCERN (http://www.discern.co.uk) "Despite a rapid growth in the provision of consumer health information, the quality of the information remains variable. DISCERN is a brief questionnaire which provides users with a valid and reliable way of assessing the quality of written information on treatment choices for a health problem." (Discern 2002). Let your students review the commandments on www.hon.ch, let them use the DISCERN questionnaire to assess a good and a goofy website and then discuss the findings in class.

While using the DISCERN tool in class, proceed to *show examples of good resources and explain why they are good resources.* Of course the Internet offers plenty of high quality health information. You might want to show your students http://www.nlm.nih.gov/medlineplus/tutorials.html. The tutorials explaining a procedure or condition are a good starting point for demonstrating what the Internet has to offer in health-related information, as they stand out because of their very colorful and animated Flash-Movies. They are also very easy to understand.

Show examples of bad resources and highlight the intentions of the authors: A good starting point for choosing a "quacky" site to show to students is Stephen Barrett's website Quackwatch.com. This website "combat(s) health-related frauds, myths, fads, and fallacies (and provides) quackery-related information that is difficult or impossible to get elsewhere" (Barrett 2002).

Explain where to start researching for high quality health information: Let your students use Healthfinder (http://www.healthfinder.gov/) or MedHunt (http://www.hon.ch/) to research a given condition, let your students then use DISCERN to assess the articles they have found.

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Inspired by Inspiration

Leo Wells, Barat College of DePaul University, US

Inspiration: The Program

Inspiration was developed in 1999. It is a product of Inspiration Software Inc. A companion product, Kidspiration exists to allow lower grade students a much more visual and kid-friendly experience with the Inspiration concept.
I am using Inspiration for not only this submission, but also the outline for another paper at SITE this year.

Concept mapping with Inspiration as its model has been discussed in the literature already (Scappaticci,2000; Vojtek and Vojtek, 2000).

How Inspiration works

Inspiration is cross-platform, and works in Windows as early as version 3.1; Macintosh OS on Power PC with System 6.0.4 or higher. Inspiration is network compatible.

Fundamentally, Inspiration works in two contrasting modes. Diagram mode is where the "concept map" is best displayed. Ideas are literally "thrown" onto the screen and linked together. Outline mode literally makes a traditional outline of the concepts earlier shown on the diagram. The user moves back and forth between the modes, arranging and modifying the material for the user's purpose.

We have found that Inspiration works best with learners when there has been little formal instruction. Rather, the "learning by doing" method seems to work best for us in using this product with learners.

Inspiration: Audience

The Inspiration audience is generally assumed to be students. However, it can be effectively used wherever it is found. We are looking at SITE attendees that may not have the opportunity to use this type of software in their regular duties. Those that interface with K-12 educators and college-level trainers will be more likely to have had experience with Inspiration.

Educators

Educators can do a myriad of things with Inspiration, planning, mulling over ideas for lessons, preparing written reports, etc.

Students

Students can develop individual ideas, or work in cooperative groupings to plan or discuss ideas. Students in upper grades will be able to prepare, organize, and largely outline written assignments. The product Kidspiration will do similar functions for students in lower grades.

Everyone

Indeed, the uses for Inspiration seem to be endless. Anyone who needs to put ideas together can first put them in a visual form with Inspiration in its Diagram mode.

Session Objectives

We want all attendees, regardless of their role to experience Inspiration and discover the potential it can have for their own role in education, business, or whatever. No experience with Inspiration is expected or required. Indeed, we want attendees to enjoy this software and have fun with it.

Inspiration: Benefits

On the surface, Inspiration is a good organizer, but higher order thinking skills are also in play. Users can see how ideas are connected, construct ideas in a more meaningful way for the individual learner, discover how new knowledge can be integrated into the learning matrix, and find out how misconceptions can be more easily identified.

We would want to have three or four laptop computers with Inspiration already installed for session attendees to enjoy this fun and interesting software. We can provide these laptops if necessary.

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Technology Based Learning: Myth or Reality?

Dr. Michael Young
Cornerstone University, United States
myoung@cornerstone.edu

Dr. Michael Plaisent
Université du Québec à Montréal, Canada
Plaisent.michel@uqam.ca

Dr. Prosper Bernard
University Consortium of the Americas, United States & Canada
Prosper1@compuserve.com

Abstract: This paper questions the robustness of empirical evidence regarding technology's ability to promote increased learning. The use of a new technology, by itself, does not seem to increase student learning. Most evaluation research has found that learning can take place with any technology-based medium. However, the literature has shown a significant interaction between instructional approach and student learning style. The introduction of educational technology into the classroom likely affects the patterns in the relationships among variables associated with teaching and learning.

Technology Based Learning

Not long ago, an educator asked to name the tools of technology based learning, would perhaps suggest chalk, a mimeograph machine to cut stencils for handouts, or transparences and an overhead projector. Now, because of the rapid rate of technology improvement, the toolkit is so much fuller. The use of the term educational technology is often less than precise. Thompson, Simonson, and Hargrave (1992) placed educational technology research into five categories which include: (1) evaluation research, (2) media-comparison studies, (3) intra-medium studies, (4) aptitude-treatment interaction studies and (5) alternative research designs. Evaluation research concerns itself primarily in testing the extent to which student learning is impacted by a new medium. Most evaluation research has found that learning may take place with any technology-based medium. In contrast, media-comparison studies compare one type of medium to another or to conventional instruction to determine impact on student learning. These studies, however, have been mired in controversy since the early 1980s when it was suggested that media were mere vehicles that deliver instruction without influence on student achievement.

Ester (Winter94/95) has demonstrated that computer-assisted instruction (CAI) may improve achievement and student attitudes while decreasing instructional time. Ester was, however, concerned about a possible discriminatory effect of CAI on students with different learning styles. He conducted empirical research seeking to determine if student learning style interacted with CAI, and found a significant interaction between instructional approach and student learning style. In effect, abstract learners demonstrated significantly higher achievement with the lecture approach, while concrete learners performed equally well with lecture and CAI.

The literature suggests that student learning styles vary with: (1) age, (2) achievement level, (3) culture and (4) global versus analytic processing. In addition, learning styles have been found to vary within the family. First-born children tend to reveal characteristics of one of their parents while second-born children often evidence characteristics of the other parent. In contrast, the third-born child has a style very different from both older siblings. Several different learning style definitions and inventories have been developed. For example Grasha and Yangarber-Hicks (2000) defined learning styles as the preferences students have for thinking, relative to others and particular types of classroom environments and experiences and created a model of teaching styles used in the classroom which include: (1) expert, (2) formal authority, (3) personal model, (4) facilitator and (5) delegator. The expert style takes the attitude that "facts, concepts, and principles are the most important things that students can acquire" (Grasha, 1994, p. 19). Formal authority says "I set high standards in this class" (p. 19). Their personal model suggests that "what I say and do models appropriate ways for students to think about content issues" (p. 19). The facilitator adopts the notion that "small group discussions are employed to help students develop their ability to think critically" (p. 19), while the delegator says that "students in this course engage in self-initiated self-directed learning experiences" (p. 20).

Grasha and Yangarber-Hicks (2000) empirically studied the notion that the teaching style of the instructor should be adapted to fit with the learning style of the student. The authors suggest that faculty members need to think about how technology fits into their philosophy of both teaching and learning. While they found that the effect of the introduction of technology on teaching style, learning style, grades obtained and course satisfaction was not robust, the effects of the absence of technology could be observed. Therefore, the introduction of educational technology into the classroom likely affects the patterns in the relationships among variables associated with teaching and learning. Other studies suggest four strategies to develop the compatibility of teaching and learning styles using technology. These strategies suggest an alignment of teaching styles which reinforce specific student learning styles in conjunction with the use of technology. The first strategy uses the expert and formal authority teaching styles to reinforce dependent, participant and competitive learning styles. The second strategy uses the personal model, expert and formal authority teaching styles to reinforce dependent, participant and collaborative learning styles. The third strategy uses the facilitator, personal model and expert teaching styles to reinforce independent, participant and collaborative learning styles. Here, faculty create activities, facilitate interactions and direct instructional processes with a plan to encourage active learning. The fourth strategy uses the delegator, expert and facilitator teaching styles to reinforce independent, participant and collaborative learning styles. Here, the faculty member adopts the role of consultant to students.

Conclusion

Critics may provide a useful service in providing a healthy skepticism about the potential of technology in the classroom. Empirical evidence regarding technology's ability to promote increased learning is not robust. The use of a new technology, by itself, does not seem to increase student learning. According to Neal, (1998) those who promote technology often emphasizes the delivery of instruction, rather than improved learning for students. In fact, technology often leads to less face-to-face contact among teachers and students, which may result in the promotion of an impersonal atmosphere.

Most evaluation research has found that learning can take place with any technology-based medium The literature has shown a significant interaction between instructional approach and student learning style. The introduction of instructional technology into the classroom likely affects the patterns in the relationships among variables associated with teaching and learning. In addition the notion of using educational technology to tailor the faculty member teaching style to fit that of the student learning style may be useful. More research needs to be done in this area.

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PARTNERSHIPS ACROSS ORGANIZATIONS

Modeling Instruction with Modern Information and Communications Technology: the MIMIC Project

Ronald J. Abate
Cleveland State University
r.abate@csuohio.edu

Jim Meinke
Baldwin Wallace College
jmeinke@bw.edu

Mary Jo Cherry
Ursuline College
mcherry@ursuline.edu

Pam Cook
Notre Dame College of Ohio
pamswim@aol.com

Jennifer Merritt
John Carroll University
j.merritt@jcu.edu

Abstract: This session describes the distinct approaches employed by four of five Colleges of Education in the Greater Cleveland area partnering in the implementation. of the MIMIC Project (Modeling Instruction With Modern Information and Communications Technologies), a Preparing Tomorrow's Teachers to Use Technology (PT3) Implementation Grant. The common goal of this partnership is to increase the level of educational technology modeling in pre-service teacher education classrooms and field experiences. Each institution outlines different methods for technology integration unique to the needs of their specific constituency.

Introduction

The Modeling Instruction with Modern Information and Communications technology (MIMIC) Project is funded by the U. S. Department of Education PT3 program. The overarching PT3 goal is to prepare new teachers to effectively use technology in their teaching. The MIMIC project includes five Cleveland area colleges of education (Cleveland State University, Baldwin-Wallace College, John Carroll University, Notre Dame College of Ohio, and Ursuline College). Each of the partners conducts professional development activities for higher education faculty and classroom teachers involved in pre-service teacher preparation. The teacher preparation programs vary across the five institutions. To accommodate these differences, the MIMIC project supports local management of professional development efforts while promoting the exchange of ideas and solutions across institutions. Despite programmatic differences, all of the partner institutions are guided by a commitment to prepare pre-service education students to effectively integrate technology into K-12 teaching.

Cleveland State University (CSU) serves as the lead institution for the MIMIC Project. Implementation of the MIMIC project was influenced by experiences gained from a one year Capacity Building grant (Abate, 2000). Practices that proved successful during the Capacity Building year were continued in the Implementation project.

Cleveland State University

Four implementation features have proven critical to the success of the CSU implementation of the MIMIC Project. These features entail: 1) the use of K-12 classroom teachers as mentors for higher education faculty; 2) a focused project management scheme; 3) a sophisticated evaluation plan; and 4) individualized professional development for higher education faculty.

K-12 Classroom Teachers as Mentors. CSU was fortunate to have experience with incorporating the services of master classroom teachers into teacher preparation programs from 1982 to 1990 when the College of Education conducted a K-12 visiting instructor program that featured team teaching of methods courses by higher education faculty and classroom teachers (Takacs and McCardle, 1984). The MIMIC project extends this approach by employing technology-proficient classroom teachers in the mentoring of higher education faculty in educational technology. The K-12 teacher as mentor arrangement provides several benefits. The mentors serve as a support structure for bridging theory and practice. Also, during visits to their mentors' classrooms higher education faculty gain first hand experience of technology integration in "real" classroom settings. On occasion, mentors team teach with faculty in pre-service classes. Most importantly, the classroom teacher mentors supply technical, pedagogical, and content expertise to the mentoring process. The inclusion of classroom teachers in the process has also helped to establish a greater sense of community among CSU MIMIC participants.

Project Management. The goals of the Implementation project include support for the professional development of higher education faculty, the organization of professional development for the classroom teachers who accept pre-service students in field placements, coordination of partner programs, budget oversight, and dissemination efforts. Management of a project servicing five institutions, a diverse higher education faculty, full-time classroom teachers, technology service providers, and hundreds of pre-service teachers is an immense and complexundertaking. In addition to a Project Director, the MIMIC Project employs a full-time Project Coordinator who manages both the everyday and long term objectives of the project. Coordination of the MIMIC Project has a "job description" unique unto itself. Requirements include such unique skills as knowledge of K-16 academic environments and the ability to match personalities, content foci, and technology expertise with needs while setting up and sustaining faculty/mentor teams. Flexibility is a key aspect of Project coordination since the events of any given day may range from conference travel questions, article editing, equipment crises, budget attention, meeting planning, report compilation, and filing. To accomplish this, a Project Coordinator must be able to envision order in chaos and appreciate the intrinsic reward of in seeing the Project goals accomplished on a daily basis.

Evaluation. Project evaluation activities address both formative and summative evaluation questions that examine the validity and impact of the project. A local evaluator directs the evaluation effort for CSU and the partner institutions. The evaluator works closely with the project team to ensure that planned activities occur as scheduled. Progress is recorded via monthly review forms. The evaluator meets with the project team on a regular basis to provide formative reviews and to provide suggestions and modifications for planned activities.

Baseline data is collected via surveys to identify the technology proficiency of higher education faculty and supervising teachers. Information collected from the surveys is used to tailor mentoring, develop specialized workshops for College of Education faculty and to schedule instructional workshops for classroom teachers who supervise pre-service teacher field experiences. Mentors prepare an implementation plan with each faculty member and maintain notes on the support provided. This qualitative data is used to modify mentoring plans. A pre-post review of syllabi developed by the participating faculty members offers qualitative data that documents technology use by participants. End-of-the-year surveys, including a technology use follow-up, are administered to furnish a picture of faculty and supervising teacher skill development. Evaluation is ongoing and the constant interaction among the evaluation team, the participants, and project management leads to timely and effective action. Evaluation is interwoven into the fabric of MIMIC activities. As a result the evaluation team is directly engaged as a partner in the success of the project.

Individualization. The cornerstone of the CSU implementation is the individualized professional development provided participants. All professional development is derived from a "bottom up" perspective.

Novice, intermediate, and advanced faculty participants are encouraged to develop plans that best meet their interests and skill level. Mentors for faculty are selected based on how well their knowledge and skills meet the needs of a faculty member. As a result, mentoring is focused on individualized needs, and acceptance of the technology integration plans by higher education faculty is very high. The Project team also supports individualized technology skill development through selected workshops and continuous technical support. Individualization is further addressed with classroom teacher participants via a wide range of specialized workshops typically tied to specific content areas. As a direct result of this individualization faculty are more likely to fulfill the objectives of the project.

Overall the success of the CSU implementation revolves around the plan, the purpose and the people. Project team staff, participants and evaluators pursue goals that offer individual attention while addressing the larger purpose of the Project. Finally, the people involved in the CSU MIMIC Project see value in the purpose and are highly motivated to achieve this purpose.

Baldwin Wallace College

The MIMIC Project at Baldwin-Wallace College is alive and very involved over the past two years of work. BW has taken advantage of its position as a premier teacher training institution to spread classroom technology skills throughout the campus by pairing pre-service teacher candidates with both education and general faculty. Transformational and measurable results have been achieved. Within the education program, faculty members have adopted both PowerPoint and web resources into their regular classroom routines.

Students are encouraged to enhance their presentation skills through the inclusion of technology-based content. Additionally, a growing number of the faculty members are in the early stages of extending their classroom contact via implementation of BlackBoard postings and discussion exchanges. At BW our method of project management is one that attempts to direct the faculty to actively adapt their course syllabi by infusing technology where appropriate. In the academic year of 2000-2001 we had eight faculty members mentored on our campus. In the current year of 2001-2002 we have six additional faculty members being mentored. What follows are highlights of the accomplishments of these two years of work.

Year 1: 2000-2001 Listed below are some of the highlights of the first year of the project on BW campus. All of these faculty members were novice technology users prior to the Mimic Project.

- The development of the first online web-based course on our campus – The Geology of the Rocky River Reservation. This resulted in the professor leaving the techniques of Blackboard and creating a CD as a field manual and guide for the students. This same professor then served as the mentor for another professor the following year to creating a CD lab manual for Microbiology.
- Four of the education faculty developed courses in Blackboard (campus adopted) and began development of the creation and use of PowerPoint in the respective courses.
- One education faculty member saw the Mimic Project as a focal point for her sabbatical experience. She was very interested in reading and literacy and centered her study on the use and incorporation of "concept mapping" software into her course syllabi. Therefore, she pursued the use of Inspiration software into here course structures and recent presented a colloquium to the Division of Education on here results and findings.

Year 2: 2001-2002 In the second year of the project the emphasis is not only to continue the successes of the first year but also to expand on the project by dissemination of the innovative ideas to areas beyond our campus. Listed below are some of the current projects in progress.

- One special needs professor is building lab experiences into her course for assistive technologies. She is also incorporating audio-streaming for some assignments normally done in class that now can be linked to her Blackboard component of the classroom.
- Another educational faculty member is making maximum use of using Real Producer to incorporate streamed videos into her courses within the construction of Blackboard.

- A health professor is being mentored in Blackboard and is also planning on using CBL and MBL equipment in probe usage for teaching Health Methods to future teachers.
- A tremendous success story has played out as a result of last year's participant. Our geology professor has organized a trip abroad for the purpose of studying the volcanoes of Iceland. She plans to send downloaded images and videos of the experiences with the students for the remaining students on campus. This to be accomplished via the web as well as via desktop videoconferencing – campus to volcano.
- The Collaboration of the Americas grew out of the original PT3 Project MIMIC grant. The Collaboration of the Americas expands the MIMIC model through the use of desktop videoconferencing as well as into Internet 2 for distance mentoring....whether that is from within US (university to university) and/or in collaboration with foreign colleges and universities, (Argentina and Chile). The project has expanded into three sub-projects: One education faculty member is a MIMIC participant working in the area of early childhood teacher preparation. She will have a mentor who is a current 3rd grade teacher in a local school district. Her mentor is also finishing her Master's Degree in Educational Technology this spring. In addition to these two folks working together, a third tutor is being arranged at a distant University and the plan is to connect these people via Internet2 with distance videoconferencing. This professor works in the area of educational technology but is also interested in early childhood computer literacy.
- Two professors from the Instituto Superior de Formacion in Patagonia, Argentina, have formed a collaboration with Baldwin-Wallace College for Spanish audio files in exchange for technology skills for their teachers in training. The goals of this project are: 1) to actively collaborate with other teachers in a distant environment via email, discussion board, virtual classroom and hopefully live teleconference (iVISIT and NetMeeting) on various teacher classroom methods; and 2) to receive, from Argentina, Spanish audio files (male, female, teenager, different dialects) to assist our Spanish Department on the Baldwin-Wallace College campus in helping future Spanish K-12 teachers. (This is a problem we are experiencing on our campus with the PRAXIS II language test) and finally 3) to achieve cross-cultural pollination of teaching methods and ideas as well as other cultural variations between our two countries.
- A BW music education faculty member has been fortunate to be involved in three Artist Residencies sponsored through the Ohio Arts Council and the Chilean North American Cultural Institute in Chile, South America. Her target projects have been focused in the Chilean cities of Copiapo and La Serena.

Her work in Copiapo has been at the Liceo Experimental de Musica de Copiapo which is a grade three through twelve school of the arts in the middle of the Atacama Desert. The Chilean government has declared this Liceo as the model arts school for the country in the development of curriculum, scheduling and programming. Her residencies there have been multifaceted. In addition to guest conducting the bands, orchestras and choirs, she have been charged with assessing and evaluating all perspectives of the school from teacher and student performance in the classroom to scheduling, materials, teacher education, inventory and the coordination of the writing of the National Chilean Music Education Curriculum. It is her hope that the development of her technology skills will enable her to develop a web site that will support sharing web stream broadcasts of quality teaching and performance examples and professional development information. Through the use of video conferencing, she hopes to be able to maintain an ongoing dialogue throughout the year so that she is able to support her Chilean colleagues on a daily basis as they work to further music education in their country.

Her second project is in La Serena, Chile, at the Universidad de La Serena and Escuela Experimental de Musica "Jorge Pena Hen." This past August, she spent a week at the University de La Serena leading the "Encuentro de Directores de Bandes de Concierto Escuelas Artistics del Norte Chileno." This was a weeklong convention for all of the band directors in the north of Chile. She presented clinics on numerous subjects such as conducting, rehearsal techniques, repertoire, and singing in the instrumental classroom. This was the first time that an event of this type had been presented in Chile and the first time that these thirty music educators had ever met! It was an extraordinarily successful event that ended with a commitment on the part of the teachers to attend every year. The opportunity presented itself to start the very first Chilean Music Education Association. She is committed to working with these dedicated music educators to help them continue their professional growth through the year. She hopes to experiment with distance learning through the use of Internet2, video conferencing and web stream broadcasting to share what she can with her new colleagues.

- Time during the visitation to the BW campus in January by the Universidad de La Serena and Escuela Experimental de Musica participants will be used to train them in desktop video teleconferencing software as well as in Real Producer and file transfer for streaming their future concerts. On Feb. 22nd BW will stream a live concert especially for these two intuitions. This is in preparation for their institution doing a stream back to BW. This maintains the dialogue of the instructors involved in the collaboration from the conferencing and the performance level.

Notre Dame College of Ohio

The MIMIC project at Notre Dame College focuses on three areas: (1) education college faculty members, (2) pre-service teacher courses and (3) cooperating teachers who supervise Notre Dame student teachers.

Education College Faculty Members. Notre Dame College has implemented the MIMIC project at this level through workshops and institutional policy. The education faculty participates in workshops in how to set up a class web presence, Power Point presentations and how to use the laptop/projector in their classroom. They have also added to their syllabi the requirement that in each class the student will produce an digital artifact which will be incorporated into an electronic portfolio when they take a required education technology class.

Pre-service Teacher Courses. In the pre-service integration of technology into the curriculum, the pre-service teachers have been paired with Master Classroom Teachers (MCT) in the development and implementation of a modeling of technology lesson. The pre-service teachers meet with their MCT and plan a lesson integrating technology and then team-teach the lesson with the MCT. Evaluation forms were developed which document the process and the reflections of both the Master Classroom Teacher and the pre-service teacher individually and jointly.

Cooperating Teachers Who Supervise Student Teachers. In each student teaching experience, the cooperating teacher and the student teacher model a lesson integrating technology into the curriculum. This policy has been added to the requirements both for student teachers and cooperating teachers. Each fills out an evaluation form on the modeling of technology lesson.

For the second semester, best practices in the college and field classrooms will be videotaped and the different experiences will be collected on one tape to be shown in the pre-service integration of technology class. The modeling of technology will encompass different content areas and different grade levels.

Ursuline College

The MIMIC project at Ursuline College is comprised of several parts. Implementation occurs during the spring semester of the year, as the methods courses involved are offered during that time.

1. Ursuline faculty responsible for teaching methods courses in the early childhood and middle childhood programs vary in technological expertise. They are, however, quite amenable to guidance and tutelage. These services are provided by technology faculty/directors from two local public-school districts. Methods faculty determine the technological process they would like to teach to students as a teaching/learning tool for the classroom. Joint sessions held with the technology faculty from the school district allow planning of three to five classes for the semester. School-district personnel serve as guest instructors in the methods courses, teaching the process to the college students. Methods faculty then guide students in projects which allow them to implement the techniques learned during the guest instruction. Methods faculty incorporate the processes in subsequent semesters with other students. Thus, the focus of this portion of the MIMIC project is to allow college faculty to learn processes which then become a planned part of future methods courses. This portion of the project has been quite successful.

2. During the first two years of implementation of the project, a school-district administrator served as an adjunct faculty member for the college, and worked with three teachers in the public school (middle-school level) to enhance use of technology as a teaching/learning tool within several sixth-grade classrooms. The goal was to place students from the college for pre- and student-teaching experiences with these three teachers so that the college students would benefit from observing and learning how to use technology in the classroom. Scheduling students to complete experiences in the school has proved problematic. A student teacher has just completed an experience with one of the teachers. However,

due to an extended illness, the teacher was unable to work with the student for the latter portion of the placement. This part of the project has not been as successful, and review of the process is underway.

3. During the spring semester '02, full-time faculty in the Education Department will participate in several in-service sessions which will address additional areas of technology use in the methods courses. These sessions will not occur within the methods courses; rather, the faculty will participate in the sessions first, and then pilot the processes within methods courses during the spring '02 and fall '02 semesters. The "mentor" teacher will be the technology director for a local public -school district.

John Carroll University

John Carroll University's overarching strategy for the implementation of the MIMIC grant has been to employ the expertise of skilled technology trainers to create fertile and relevant backgrounds in technology implementation for higher education faculty and for K-12 teachers. The goal of this effort has been to allow the higher education faculty and the K-12 educators to share their newfound technological skills with pre-service teachers and students. We have chosen to focus our work with K-12 educators in urban schools and have elected to work with higher education faculty at John Carroll University.

MIMIC in the K-12 Arena

JCU began its implementation of the MIMIC grant working with teachers from one urban, parochial school and later added two urban, public schools from the "alternative/option" school group. Incorporating the training skills of master classroom teacher, Judi Wolf, and JCU Department of Education faculty member, David Shutkin, MIMIC extended learning experiences to K-12 teachers including bi-monthly workshops on software application and Web exploration. Additionally, MIMIC created opportunities for K-12 teachers to work individually with the technology trainers to adapt their training for use in specific curricular areas, such as Social Studies and Language Arts. On several occasions, the trainers observed K-12 classroom teaching and co-taught lessons with K-12 educators, periodically modeling instruction for JCU pre-service teachers who were working as volunteers and work study students within the school setting. These efforts have been met with great enthusiasm on the part of K-12 educators who see technology training as a door to the classroom of the future and a bridge for students marginalized by the Digital Divide.

MIMIC in the Higher Education Arena

The first phase of professional development provided for JCU faculty as part of the MIMIC grant was created in accordance with the CSU implementation plan. Faculty received individualized professional development derived from a "bottom up" perspective and designed to meet their interests and skill levels. This training was very well received and seen as highly beneficial. The second phase of professional development focused on "technology transfer" and utilized a skilled technology trainer to work with higher education faculty from the Department of Education within their *student teaching seminar classes*. Thus, the trainer was able to extend her instruction across the continuum from JCU faculty members to pre-service teachers while supporting specific instructional goals.

Conclusion

A sense of community has developed among the five MIMIC partner institutions. The flexible project management scheme coupled with the structured evaluation plan has lead to unique and successful implementation at the five university sites. Indications at this point are that university faculty, and classroom teachers are reacting favorably to the various forms of technology modeling. More importantly the modeling appears to provide pre-service students with a context for understanding how technology can improve instruction and why the modeling of technology is so important.

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Problem Based Learning with Young Children: Designing and Implementing Action Research Projects in an Urban Classroom

Comfort Akwaji
Curriculum and Instructional Technology Department
Iowa State University
United States
comfortakwaji@aol.com

Abstract: This paper is a report on an early learning project, using technology in inquiry and problem-based learning strategies, by kindergarten children in an urban classroom. The benefits of the problem-based learning project are three fold; it allows young children to engage their natural curiosity through involvement in activities that utilize both real-life and laboratory based experiences, it provides pre-service teachers the opportunity for hands-on training and application of theoretical concepts while working with early learners in an applied setting, and the project affords the in-service teacher the opportunity to focus on instructional design and curriculum that is challenging, student-centered, hands-on and relevant to the students present and future needs. The focus on real-world problems enables students to become problem-solvers, constructors of knowledge, and engaged learners who understand the relevancy of their educational experiences.

Introduction

This project resulted from conclusions derived from the observation of kindergarten students over three years at an urban elementary school. There was a noticeable lack of cooperation, creativity and problem-solving skills among these students as well as frequent displays of inappropriate social skills. Additionally, the project provided an opportunity for teachers' efforts to enhance their personal/professional growth through action research. Base-line data were collected on beginning kindergarten students at an urban math & science magnet school. Included in the assessments were measures that looked at their problem solving skills through the utilization of real world scenarios. Analysis of these data showed that students needed lots of interactions and experiences with problem solving. As a result, I set out to find ways to facilitate the learning of this highly needed skill that would capitalize on social interaction/cooperative learning, one of the best ways to get kindergarten students to learn. Also, one Friday a month, parents and guardians were invited to eat lunch with their child followed by a short technology literacy presentation session or activity which could include a software demonstration, modeling hardware or software or a visit to a highly recommended and appropriate website for young children.

The development and implementation of the early learning activities focused on math, science and technology. This approach took into consideration developmentally appropriate practices in early childhood, best practice principles, national standards and benchmarks and the School District's curriculum expectations for kindergarten students. I collaborated with Dr. Larry Genalo, Professor of engineering at Iowa State University. His course, "Toying with Technology" for elementary pre-service teachers was designed specifically to provide students in non-technical fields, especially elementary education majors, with an appreciation for the basic principles underlying the technological innovations that surround them. One expectation for students taking this course was to assist in hands-on workshops involving K-12 students and teachers from area schools.

Problem-based early learning harnesses the power of creativity, natural curiosity and engages young children in challenging learning activities. Students completed activities that drew on real-world, developmentally/age appropriate problems designed as weekly cooperative learning activities presented in the form of scenarios called "Problems of the Day". Students had opportunities to construct their own knowledge about how things work (i.e. the technology & engineering involved), through a focus on scientific concepts such as wheels, pulleys and gears. Students planned, implemented and reviewed their solutions in ways that encouraged and built creativity, cooperation, collaboration and problem solving skills. Between sessions students engaged in learning across the curriculum through activities designed to reinforce the concepts embedded in the "Problem of the Day". Additionally, students were deliberately involved in a variety of literacy-based activities related to these concepts, to develop and strengthen their emergent literacy skills. The rationale for choosing problem-based learning includes the following reasons.

- It supports the way young children learn – seamless opportunities for exploration and natural curiosity
- It provides skills needed to succeed in the modern scientific and technology-intensive world
- It promotes hands-on, minds-on learning
- It provides for many "correct" answers/possibilities
- It accommodates diverse needs of students
- It encourages more active, less passive, learners

Implementation

On Tuesday October 10, 2000 and the following four Tuesdays (Oct. 17, Oct. 24, Oct. 31, and Nov. 7) a group of twelve students from the Computer Engineering 370 course (Toying with Technology) at Iowa State University, accompanied by a graduate student, went to Ms. Akwaji's Kindergarten class. It was the graduate student's responsibility to see that the ISU students understood the challenges that the Kindergartners were up against and to aid Ms. Akwaji in developing challenges for the Kindergarteners. The ISU students were not allowed to do the tasks for the students, but help them to understand the information before them. The ISU students were to understand the goals that Ms. Akwaji had for her Kindergarteners, which included: the ability to work in teams, to better explain themselves, and to understand the information presented to them (wheels, levers, pulleys, gears). Toying with Technology is a program in which pre-service teachers learn how to use technology in the classroom, and how to apply the knowledge in the classroom to the appropriate grade level.

During Phase 2 (the second semester), the early learning project exposed young children to science, technology and engineering in a highly motivational and non-threatening way by having them build computer-controlled LEGO models; a goal comparable with that outlined for ISU students enrolled in the "Toying with Technology " course. As a result of observing and understanding the needs, abilities/capabilities of these students during Phase 1 (the first semester), software appropriate for young learners was developed to enable the kindergarten students to design things and make them "work/go".

Conclusions

With respect to the objectives outlined for the project, the first phase was successful. Out of the 24 kindergarten participants, only four had difficulty working cooperatively with peers. The goal was to have all of the students assume the role of "group spokesperson" to explain how they solved the "problem of the day" and the rationale for doing it at the end of each session. About half of the students understood and actively participated in this review/share part of the project. Overall I have seen a lot of improvement in both the students' communication, computational and problem solving skills. Based on observation and information obtained from the ISU students' journal entries, some of the kindergarten students had difficulty staying on task during the project sessions. Generally these were students who had finished early. As an intervention, those who had finished with an assigned task were encouraged to move on or engage in other appropriate activities. This is a common classroom practice that allows for all to participate and continue to learn/progress at an individual pace and at the same time contribute to the group. Through manipulating legos and the other materials/tools utilized for activities, students enhanced their fine motor skills. Students have also demonstrated individual and group responsibility through caring for materials/tools, taking turns and showing respect for the work of others. With the exception of a few, students focused on learning through exploration, and completed assigned tasks with some support from their "university buddies". During the first phase (Fall Semester), the time on task for some of the students was twenty minutes. This is typical of students of this age. During the second phase (Spring Semester), the time on task for all students increased.

Mestrado Band: Developing a New Model for Teacher Professional Development in Brazil

Cristiana Mattos Assumpção, Ed. D.
ANE, Colégio Bandeirantes, Brazil
Email: cmattos@colband.com.br

Abstract: The need for professional development in the area of technology integration has been an emerging theme throughout the latest reports released by major institutions (CEO Forum 1999; CEO Forum 2000; OTA Report on Teachers and Technology: Making the Connection 1995; Gibbons 1997; Greene 2000). Researchers have been studying several models to decrease the gap between higher education research and what is actually happening in the classroom (Fishman et al. 2000, 2001). This paper proposes the creation of a new model of professional development in technology integration at the secondary level, where a partnership is being developed between a private High School in Brazil (Colégio Bandeirantes) and Universities both in the United States and in Brazil. The model proposes integrating teacher professional development at the high school with actual research work, by developing an official master's degree course using the expertise of researchers and professors to teach the courses both face to face and via online learning.

Introduction

Learning to manipulate technology is shifting from a privilege to a requirement in today's global economy. This is not only true in the United States, but in other growing countries as well. Brazil is the 8th largest economy in the world, and several initiatives are already being implemented to ensure its educational system prepares its students to take leadership roles and participate equally in the growth of this global wealth. The *Mestrado Band* model is being created based on lessons learned from my doctoral research (dissertation to be published in 2002 – Earth2Class: The Role of Technology in Providing Structure for Science Content Delivery from the Research Scientist to the Secondary (6-12) Classroom Teacher, Teachers College, Columbia University) in professional development using online technologies to integrate the work of the research scientists at Columbia University with the work of Earth Science teachers from various communities in the New York – New Jersey area and beyond (Passow et al. 2001). To view this project, the website is www.earth2class.org. The problems being addressed by this model include: (a) the time constraints teachers face in improving professionally while dealing with the daily routines and requirements of teaching; (b) the lack of effective technology integration in the classroom; (c) the distance between the work of researchers in higher education institutions and the classroom practices; (d) the lack of recognition of the value of the work being developed by the teachers in their classroom; (e) the need to revisit academic standards to measure excellence in contributions to a field of study and (f) the role of strategic partnerships in developing new professional and educational paths for personal and institutional growth.

The Professional Development Model

The *Mestrado Band* program being proposed will consist of a complete M.A. curriculum in Computers in Education or Instructional Technology, where the teachers will have intensive courses during summer vacations at the partner universities, thus having the opportunity to see functional models of uses of computers in schools in the United States, and complete their coursework back at Colégio Bandeirantes, developing and testing out projects as they teach. The effort will be complemented by online courses, and guest professors will be invited to teach intensive workshops in Brazil, very likely once a month. Strong emphasis will be given to pedagogical theories and applications that use technology in innovative ways to enhance teaching and learning and truly transform classroom practices.

The advantage of partnering with Universities from other countries is to have access to specialists and projects in a country where the use of computers in education has been going on for a longer period of time, thus allowing teachers in Brazil to benefit from the experience already acquired there. As the Internet becomes more widely accessible, the potential for collaborative projects increases and should be taken advantage of.

In this proposed model, not only are there major advantages for the teachers, who can now use their time for personal growth and for school work that is officially recognized as valid research by higher education institutions, but also for the school, as it builds on the teachers' production and develops more advanced projects and products within the school context for their student body, therefore becoming more competitive in the market. The professional development efforts become more consistent and build upon the strengths and diversity of different participating institutions. When teachers are transformed into recognized researchers within the school context, the gap between researchers and practitioners is narrowed. A partnership relationship is developed, as both parties become collaborators in the greater effort of improving education.

This model would not have been possible without the development of the modern technology tools now made widely available to the community. The Master's program is being designed not only to capacitate the middle and high school teachers to teach using technology to enhance their lessons, but also to gain professional growth and research abilities using these same tools to learn, communicate, collaborate and network with the research community globally. The development of a network of education institutions (middle and high schools with universities) is a key element of this design.

As more educational researchers are becoming aware of the importance of building these strategic alliances with the classroom professionals to bridge the gap between theory and application, I propose that it is time to officially develop organized and institutionalized partnerships that build on the strengths of educational institutions at different levels, reflecting the same strengths this new technology has brought us – moving from a model of competition for few resources to one of collaboration to share widely available resources that are now accessible because of the democratization of information.

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Strategies for Integrating Technology into Field-Based Teacher Training Programs: Perspectives from Educational Technology and Teacher Education Faculty

Thomas Brush, Kathleen Rutowski, Krista Glazewski, Jean Sutton, Cory Hansen, Doreen Bardsley
Arizona State University
United States
tbrush@asu.edu

Abstract: Most researchers agree that more technology training is needed for teachers, and numerous suggestions already exist in the literature regarding the content of the training and the methods for delivering the training. One of these methods involves the integration of technology with undergraduate methods courses, thus providing students with knowledge and experiences applying technology to their specific content areas. This field-based model is the basis for teacher education experiences at Arizona State University (ASU). A collaborative effort between methods and educational technology faculty worked to identify and implement two key components of a model designed to provide pre-service teachers with the skills and experiences required to fully integrate technology into their future classrooms. This paper will consist of perspectives by the following key individuals regarding the effectiveness and challenges of implementing this new model:

- **Faculty in Educational Technology**, who will provide an overview of the field-based model and discuss the evolution of the technology integration component of the model over the past two years;
- **K-12 site coordinator**, who will discuss strategies for obtaining access to schools for use as field-based sites, and will describe how field-based placement teachers are involved in the technology integration activities;
- **Methods faculty liaison**, who will discuss strategies for collaboration between methods faculty and technology faculty with regards to technology integration activities for pre-service teachers;
- **Methods faculty**, who will describe the strategies they are using to integrate technology into the field-based experiences for their students, and;
- **Field-based technology instructor**, who will discuss technology integration activities completed by pre-service teachers, collaboration with methods faculty, and participation in activities with teachers at field-based sites.

Overview

Most researchers agree that more technology training is needed for teachers, and numerous suggestions already exist in the literature regarding the content of the training and the methods for delivering the training. One of these methods involves the integration of technology with undergraduate methods courses, thus providing students with knowledge and experiences applying technology to their specific content areas. This field-based model, also known as *job-embedded learning*, concentrates on providing pre-service teachers with authentic training experiences in real classrooms prior to their student teaching experiences.

At Arizona State University (ASU), students enter the pre-service teacher education program at the beginning of their junior year. Once they enter the program, they are immediately enrolled in a series of semester-long field-based teaching methods experiences at local "partner" schools. Each of these experiences requires students to successfully complete more traditional methods classes taught by methods faculty at the partner schools, and serve as interns to "placement" at the partner schools in which they spend a minimum of six hours per week in elementary or secondary classrooms observing classroom practices, assisting the placement teachers with instructional activities, and complete methods class assignments to learn about themselves as they begin to assume the role of a teacher.

Students are required to participate in a different methods experience (or block, as it is called at ASU), each semester. Each block focuses on different content and provides students with different experiences. For example, teacher education students who are pursuing elementary certification complete the following sequence of field-based methods experiences: Block I – Social studies and language arts, Block II – Mathematics and science, and Block III

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– Reading and multicultural education. Students pursuing secondary certification in a content area complete one semester of general teaching methods and two semesters of teaching methods specific to their content area (these are also field-based and taught in conjunction with faculty in the College of Liberal Arts and Sciences). Thus, regardless of their certification program, students are involved in field-based teaching activities throughout the teacher education program. This field-based component is one of the unique and innovative aspects of the teacher education program, and also provides a mechanism for infusing technology throughout the program.

Prior to 1999, the integration of technology within these field-based courses was not emphasized. Pre-service teachers were required to participate in a campus-based educational technology class sometime during their junior or senior year, but there was no real coordination between what students were learning in this class and what they were doing in their methods experiences. The movement of methods courses to field-based settings, however, provided an opportunity to implement a plan to integrate technology skills and experiences with the field-based methods experiences. Working with the methods faculty, educational technology faculty, and field-based placement teachers at participating school districts, pre-service teachers were able to create technology-rich learning activities and implement those activities as part of their methods instruction. This involved a process of working with methods faculty to integrate technology skills into their field-based activities, providing methods faculty and field-based placement teachers with additional training (when necessary) in technology integration in education, and providing additional instructional technology expertise to field-based placement teachers and pre-service teachers at the point of instruction.

This paper will consist of perspectives by the following key individuals regarding the effectiveness and challenges of implementing this new model:

- **Faculty in Educational Technology**, who will provide an overview of the field-based model and discuss the evolution of the technology integration component of the model over the past two years;
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Perspectives from Educational Technology Faculty

Dr. Thomas Brush – Educational Technology Faculty Member. In order for pre-service teachers to acquire the skills and experiences necessary to fully integrate technology into their future, we felt that two key components were needed:

1. Providing pre-service teachers with field-based, situation-specific technology training they are able to integrate into the initial teaching activities they complete as part of their teaching methodologies experiences. In order to provide appropriate technology training for pre-service teachers, we collaborated to develop a set of technology competency activities to serve as a guide for both placement teachers and pre-service teachers. The competency activities were strategically created to align with both the International Society for Technology in Education (ISTE) National Educational Technology Standards (NETS) and the content covered in the field-based methods experiences (or "Blocks"). In this way, the competencies could easily be integrated into the teaching activities pre-service teachers are required to complete as part of their methods experiences. For example, a major competency area for Block I of the teacher education program is "Classroom Management and Technology Integration in Language Arts and Social Studies." In order to demonstrate this competency, pre-service teachers were required to design lessons that both focuses on language arts and/or social studies content and utilized some aspect of technology appropriately. To assist them with this activity, we presented field-based "workshops" in which we modeled appropriate uses of technology for various language arts and social studies concepts. We then assisted pre-service teachers in developing their own technology-rich lessons, and implementing these lessons with students at the partner school.

We are in the process of developing the foundation of a collaborative relationship among educational technology faculty, educational technology graduate students, and methods faculty that will form the basis for the alignment of activities across courses and increase the opportunities pre-service teachers have to design, implement, and evaluate technology-rich learning experiences for the children in their placement classes. In addition, educational technology graduate students are available in the partner schools to assist pre-service teachers with designing and implementing their activities with students. Through these collaborative practices, the expectations for the utilization of technology by pre-service teachers has dramatically increased. Pre-service teachers learn a variety of appropriate options for using and integrating technology, demonstrate the use of state-of-the-art technology in their teaching, and understand how this technology can be leveraged to enhance numerous learning activities

2. Providing College of Education faculty and field-based placement teachers with training, guidance, and just-in-time assistance as a means to more effectively enable them to support pre-service teachers with technology integration activities. Although many of the methods faculty and field-based placement teachers already possess exceptional skills in integrating technology with teaching, there was still a need to provide many of these individuals with additional training regarding effective uses of technology in various teaching domains, as well as available technology resources in those domains. Methods faculty and field-based placement teachers were not expected to possess comprehensive knowledge of the vast number of resources available or which of the resources might be most appropriate for various teaching and learning activities. In response to this need, we developed a series of intensive summer institutes. Working in collaboration with the partner schools, these institutes are led by teams of educational technology faculty, methods faculty, and educational technology graduate students. Each institute is designed to focus on specific content areas emphasized in each of the methods blocks. For example, faculty responsible for the social studies and language arts methods block participate in workshops that specifically address the technology resources available in those content areas and receive hands-on opportunities to use the resources and discuss how those resources could be integrated into classroom activities. These institutes serve as opportunities for faculty and placement teachers to learn about both strategies for integrating technology into teaching and the vast technology resources available that teachers should be using with their students. With this ongoing training, methods faculty and placement teachers are better able to assist pre-service teachers in making informed decisions regarding effective technology integration during their field-based experiences.

In addition, ongoing support is provided *in the field* to methods faculty and field-based placement teachers by the educational technology faculty and educational technology graduate students. Educational technology graduate students are continually placed in the schools to assist both pre-service teachers *and* field-based placement teachers. These students have expertise in both teaching and technology integration; thus, they are able to assist the placement teachers with activities they would like to attempt with their students, as well as activities the pre-service teachers are planning. This resource and support structure helps methods faculty and field-based placement teachers better model effective integration of technology into teaching and learning activities.

Perspectives from the K-12 Site Coordinator

Jean Sutton – PT3 Site Coordinator. As Site Coordinator, I worked directly with the individual schools to schedule and coordinate the PT3 technology workshops for the Fall semester. I found the school principals to be enthusiastic and cooperative when I met with them individually before the school year began. The technology instructors, computer lab teachers, media specialists, and ASU methods professors sometimes attended these meetings. To encourage the teachers from each site to participate in the program, I attended and spoke at a faculty meeting at each school. I distributed flyers explaining the benefits of attending the PT3 workshops with times, dates, topics, and locations.

I built a profile of each school with the information that I obtained from the principal, other school personnel, and the school web sites. This profile included information such as grade levels, number of students, location (written directions), phone numbers, types of computers/programs in computer lab, etc. This profile was made available to the technology instructors.

Overall, the first semester of the program went smoothly. I met with principals at the conclusion of the semester to obtain suggestions and feedback. They all reported no problems and felt the program was successful. One of the challenges has been to motivate on-site teachers to participate in the filed-based workshops and summer institutes. Although the principals viewed this part of the program as a "perk" for teachers, in reality, the teachers were overwhelmed with other teaching responsibilities. The principal at one of the schools remarked, "This is a topic that teachers are interested in, they are just too stressed out and busy."

Two of the field-based schools have been involved in a performance-based pay plan in conjunction with "Section 301," which is a specially allocated Arizona state tax revenue designated for teacher training and skills enhancement. Since the PT3 workshops were included as an option for fulfillment towards the required 15-hour staff development, teachers at these two sites were more motivated to attend.

Any scheduling and staffing problems during the semester were minor. For example, classes that fell on a Monday needed to be rescheduled because of several holidays. Although the on-site computer labs were scheduled ahead of time for the regular workshops, on a few occasions the school had scheduled something else in the same room. This problem was easily solved by temporarily using a regular classroom. If one of the technology instructors was sick or unable to attend, I was available to substitute. In addition, I rotated schools to assist the technology instructors with the workshops.

Scheduling and planning began several months prior to the start of the Spring semester. Many adjustments and improvements have been made. Suggestions taken from school administrators, PT3 staff, methods teachers, and ASU students have been taken into consideration. I have worked closely with the methods faculty liaison to improve the effectiveness of coordinating the activities. Information she has shared regarding student expectations, schedules, and requirements has been invaluable. We hope by anticipating some of the student conflicts, we will be more successful in meeting students' needs. This next semester should be even more successful and productive with the experience gained from last semester and the comprehensive planning.

Perspectives from the Methods Faculty Liaison

Dr. Kathleen Rutowski – Methods Faculty Liaison and Instructor. In this section of the paper we describe a strategic framework employed to support the development of a collaborative style of interaction among methods faculty, educational technology faculty, and educational technology graduate students. Collaboration was essential to integrate educational technology experiences into the preexisting field-based methods courses in our elementary teacher education program. It also provided the opportunity to model a collaborative style of interaction for our preservice teachers. The ability to collaborate is a critical component for developing productive relationships between teachers and educational technology experts in schools, teaching practices that support diverse learners (Fennick & Liddy, 2001; Friend & Cook, 2000; Pugach & Johnson, 2002; Stainback & Stainback, 1992; Villa, Thousand, & Chapple, 1996), and has been cited by principals as an important consideration when renewing teaching contracts (Pugach & Johnson, 2002).

Friend and Cook (Friend & Cook, 2000) defined interpersonal collaboration as "…a style for direct interaction between at least two coequal parties voluntarily engaged in shared decision making as they work toward a common goal." (p. 6) They identified several characteristics evident in educational institutions endeavoring to develop a collaborative culture among faculty: collaboration is voluntary; collaboration is based on mutual goals; collaboration requires parity among participants; collaboration depends on shared responsibility for participation and decision making; individuals who collaborate share their resources; and individuals who collaborate share accountability for outcomes. During the course of the initial 18 months of the program we have deliberately worked to develop a strategic framework that fosters the development of these characteristics.

The PT3 grant designed to integrate educational technology into the field-based component of our elementary teacher education program was secured through the educational technology faculty at ASU. Elementary education methods faculty were invited to participate in the project which was designed to better prepare their pre-service teachers to use technology using the same constructivist pedagogical approach embraced by the elementary education program. In addition, participation would provide them support to refine and expand their own technological expertise and bring additional technology resources to the partner schools hosting their methods courses. The stage was set for voluntary participation of the methods and educational technology faculty in a three-year project with the goal of integrating educational technology throughout the pre-service teacher program and predicated on evolving collaborative relationships among participants.

During the first 18 months of the project a framework has evolved that provides formal and informal opportunities for methods faculty, educational technology faculty, and educational technology graduate students to interact in ways that enable them to share responsibilities, resources, and accountability for the outcome of the program. The formal components of the framework include: retreats during which methods faculty and the educational technology team share syllabi and align course activities; summer technology institutes; educational technology team meetings that include a methods faculty liaison; joint presentations at professional conferences documenting the program; and the development of a compendium of technology-rich lessons and activities for pre-service teachers. Interactions are structured to establish parity among all participants in the program, faculty and graduate students, by valuing the contributions of each individual and encouraging involvement through a process of shared decision-making. The formal components of the project have stimulated the emergence of informal collaborative opportunities. Methods faculty have begun to participate in technology workshop sessions at their partner schools. Methods faculty and educational technology graduate students are beginning to engage in ad hoc discussions regarding pre-service teacher participation in and response to workshop sessions. And, there have been several requests by methods faculty for demonstrations of new technologies they think will complement the content of their courses. There is an emerging sense of trust and community exemplified by an increased interest in team teaching and enthusiastic participation in efforts to merge and integrate course content.

Perspectives from Methods Faculty

Cory Hansen – Elementary Methods Faculty. I attended the PT3 Summer Institute and have integrated the knowledge I gained in the teacher preparation courses I teach. As an introduction to Early Childhood Education, students at Arizona State University are required to take a course in child development. Besides developing knowledge about children, we wanted our future teachers to become aware of the resources available on the internet, to be able to access those resources to meet the needs of children and to instruct parents how to find the same information to benefit their families.

In collaboration with other methods faculty, I developed a syllabus based on students using and sharing technology. The students in my ECD 314 class ranged from freshmen to post-bacs with the same goal of applying to our Education program. Each student was required to locate 14 articles to present to the class and 5 website reviews to share. To ensure students had the technological base to complete the course requirements, they were required to complete an internet training exercise for early childhood educators and to attend a Library Research Class to learn how to search ERIC, Education Abstracts, Psych Info and EBSCO. I would not have been confident guiding my students through this process without the experiences of the PT3 Summer Institute.

In order to scaffold this technological – and - learning experience, topics and key words were provided. For example, within the construct of maturationist theory, students were provided with the following key words: Gesell, School Readiness Tests, Developmental Screening. I instructed my students to locate articles within those boundaries, yet still to address individual areas of interest. The resulting conversations were focused and varied. Consistently, my students were surprised at the range of ideas within the topic at hand and pleasantly surprised at how choosing their own articles broadened their interest and knowledge about the subject.

Each student was required to compile a Resource Notebook for future reference. They are now secure in their ability to access the information they will need as teachers. In addition to these assignments, my students were required to observe, interpret and assess levels of child development. Without direction, the majority of my students referred to information they had retrieved through technology to assist them in making these judgments and suggestions.

Before completing the PT3 Summer Institute, I would never have had technology be emphasized as such a strong component in a child development course. Now, I wouldn't do it any other way. My ideas for future sections include power point presentations of child observation studies and, for myself, an electronic grade book.

Doreen Bardsley – Elementary Methods Faculty. I teach two Reading Methods courses and an integrated Children's Literature course (to the same group of students) in the third semester of the Elementary Education program at Arizona State University. I have been directly involved with the PT3 program for the past two years through attending workshops, meetings and a week-long summer institute.

By the fall 2001 semester some my methods class students had been involved in the PT3 pilot program during their first two semesters, while others had taken a regular technology course instead. One of the major assignments in my methods class was the development of a theme-based unit encompassing all subject areas. Students worked in groups according to grade level interest to develop their unit, and one large component of the unit was the inclusion of technology. We first brainstormed possible ways to include technology, then each group decided how they and their elementary students would use technology to enhance their learning.

As we talked about using technology in elementary classrooms it became obvious to me which students had been involved in the PT3 pilot program and which had not. Students who had been in the program were able to suggest more ways to incorporate technology in their unit planning, and they also were more likely to have used technology in their own teaching during their internships. There was a higher degree of technology knowledge and comfort with the students who had been involved in PT3 and had therefore received more practical experience with applying technology in the classroom. As a methods instructor I, too, felt much more knowledgeable about using technology, especially computers, as a result of participating in PT3 workshops and the summer institute, and as a result I felt more comfortable guiding my students.

In their unit plans my students suggested numerous ways that they could have their elementary school students use technology to enhance their learning: students could communicate with pen pals via email; they could research topics in the internet; they could use spreadsheets for graphing; they could use Web cams to see other places and people; students could use scanners and printers to input and reproduce information; they would use word processing for report writing; they could develop web pages or use power point presentations to show what they had learned; they could use digital cameras to add visual information; they could use computers for tests or educational games, and they could use calculators to help with math activities. The ASU students also saw a use for fax machines, CD players, videos, audio books, telephones and telescopes; they were very able to suggest ways to use technology in their teaching, and many gave evidence that they were already doing so.

Perspectives from a Field-Based Technology Instructor

Krista Glazewski – Technology Workshop Instructor. Instructing the technology workshops proved to be both a challenging and rewarding experience. The first challenge was in setting the context and expectations for the students. Students entered with the expectation that they would learn "computers," even though we went to great lengths to describe the goals of the PT3 project. Having no previous context for the ineffectiveness of the campus-based model, the students initially expressed disappointment in the realization they would not learn skills. In response, we, as the instructors, continued setting and reinforcing the expectations, which would not change.

The primary manner in which we set the expectations for the students was in modeling a language arts and a social studies lesson which incorporated technology. We as the instructors taught the lesson and the students experienced it as if they were the elementary students. They then received copies of the lessons and experienced a debriefing session in which we examined the preparation for the lesson, delivery of the lesson and the technology incorporated, and the lessons' overall effectiveness. Students were then asked to plan and deliver a similar lesson in which they taught language arts or social studies content and incorporated technology.

While the students enjoyed the experience of the modeled lessons, they expressed uncertainty in knowing how to proceed, especially since for most this was their first lesson planning experience. Many complained about not having adequate skills, while others had difficulty thinking of an idea. In anticipation of this, we had planned optional workshop time into the schedule; students could attend and receive one-on-one assistance from one of their instructors regarding any stage of the lesson planning with which they were having difficulty. However, only a few students took advantage of the support offered to them, preferring instead to ask their questions via email. Those who did choose to seek support, however, were extremely pleased with the patience and understanding offered by the instructors.

Despite their initial reticence, almost all students were able to create and deliver their lessons, and the final debriefing session proved to reflect the greatest reward for us as the instructors. Students described their lessons and experiences delivering them to each other, and the tone as they spoke reflected a positive, enthusiastic attitude. One student was placed in a classroom where the teacher had never taken the students to the computer lab. During the debriefing session, she related being called "the computer teacher" by the elementary students, and expressed her feeling of pride at providing students with a new and different learning opportunity.

Another student related the continuous technical difficulties she experienced in delivering her lesson, but concluded by showing us her final product, which was a book she had created with her students. With pride, she displayed the book for us, and stated that in spite of the difficulties, she found the experience invaluable because she was able to do something she had not been able to do prior to this class.

As instructors, we saw and articulated the value in having students experience what they would actually be doing as a teacher someday. The overall result was a feeling of effectiveness in our instruction as we listened to our students relate their sense of success.

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Telementoring: A Partnership Of Learners

Donna R. Everett
Information Systems
College of Business
Morehead State University
United States
d.everett@morehead-st.edu

Glenda A. Gunter
Educational Technology
College of Education
University of Central Florida
United States
ggunter@pegasus.cc.ucf.edu

Abstract: The purpose of this qualitative study was to offer opportunities for mentoring and communication through a telementoring computer-mediated communication project. The researchers wanted to examine the relationships that could develop between experienced teachers enrolled in a Master's of Educational Technology program at the University of Central Florida, Orlando, Florida, and pre-service teachers enrolled in Business and Marketing Education at Morehead State University, Morehead, Kentucky, during their professional semester (student teaching) via asynchronous technology. The results supported and added to the research in telementoring and qualitative research.

Introduction

Like most institutions in a sea of change, the age-old practice of mentoring (a process which establishes a relationship between a protégé and an expert to provide guidance, advice, support, and feedback) is being influenced by new forms of work, technology, and learning. The benefits of mentoring are not only work related, but can provide individuals with opportunities to enhance cultural awareness, facilitate personal and professional growth, and provide the runway for successful admittance into a selected profession.

Mentoring is potentially one of the most powerful influences in a person's life. Whether it emerges out of an intimate relationship (grandparent, parent, sibling, a spouse or life partner), or a professional role (teacher, manager/supervisor, co-worker), most people have been, or will be a protégé, a mentor or both at sometime during their life (Zachary, 1997).

Mentors assist employees in dealing with the challenges associated with entry into and advancement toward successful, productive, meaningful professional lives. Historically, mentoring is based on the traditional apprentice learning from a master. The Industrial Age focused on mentoring to advance careers within organizational hierarchies (Haney, 1997). However, the Information Age demands a wider range of cognitive, interpersonal, and technical skills; therefore, mentoring is bound to change to meet these needs.

Creating new opportunities for students enrolled in teacher education programs to learn and integrate technology into all types of classrooms and to reach all types of learners has been the focus of much discussion in teacher education programs (Web-Based Education Commission, 2000).

The purpose of this study was to determine whether mentoring of pre-service students in their professional semester (student teaching) by in-service teachers could provide support and enhance assimilation into the teaching profession. Additionally, was it possible to mentor over distances, using computer-mediated communication?

Review of Related Literature

Many mentoring relationships today still are rooted in the "old paradigm" of power, prestige and hierarchy, based on the assumption that one learned something from a mentor (more often than not passively) and eventually separated from a mentor. The new mentoring paradigm is a partnership based on mutual learning, growth, and satisfaction. Through active engagement the needs of both partners are met. "Wisdom is not passed from an authoritarian teacher to a supplicant student, but is discovered in a learning relationship in which both stand to gain a greater understanding of the workplace and the world" (Aubery & Cohen, 1995, p. 161).

The academic arena has been reported by students as a stressful and sometimes overwhelming experience (Gunter and Jones, 1999). Many mentoring programs have developed from the philosophy that students need to connect with other experienced teachers and work together as a team to have a more favorable educational experience (National Center for Research on Teacher Learning, 2001). This particular pedagogy lends itself well in pre-service teacher programs.

Technology in itself can be an overwhelming and intimating factor for students, adding to students' stress level. Teachers who teach with technology to support student learning also share these fears. Knowing this then, a program design could be adjusted to meet the needs of students by providing mentors. At the same time, experienced teachers also might gain expertise at becoming effective leaders and mentors.

Examples of mentoring projects using telecommunications technology are prevalent in the literature (see Web sites listed in *References* for a host of examples of telementoring projects). The upshot of all of these telementoring projects is that they use peer coaching, cognitive coaching, and other mentoring techniques to increase support for students, teachers, and faculty during all types of new learning experiences. Pre-service teachers who are entering the classroom may need even more support and may not always feel comfortable seeking advice from their peers, supervising teachers, or their university supervising professors. The researchers assumed a telementor might be able to provide advice and support in a non-threatening, non-judgmental environment. And no formal telementoring project was found that paired in-service teachers and pre-service students in the manner designed by this study.

Methodology

The mode of analysis used to present the data from the study focuses on the content analysis (semiotics) of the telecommunications exchanges. Krippendorff (1980) defines content analysis as "a research technique for making replicable and valid references from data to their contexts." The researcher searches for structures and patterned regularities in the text and makes inferences on the basis of these regularities.

The primary purpose of this study was to investigate the phenomenon of the relationship between graduate students enrolled in a Master's of Educational Technology program who telementored pre-service teachers enrolled in their professional semester (student teaching). Another purpose was to examine whether experienced teachers could assist pre-service teachers at a distance in topics, such as tips and tricks, students, methodology, teaching resources, technology integration, and assessment.

The sample population for this study consisted of five graduate students who were experienced teachers (with an average of 9 years' teaching experience) and nearing completion of their Master's program and five pre-service students during their professional (student teaching) semester. The teachers were matched by teaching areas, personality traits, and other areas of interest. One pair was disbanded when the pre-service student dropped out of student teaching. Therefore, four pairs of students participated in the study.

The researchers created a sense of community at the beginning of the semester by introducing themselves and by creating a personal Web page in a Blackboard course site set up specifically for the telementoring project. Each mentor and pre-service teacher also created Web pages so all participants could get to know each other. After that, the two professors let the paired students communicate via e-mail for privacy. Specific directions and criteria were outlined for the purpose of creating dialogical communication. The only quantitative requirement was that the pairs had to be in touch with each other at least twice a month during the four-month semester.

Findings

The researchers considered they might have to stimulate the communication or facilitate the interaction to keep the messages flowing so both researchers were copied on all messages. However, this proved not to be the case. The communications between the pre-service and in-service teachers were enlightening to the researchers and the students. The telementoring proved to be a successful communication experience. All the participants gained in the process of collaboration, community, support, leadership, kinship, and at the same time learned and shared classroom strategies and techniques. To present the findings, the results are presented in the following categories: tips and tricks, students, methodology, technology integration, and assessment.

Tips and Tricks. As in any profession, experienced workers know or have a few techniques that they have learned to enhance their effectiveness in the job. Teachers are no exception. Telementors shared some of their tips with the pre-service teachers, as follows:

David C: Here are a few goodies I've picked up along the way in my 20 years in the classroom. Learn the kids' names; get to know them; get advice; and whatever you do, don't run screaming into the night!

Pam: I truly believe that [teaching] is the most important profession and when I see "the light bulb go on" for a student, it is the most rewarding. Learn students' names right away...I cannot tell you how many times I had my day all planned out and when I came in to school the day had to be rearranged. I had to go into my teacher bag of tricks and pull out an activity...one of the reasons I love what I do is that no two days are exactly alike.

I have trained my students to give me nonverbal signals to show me that they need help. This helps me and it doesn't disturb the others. Signals also keep the student that I am helping from feeling rushed to finish so I can help someone else because the other students usually don't see the signal.

William: Respect your students and expect them to respect you. Treat your students like students and not friends.

Pam: Your first day teaching is a day that you never forget. You are definitely stepping into the unknown but it sounds like you are in a wonderful situation. The students may try to test your authority but imitate the discipline/control procedures that your cooperating teacher uses. When students find out that the same rules and consequences still apply, they will stop. Also, don't worry about knowing the answers to every question. Students understand as long as you are honest with them. Good, constructive feedback is helpful...sometimes we don't hear our own slang. Proper English will help communicate ideas clearly.

William: How do you rate your time management skills?

Nirsa: The more you teach, the more you will find you will be able to focus on many things at once. You must know your content, though; because if you don't, then you won't be able to focus on the other aspects of teaching...I have to be honest—after 11 years of teaching I still feel disappointed in some of my lessons. Because students all have different learning styles, they each need different levels of support to learn a skill and concept...I totally agree with you: they need to know you care and that takes time.

Effective teachers have a repertoire of "tricks" to engage students. Enthusiastic, supportive comments from all telementors laid the runway for solid interactions. As the semester progressed, other tips evolved from the exchanges. The teachers' voice of experience, as well as their love of teaching, was clearly evident.

Students. The researchers noted a definite student-centered approach taken by the telementors. The following comments support this observation:

David C: They're [Students] all good at something. Or, at least, they all have areas of interest. Find out what they are and figure out a way to make use of them in the classroom... Different learning styles! Don't try to teach all kids with your favorite style of teaching. [Use] verbal, non-verbal, auditory, tactile, hands-on, writing, reading, pictures, color, etc...It's a lot more work than "worksheets for everybody," but in the long run, it's better for everyone, including yourself.

William: My kids will be testing for two weeks (FCAT) under very stressful conditions. Hey! Did you notice I kept saying "my kids"? Have you started doing this yet? If so, can you remember when you started referring to your students as yours? Kind of cool.

Nirsa: My best teachers are my students and their parents. Recently, I was having a casual conversation with one of my students about a TV show they all watched. She was amazed to know that I watched the same show and I was talking to her about it. Out of nowhere she exclaimed, "...You are like a regular person." This was the greatest compliment I have ever received.

Pam: I always get very attached to my students. I get emotional when they leave...I have found that students are very accepting to the response "I don't know but I can look it up or ask __________ and I will tell you the answer when I find it."

Our sense was that the telementors were very dedicated teachers and learners; their comments were grounded in experience and in caring whether the students learned and grew as individuals.

Methodology. Methods of teaching take on as many forms as there are teachers. Coupled with a high energy level in the classroom and attention to the "teachable moment" in their students, the telementors provided specific, ready-to-use techniques to enhance student learning.

Pam: Don't feel bad about having a part of a lesson that the students didn't understand. This happens often. I remember one lesson I abandoned for the day and taught it again the next day in a different way when I sensed I was confusing them. The next day went perfectly! A good review of previous knowledge is always worth the time. You can do this in ten minutes and it helps students connect their prior knowledge with the new knowledge...The problem of boredom is always present. I get bored as well as my students. I am constantly reading. I feel that it is important for me to continue to grow and learn. I read professional literature as well as articles with ideas for teaching. I have learned how to adapt these ideas to fit my situation and subject. This is a challenge but my students appreciate the variety.

Nirsa: As we know, repetition is important but boredom is not...one of the keys I have found to make a boring subject more interesting is to anchor it in a real world situation. Create a scenario or find a way to make it relevant to their lives. Nothing makes my students perk up more than when I start relating the subject to where they are.

Flexibility! Flexibility! Flexibility! What great intuition and insight you have on being flexible. Not only did you show how well prepared you are but you did it with a fabulous attitude. The better you handle these unexpected challenges, the more you will love what you do!

William: Congratulations on the grant. I think the SmartBoard is an awesome tool for teachers.

David: My best advice on this topic is "if it's not working, change it!" In response to your question about job searching, have your students search for resume templates and fill them out. I'd also have them start a file of their own personal skills, talents, abilities, interests, hobbies, travels, volunteer activities, accomplishments, etc. Have them keep it updated throughout the year. Most folks are usually pleasantly surprised when they see a year's worth of their value accumulated into a single file.

What great advice from seasoned teachers! Even the researchers learned a lot from the suggested methodologies from the telementors.

Technology integration. Researchers expected, and rightly so, that this was an area in which the telepartners would be able to share and exchange techniques. We were not disappointed.

Pam: I moved into my new lab over the weekend; found out that they are bidding on installing a ceiling and air conditioning for my class. I can't believe that they forgot to put those important things in my lab...I have had to work out a few "bugs" in the network and some software.

Nirsa: Joke for the week: After doing a Web scavenger hunt on the revolutionary war, I asked my students to draw a picture of what they think the Boston Tea Party must have looked like. Much to my surprise some students drew pictures of ladies (some in hats) drinking tea around a table. (True story)

Check out this site (Website inserted) for Monopoly Accounting. BTW, thanks for the commercial Website. I will let them know that my teacher friend in Kentucky gave it to me. You will be the toast of the town!

You won't believe this! I was in my car and my daughter was telling me how her middle school teacher reviewed spreadsheets using Jeopardy...I would sure like a copy of the Jeopardy game so I can modify it for my purpose.

Incorporating higher level thinking skills is an important part of learning. Check out this Web site (Website inserted) and let me know what you think...my students are working on PowerPoint projects this week. One group even narrated its entire presentation.

William: I really like using PowerPoint in my classroom. I also have my students complete a project or two every year that includes using PowerPoint. Using technology takes a lot of planning so that it is truly beneficial to the students...

David: Use every available technology resource at your disposal to its best advantage to most efficiently help children learn what they need to know. And remember, "technology" does not just mean "computers," although computers should be a natural, integral part of what's happening in any classroom that is properly preparing kids for their world. A couple of favorite computer integration techniques are scavenger hunts and WebQuests.

I'm attaching two files I use to introduce formatting in Excel…I have other files that I can also send you later. Here's a Web site (Website inserted) also I found that's a quick reference guide.

A summary of the exchanges between the telepartners can be summarized in one telementor's comments: "The measure of success with technology is not so much how well you can teach with it when it cooperates, but how well you can teach with it when it acts cantankerous!"

Assessment. Only one telementor shared comments about specific assessment techniques, as follows:

David: Hopefully, you have been taught about rubrics and project/portfolio assessments as alternatives to traditional written tests, but don't overlook having the students help design the rubric for given assignments. Given the chance to show some responsibility, kids can usually come up with a pretty legitimate set of assessment criteria.

Summary and Conclusions

The study revealed that the telementors provided support to pre-service teachers in a less stressful learning environment. From the exchange of communication, a rewarding relationship developed between the experienced and pre-service teachers. At the same time, the experienced teachers also gained a great deal from the pre-service teachers. They self-reported a sense of accomplishment and heightened self worth by helping these prospective new teachers. They spent time looking for answers to questions, strategies to suggest, Web sites, lessons plans, and other pertinent suggestions and advice. The researchers found the students communicated at a much higher level and continued the communication far beyond their expectations.

One of the last activities in the project was to meet in the synchronous environment (the Virtual Classroom) provided by the Blackboard courseware. The last exchanges between the telepartners reported very enthusiastic results from the chats. Comments, such as "I really enjoyed our chat last night," "I was really glad to meet with you live," and "Wasn't the chat room fun!" put the icing on the cake for the telementors, the telementees, and the researchers. Concluding remarks in the last email showed the supportive relationships that had been forged: "I really enjoyed working with you. You seem to be a person who puts in quality work [my kind of person]. Good luck and enjoy your graduation. You are going to be so successful!"

The successful conclusion of the telementoring project provided the answer to the research question: Yes, it is possible to mentor over distances, using computer-mediated communication.

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Riverlink: A Collaborative Technology-Based Project for Improving Science Teaching and Learning

Cheryl Claxton
Lone Star Elementary School
Duval County Public School District
United States
claxton_c@firn.edu

Dennis M. Holt
College of Education and Human Services
University of North Florida
United States
dholt@unf.edu

Scharyle Nottke
Lone Star Elementary School
Duval County Public School District
United States
nottke_s@firn.edu

Abstract: This article presents the details of a collaborative technology-based science learning project completed through a learning community of students and teachers at four public schools with participation by university faculty. The project involved a study of the impact of the environmental health of the St. Johns River and feeder creeks on residents of Jacksonville, Florida. Through field studies, analysis of data, and the use of educational technology for research and communication, the participants developed new ways to facilitate science teaching and learning.

Project Description

The Riverlink project was a collaborative project among four public schools within the Duval County Public School District in Jacksonville, Florida and the preservice teacher education program at the University of North Florida. The project coupled selected students and teachers in two of the school district's elementary schools with selected students and teachers at two area high schools. The project incorporated several educational technologies to link the four schools so that students of different ages and cultures could work together to find solutions to commonly shared science learning topics.

Background

The purpose of the project was to develop an awareness of the impact that the environmental health of the St. Johns River has on Jacksonville's residents. The project created a four-school educational technology connection to monitor the health of selected feeder creeks and streams that flow into the St. Johns River.

One of the elementary schools (Lone Star) and one of the high schools (Sandalwood) is located in suburban Jacksonville. One of the elementary schools (Carter G. Woodson) and one of the high schools (William M. Raines) is located in urban Jacksonville. Participating teachers at Lone Star and Sandalwood worked together on a similar project for two years prior to beginning the Riverlink project.

Through field studies, analysis of resulting data, and the use of educational technologies for research, communication, documentation, and dissemination, project participants discovered new ways to facilitate science teaching and learning through cooperation and collaboration in a learning community.

Structure

To accomplish goals of the project an eleven-member team of experienced educators was formed. The team consisted of three teachers from Lone Star Elementary School, two teachers from Sandalwood High School, two teachers from William M. Raines High School and three teachers from Carter G. Woodson Elementary School. A teacher educator from the University of North Florida participated in the project's planning, training and evaluation. New delivery strategies were developed and used which impacted the roles of all project participants. Project activities were designed to enable teachers at each school to achieve objectives of their school improvement plans and to integrate new teaching strategies and technology-based learning materials and strategies into their classrooms.

Unique Attributes

As a multi-agency collaborative partnership involving public schools and an urban university teacher education program, the project enhanced the effectiveness and productivity of partner institutions by simultaneously addressing related educational concerns. These included the achievement of educational accountability through standards-based teaching and learning coupled with effective uses of educational technology, including the authentic assessment of the academic achievement of P-12 students through the production of their electronic classroom portfolios. The project used a collaborative interdependent change system thereby initiating a redesign of roles for university and school-based faculty. Exemplary classroom teachers examined the link between theory and best practice. The project also provided assistance to participating educators in achieving institutional improvement goals.

Research-Base for the Project

The work of Reeves (1992) provided a useful foundation for identifying four critical success factors used as benchmarks for the project.

1. Clearly defined goals for the project.

Reeves states that "Technology infusion as well as other restructuring activities should be driven by clear goals" (p. 520). Goals for this project involved "authentic achievement" for students and teachers in the form of teacher training, cooperative education, documentation of project activities through digital photography and video, electronic portfolio production and professional presentations at education conferences. Newman (1991) also supports the approach of the project by suggesting that "Rather than reproducing knowledge, students should be involved in producing knowledge, through discourse, through the creation of things, and through performance" (p. 459).

2. Thorough documentation in all phases of the project, Riverlink provided an understanding of where teachers started, where they were at any one point, and where they were going. Reeves states "Documentation attempts to capture all the changes that occur in the process of reform so that interested participants can understand what is really occurring" (p. 522).

3. Formative experimentation is defined by Newman (1990) as follows: "In a formative experiment, the researcher sets a pedagogical goal and finds out what it takes in terms of materials, organization or changes in the technology to reach the goal" (p. 10). The Riverlink project adapted and restructured the project to incorporate new knowledge and improved methods for meeting project goals.

4. Impact evaluation is defined by Reeves as "attempts to assess the effects of innovative instructional practices on factors such as organization, climate, teacher and student self-perceptions, parental and community aspirations, and numerous other difficult-to-measure factors" (p. 524). The Riverlink project used traditional and non-traditional methods of assessment to measure progress toward goals.

The three critical success factors that follow are based on research by Rogers (1983) in which adoption of interactive communication innovations differ from similar processes with other kinds of new ideas or new tools.

Critical Mass of Adopters

The Riverlink project began with four very interested teachers as a core group to influence and persuade school district personnel to get involved with innovations in curriculum, instruction and assessment using educational technology. Rogers found that the usefulness of a new communication system increases for all adopters with each additional adopter. Over 150 elementary and high school students and 11 educators successfully participated in the Riverlink project.

Degree of Use

Continued, supported use of educational technology throughout the Riverlink project was critical to its eventual classroom infusion and diffusion to other users. Rogers also found that the degree of use of a communications innovation rather than the decision to adopt it to be the most important factor indicating the success of the diffusion effort.

Re-invention of Innovations

Rogers defines re-invention of the innovations as the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation. Infusion of technology into school classrooms in the Riverlink project took place as teachers were able to successfully design and implement instructional activities using the educational technologies that met their own specific classroom needs and those of their students.

Seven Project Goals and Their Outcomes

Goal 1: Elementary and secondary students will use technology to collaborate between classrooms and between schools in solving age-appropriate aspects of real-life problems as they develop mastery of related Sunshine State Standards.

Student portfolios created in HyperStudio were produced by elementary and high school students that displayed their new understanding of science and the applications of newly acquired knowledge and skill in using educational technology.

During the year, selected Lone Star Elementary School 1st, 4th, and 5th students traveled to Sandalwood High School where they paired up with high school students to work on computer-based electronic portfolios dealing with science learning outcomes resulting from their study of Gunsmoke Creek, Pottsburg Creek and the St. Johns River. Carter G. Woodson Elementary School teachers and students traveled to the Lone Star site to view Gunsmoke Creek and learn more about Lone Star's science learning activities, materials, experiments and projects.

Throughout the school year, teachers and students at William M. Raines High School and Carter G. Woodson Elementary School worked together to establish a computer laboratory, a Riverlink project laboratory, and establish learning sites at the Pumpkin Hill Preserve. The teachers developed skill in using the educational presentation tool, HyperStudio and the Internet. They also created a distance-learning laboratory to help facilitate communication between the two schools.

Goal 2: A cadre of preservice teachers and veteran teachers will become skilled in the use of high-end technology for classroom instruction.

Partner institutions modified the original goal for the project as project activities were implemented. To guide their students in the display the learning outcomes of their study of the creeks and rivers, all participating teachers received training in the use of Hyperstudio and in procedures for facilitating the development of student electronic portfolios. Participating teachers at Lone Star received additional educational technology training in web page development at New Horizons Learning Center. Web sites were developed for Lone Star and Carter G. Woodson elementary schools. Refinements were made to web sites at Sandalwood and William M. Raines high schools.

Goal 3: The district's professional development model will be expanded to include an experimental learning approach based on the National Writing Project philosophy involving teachers in the same processes and activities required of their students.

Throughout the school year project teachers developed written science lessons, documented science learning outcomes, and created new approaches to science teaching and learning that incorporated language arts learning outcomes.

Goal 4: Students will develop self-initiated learning habits in which they become active questioners and gatherers of information to solve problems.

Students at each project school were actively engaged in science observations, recording data and drawing conclusions to solve scientific problems. The outcomes of the student learning were reflected in their Hyperstudio portfolios and work prepared for posting on the web sites.

Goal 5: The role of the teacher will evolve from a dispenser of information to a facilitator who asks analytical questions, presents challenges, stimulates discussion, and models the learning process.

Students at project schools conducted research, compiled data, and presented it to their peers and students at each other's project schools. The teachers participating in the Riverlink project facilitated the learning and supervised the documentation of science learning outcomes.

Goal 6: The learning environment will change to one in which information technologies are readily accessible to all constituents and one in which questions, discussions, and investigations are at the heart of teaching and learning.

The work with Internet sites provided considerable information to stimulate the students' imaginations. The educational technology provided tools for accessing and effecting scientific communication among students and teachers participating in the project.

Goal 7: Students will understand that science, technology, and society are interwoven.

The artifacts and descriptions provided throughout the project provided considerable evidence that participating students were actively engaged on their own learning. The Hyperstudio portfolios displayed considerable knowledge and skill in the use of technology and the learning of science.

Outcomes and Future Plans

The following dissemination techniques were designed to ensure that other educators had an opportunity to benefit from the outcomes of the Riverlink project.

1. The electronic portfolios produced by each participating student were used in presentations to educators on an invitational basis. Depending on the audience, the presentations were made by either students or teachers.
2. The creation and maintenance of a central website would allow regular student publication of data, articles, and fliers that promote environmental education throughout the community.
3. Students will produce a periodic newsletter that chronicles their investigations.
4. Participating schools will participate in the city's Earth Day celebration by developing and monitoring a public display that describes their involvement in the Riverlink project.

5. Participating teachers developed independent, multi-grade lesson plans and assessments that addressed Florida's Sunshine State Standards in science.
6. Participating teachers developed and presented the outcomes of the project at professional conferences.
7. Participating teachers began the development of their personal professional portfolios.
8. Preservice teachers from the university used the school websites and related Riverlink materials during their clinical experiences in the schools.

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Software Sources

International Business Machines Corporation, New Orchard Road, Armonk, NY 10504. Available online [http://www.ibm.com]

Microsoft Corporation, One Microsoft Way, Redmond, WA 98052-6399. Available online [http://www.microsoft.com]

Roger Wagner Publishing Company, 1050 Pioneer Way, Suite P., El Cajon, CA 92020. Available online [http://www.hyperstudio.com]

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Collaborative Teaming on Technology-Enhanced Problem-Based Learning Curriculum Units

Judith Howard
School of Education
Elon University
USA
howardj@elon.edu

Ann Cunningham
Education Department
Wake Forest University
USA
cunninac@wfu.edu

Jackie Ennis
School of Education
Barton College
USA
jennis@barton.edu

Deborah Long
School of Education
Elon University
dlong@elon.edu

Barbara Mize
School of Education
Barton College
USA
bmize@barton.edu

Abstract: This paper describes how collaborative teams consisting of arts and sciences faculty, teacher education faculty, K-8 teachers, and teacher candidates worked together during a weeklong summer institute to produce technology-enhanced problem-based learning units of study. Each of the units features a conceptual theme, a metacognitive emphasis, a guided inquiry approach, principles of universal design for learning, and technology infusion. One of the units that was developed during the institute, *The Alhambra*, is used to illustrate these design elements.

Introduction

Problem-based learning (PBL) is widely recognized as a powerful teaching/learning strategy, but its success depends on both the quality of the problem and the skill of the teacher. Problems must be sufficiently complex to demand an in-depth exploration of important content and sufficiently challenging to stimulate critical and creative thought. Instruction must be carefully crafted to engage students and to model effective inquiry, investigation, and problem-solving strategies. Ideally, a team comprised of a range of education professionals would be involved in the development of PBL units of study to ensure that complex, authentic problems are addressed in a carefully crafted learning environment.

The T^2 Summer Institute

In June 2001, Project T^2, Teachers and Technology, held its first Summer Institute. This weeklong institute provided the setting to bring together a team of education professionals to develop PBL units of study for use in K-8 classrooms. Teacher candidates, arts and sciences faculty, teacher educators, and K-8 teachers from each of the three partner institutions and their associated school districts came to the Summer Institute with the express purpose of developing technology-enhanced problem-based learning (TE-PBL) units of study. Two consultants, one in the area of problem-based learning and the other in the area of universal design for learning, worked with institute participants in the design and development of the units.

On the first day of the institute, participants were divided into five teams, each consisting of at least one arts and sciences faculty member, at least one K-8 cooperating teacher, at least one teacher education faculty member, and two or more teacher candidates. Each member of the team had a different perspective and an important role to fill on the team. The arts and sciences faculty members ensured that rich content was associated with each problem scenario. They served as the content area experts and provided the knowledge base necessary to give the unit authenticity and relevance. The teacher education faculty members provided the pedagogical content knowledge. They ensured that appropriate instructional techniques would be used to challenge and guide a wide variety of learners in a wide variety of settings. The K-8 cooperating teachers contributed their expertise and experience in today's complex classrooms. They brought an element of "reality" that ensured the content addressed state curriculum standards and the skills were appropriate for students' developmental level. Teacher candidates were central team members. Since they planned to use the units the following year in their student teaching, they asked the questions that made certain the units were clearly written and usable by novice teachers (or teachers unfamiliar with problem-based learning).

Students and faculty from the three partner institutions were mixed on each team so that there would be an enriched exchange of ideas and techniques. We recognized, however, that it would be important to provide time for team members to get to know each other, so team-building activities were built into the first day's agenda and a number of opportunities for working together were provided during the week. Most participants lived on campus during the institute, which gave them additional opportunities for socializing and working together during the evenings.

Team Collaboration

Participants responded very favorably to working in teams. Teacher candidates later listed the benefits they felt, most frequently mentioning the following:

- Learning from those with more sophisticated skills
- Having experts there to facilitate the process
- Developing confidence and recognizing our own areas of expertise
- Getting ideas from arts and sciences faculty that would not have occurred to us
- Having our teachers (teacher education faculty) there to help us with designing the unit

The Units

Five TE-PBL units were designed, one from each team. We found that we did not have enough time in one week to fully develop complete units, but each was well started with a problem scenario and a basic outline of content and activities. All units feature 5 design elements: a conceptual theme, a metacognitive emphasis, a guided inquiry approach, principles of universal design for learning, and technology infusion. Each is based on state (NC) and national content area and technology standards. In the remainder of this paper we will illustrate these design elements as built into one of the units developed during the institute, *The Alhambra*, which presents students with the following problem scenario:

> A mild earthquake occurred last week and damaged some of the precious mosaic panels in the Alhambra, a palace in Granada, Spain. Many of the most beautiful rooms in the palace have had to be closed. You have been asked to join a team that has been hastily put together to make recommendations to the Granada Municipal Council on whether it would be worth the cost to restore the panels of the Alhambra and, if so, how this might be done.

Conceptual Theme: Patterns

The generalization that provides the underpinning for this unit is "*Pattern recognition is fundamental to problem solving.*" In *The Alhambra*, pattern recognition is highlighted in at least two ways: one, the pattern in the mosaics and how shapes tessellate to form an authentic design, and two, the pattern of replacement cost change as affected by design change. In this unit situations are set up so that students will come to understand that recognizing patterns is an important skill in problem solving.

Metacognitive Emphasis and Guided Inquiry Approach

A guided inquiry approach is used during each phase of the PBL process. As TE-PBL units are developed, essential questions are built in so that teachers can lead their students to ask questions that will guide them in their information gathering and in their thinking about the problem. During the problem engagement phase of *The Alhambra*, for example, the teacher may ask students such questions as:

- What questions do we need to answer to begin solving this problem? (e.g., What is a mosaic?)
- How might we find answers to our questions? (e.g., Where could we find pictures of the Alhambra?)
- How can we focus and organize our research? (e.g., What is most important to find out first?)

As teachers model this type of questioning, they encourage students to ask questions, to plan, and to monitor their own progress.

Principles of Universal Design for Learning (UDL)

To ensure that quality curriculum is accessible to all students, T^2 units are constructed with principles of universal design in mind. Multiple forms of engagement, representation, and expression are considered from the beginning and built into each unit. *The Alhambra* provides several examples of UDL. For example, to provide multiple forms of engagement, selected websites give students realistic views of the palace, gardens, and mosaics while links to information on tessellations and tiling techniques provide different ways to engage with geometry. *The Alhambra* also includes multiple opportunities for students to express what they have learned. In addition to the rubric that evaluates the final product, there are "skill and content checkpoints" where students can assess their own progress as frequently as they wish without teacher assistance.

Technology Infusion

Technology is infused throughout *The Alhambra* unit. As noted above, students can see photographs of the palace and its mosaics at sites available on the Internet. They can also investigate geometric shapes, tessellations, and nibbling techniques by utilizing sites on the Web. There is a sample spreadsheet for calculating cost of renovation designs, and the unit links to an online dictionary of math terms in case students need to look up unfamiliar terms. Test authoring software is used to insert the skill and content checkpoints .

Conclusion

Collaborative teaming facilitated by technology provides an ideal means of developing high quality TE-PBL units. Content knowledge, pedagogical knowledge, and real-world experience combine to lend authenticity, challenge, and accessibility to curriculum development.

Acknowledgements

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A Connected Lifelong Learning Community

Kenneth Janz
Instructional and Information Technology
Indiana State University, USA
kjanz@indstate.edu

Susan M. Powers
Department of Curriculum, Instruction and Media Technology
Indiana State University, USA
powers@indstate.edu

Abstract: Recently, the Lilly Endowment announced their latest Community Alliances to Promote Education (CAPE) projects, and Indiana State University was a recipient of $5,000,000. Indiana State University is collaborating with the local school corporations to assist Sullivan County in the implementation process to enhance the educational opportunities of the citizens of Sullivan County. Sullivan County lacks the technology foundation, or delivery system, needed to access the resources to meet its educational challenges. To address the identified changes, the following solutions are being implemented in this project: a fiber optic network to connect the county schools and main library; a community learning center; video-enabled distance education; and training in technology for all the county's teachers. This presentation will focus on the project goals and successful opportunities and challenges confronted by the venture.

Introduction

Recently, the Lilly Endowment announced their latest Community Alliances to Promote Education (CAPE) projects, and Indiana State University was a recipient of $5,000,000. Indiana State University is collaborating with the local school corporations to assist Sullivan County in the implementation process to enhance the educational opportunities of the citizens of Sullivan County.

To understand the needs of Sullivan County stop – for a moment - and place yourself in a rural community, Sullivan County in particular. Then consider how technology, or the lack of it, affects the people who live there. This project appears to be all about computer technology, video conferencing and fiber optic networks. But is it? This project is about elevating the ability of a rural community to compete in an increasingly technologically driven society. This project is all about leveling the playing field.

Sullivan County is a predominantly rural community located in the southwestern part of the state between Vigo and Knox counties. It has a population of 20,280 people with the city of Sullivan serving as the county seat. Two school corporations, Southwest (SWSC) and Northeast School Corporations (NESC), currently serve the educational needs of the children of Sullivan County. Currently, according to the 1990 census, 26% of adults in Sullivan County do not have a high school diploma and only 10% have four years or more of college compared to 16% of the population of Indiana. Poor education is accompanied by low income, which is reflected by a 20% difference in annual income between Sullivan County and the state of Indiana ($23,141 compared to $28,936) according to the Indiana Department of Workforce Development. Sullivan County also has a large senior citizen population. According to the 1990 census, 18% of the citizens in Sullivan County are over the age of 65 while the state and national levels are 10%.

A representative group of citizens from education, business and industry met to discuss the educational strengths, weaknesses, opportunities and threats facing Sullivan County. While a number of deficits were noted as being serious, solutions to these difficulties as well as opportunities for advanced training for students and economic development of the county were identified in technology. Unfortunately, Sullivan County lacks the technology foundation, or delivery system, needed to access the resources to meet its educational challenges. To address the identified changes, the following solutions are being implemented in this project:

- A fiber optic network to connect the county schools and main library
- A Community Learning Center
- Video-enabled distance education
- Training in technology for all the county's teachers

The schools share facilities with the communities in the evenings and on weekends for educational purposes. Trained students, building their skills for future employment, will staff the computer labs. Studies show training continues to be a significant barrier to using technology effectively in the learning environment. To address this issue, a new generation of staff development programs is being created for teachers in the county. The new in-service program is aligned with Indiana's Department of Education's new state standards and guidelines and nationally recognized technology standards.

Fiber Network

In education, rural schools have always been behind urban schools in educational opportunities because of the lack of ability to offer a variety of advanced and elective classes. With the advancement of the technology age the gap is widening because of a lack of resources necessary to provide an adequate number of computers and Internet access to poor rural areas. Ironically, this same technology would lessen the gap if technology were available to rural areas.

In Sullivan County, while efforts have been made to provide students with computers, access to the Internet is very complicated, slow, unreliable and expensive because three separate telephone systems and two LATAs (Local Access and Transport Area) serve the county. 56K lines connect all the schools in both corporations, which is a cause for frustration resulting in limited access. 56K frame relay circuits do not allow for distance learning, voice or video. A fiber optic backbone is being constructed to connect all the county high schools, public library and Community Learning Center to allow for Internet access as well as other distance learning technologies (Figure 1).

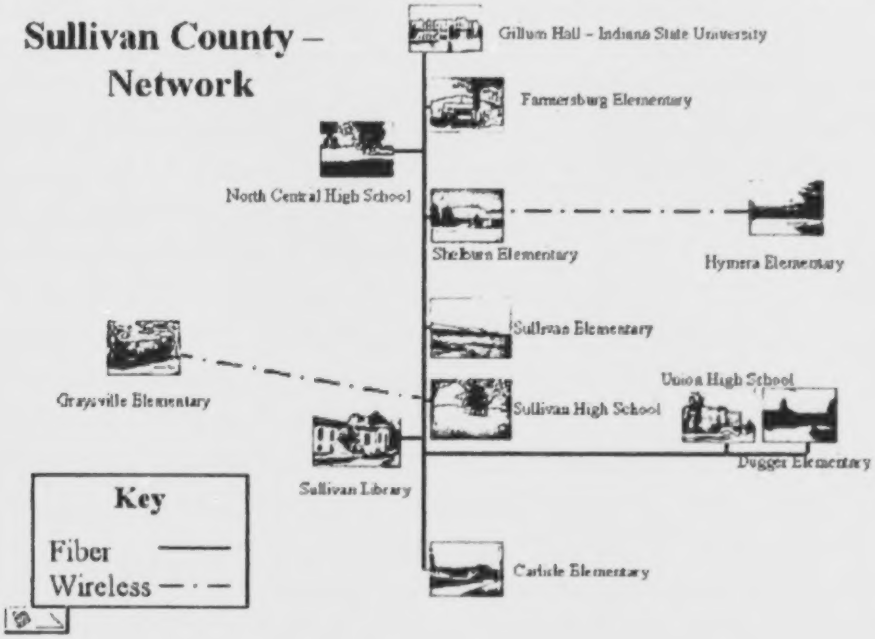
Sullivan County – Network
Gillum Hall – Indiana State University
Farmersburg Elementary
North Central High School
Shelburn Elementary
Hymera Elementary
Sullivan Elementary
Graysville Elementary
Union High School
Sullivan High School
Dugger Elementary
Sullivan Library
Carlisle Elementary
Key
Fiber ——
Wireless — · —

Figure 1. *Diagram of Sullivan County Fiber Optic Network*

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This project is replacing the present dependency on lower speed T-1 and 56K leased lines. This issue is problematic to all rural K-12 schools in the state of Indiana and the nation as a whole. Sullivan's Connected Lifelong Learning Community project could be a catalyst for the state of Indiana in demonstrating the capabilities of a fiber optic network in a rural setting. This goal of building a fiber optic network is the foundation on which all programming and training of the subsequent goals are based.

Community Learning Center

Network technologies do not become powerful until they serve the purpose of improving the human situation. The Community Learning Center is being designed to offer programs using distance education and instructional technology as a promising solution for life-long learning in a rural area.

While the Learning Center is being housed in a central location, the services offered to the County are not to be viewed as being in "four walls". The Center is mobile to the extent that equipment and personnel can go out into the community to provide services. Sullivan's Community Learning Center is enhancing skills for life-long learning through flexible (time, location, method) programming.

Video-Enabled Distance Education

This project is providing video-enabled distance education to and from the schools and Community Learning Center within the county and from higher education institutions in the state of Indiana. For example, Southwest School Corporation offers French as a foreign language while Northeast School Corporation offers German. It is financially impossible for each school corporation to offer both, but with video-enabled distance education classrooms, students in both corporations will have a choice of either class. In addition, the two school corporations will offer a complete set of advanced placement (AP) courses for college bound students. Currently, only Sullivan High School offers two AP classes.

The state higher education system offers a plethora of courses available through distance education. The community will be able to access the courses from any one of the high schools and the Community Learning Center in the county with the installed video equipment.

Staff Development

Internet access and video conferencing provides schools with resources that would not otherwise be available. Training continues to be a significant barrier to effectively using technology in the learning environment. Connected Lifelong Learning Community staff will be representative of a new generation of professional development with instructional technology. A new generation of professional development is differentiated according to participant needs; it is contextual according to teaching and work assignments; it integrates the technology for teaching and learning; and it is grounded in the standards and professional development guidelines that affect teachers, staff, and administrators in Indiana (i.e. K-12 curriculum standards, Indiana Professional Standards Board [IPSB] teaching standards.)

Programmatically, the staff development is designed for all school corporation and Community Learning Center employees. Staff development utilizes strategies that are shown to be indicative of effective professional development (McKenzie, 1999; NCREL, 2000):

1. Organizational Technology Planning. Staff participated in technology planning that begins with assessments to determine the current technology integration abilities and technology capacity of the staff, schools, and district. This assessment utilized the "enGauge Framework for Effective Technology Use in School" (http://engauge.ncrel.org/). This assessment tool was developed with support by the North Central Regional Educational Laboratory (NCREL) and provides baseline data for long-term evaluation, as well as for the purposes of planning.

2. Personal Technology Planning. The staff engaged in personal technology planning. Baseline data on personal technology capacity being collected through the web-based tool called "My TARGET"

(http://mytarget.iassessment.org/). My TARGET is a tool that allows users to assess and reflect on growth with educational technologies and was developed in Indiana with support from the Lilly Endowment.

3. Technology Facilitators. The staff includes the current technology facilitators of Southwest School Corporation and created additional facilitators in the Northeast School Corporation. Technology facilitators are full time staff that assist teachers on the integration of technology into the learning environment and are available to solve technical problems on a continuing basis. The technology facilitators are an integral component of the remaining staff development strategies.

4. Professional Growth Teams. As the staff completes the assessment and planning process (which addresses district, school, and personal needs) staff are placed in smaller, support units that coincide with the IPSB Professional Growth Teams. Team members will help each other develop Professional Growth Plans (PGP), work cooperatively throughout the project period, and provide support and feedback. The PGP's will guide the development of the topics and format of the staff development. (For example; instruction over video conferencing would not occur until participants are competent with the technology) The PGP's utilize the baseline data collected and forecast individual objectives and goals that encompass technology standards such as the Recommended Foundations in Technology for All Teachers, developed by the International Society for Technology in Education (ISTE), the Professional Competency Continuum, developed by the Milken Exchance on Educational Technology, and the National Educational Technology Standards for K-12 students, developed by ISTE and related consortium. Teams meet and communicate face-to-face, through electronic technology, and where appropriate through video conferencing.

5. Connected Student Learning. The objective of this professional development is to implement new teaching strategies that will engage students and develop their cognitive skills for higher order thinking, not on training for training's sake. Student learning will always be a contextual element present in all staff development. Participants will be expected to map professional development activities back to student learning activities and outcomes.

6. Create a Knowledge Base. In order to help teachers understand how instructional technology can be connected to student learning and how it can enhance teaching, learning, and assessment, as well as to aid in planning, all the professional growth teams will work to create a common knowledge base related to instructional technology. A significant portion of the staff development budget is devoted to the purchase, development, and duplication of training materials (books, CD's, online materials, etc.), and research materials (books, journal reprints, etc.) to develop and enhance the participants' knowledge regarding educational technologies.

7. Hands On Learning with Technology. Talking about technology will do little to enhance the ability of participants to use technology for teaching, learning and assessment. At all times, participants are active users of the various technologies, and even use a particular technology to learn about its application. For example, teachers who are learning how to effectively deliver instruction over a two-way video and two-way audio system participate in instruction through that system. Experience as a learner will enhance their abilities as an instructor. Active learning with various technologies takes time and staff are permitted the time to "play" with technologies and engage in their own constructivist and discovery learning. Therefore, two important items were necessary to alleviate this time issue. First, staff members that participate in staff development beyond their contracted hours will received a stipend. For staff development that needs to take place during the regular school day, substitute teachers are hired cover classes.

8. Collegial Learning and Support. Effective professional development teams provide supportive learning environments. The professional growth teams are one source of support that has already been described. In addition, each participant will identify a "buddy." Participants will select their own buddies from a peer group. This type of support provides invaluable experience for the students and helps the staff to better understand the facilitative mode of instruction that technology can engender. These individuals may or may not be in the same professional development team, but are a connection to share learning experiences, frustrations, celebrations, etc. Consultants also are another form of support for the staff development participants. Consultants do more than just hands-on training activities but continue to participate both before and after a particular training element to provide support and continued learning for participants.

The consultants were selected, according to the outcomes of the planning process. Selected consultants needed to agree to be available for an extended period beyond training to provide online support as needed by participants. Finally, students in the school are an excellent source of support. Whenever possible, students were used to provide assistance with training and technical support. This type of support provides invaluable experience for the students and helps the staff to better understand the facilitative mode of instruction that technology can engender. Formats for learning include but are not limited to: for-credit courses, field trips, visits to educational resource centers, Indiana Department of Education sponsored technology associates, online training, expert consultants, etc.

9. Mentor Teachers. There currently exists a number of staff who have a high level of experience and comfort with technology. Their assessments and PGP indicate that they need little actual training but need more "practice" and time at utilizing technology in the classroom. These teachers are prepared early in the process to experiment with technology integration for teaching and learning. These teachers will then be able to serve as mentors to other staff members.
10. Follow Up Assessment. The staff development budget includes money for a follow-up evaluation. The project allows for a variety of baseline data to be collected using a number of online tools. These same online tools will be revisited at the end of the third year to determine growth. In addition, an on-site technology audit of both school corporations will be conducted to receive additional feedback.

This presentation will focus on the project goals and successful opportunities and challenges confronted by the venture. When the project is completed students from both school corporations will have the opportunity to use the most up-to-date technology available in preparation for higher education and the job market. Students and teacher will experience the following improvements and enhancements when this project is complete:

- Fast, reliable Internet access for all school personnel (fiber optics is much more reliable and over 100 times faster than our present system)
- Improved network security
- Ability to share resources between school corporations
- Advanced applications such as full-motion video
- Distance Learning
- College credit classes
- Centralized software and data backup
- Centralized maintenance
- Employment of students in the Learning Center and computer labs
- Early education of children through the Learning Center
- Career exploration
- Tutorial instruction

The Connected Life-Long Learning Community from vision to reality is giving the citizens of Sullivan County the educational opportunities they will need to succeed in the 21st century.

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Technology for Participation

Dr. Terrie Shannon, Dr. Louis Abrahamson, Lyle Shannon, and Karen Keenan, partners in the Arrowhead Preparing Tomorrow's Teachers to use Technology (APT3) Project, Education Department, University of Minnesota Duluth, Minnesota, are the presenters for this 2002 SITE Conference interactive session.

Technology for Participation

The Arrowhead PT3 (APT3) project is an innovative teacher preparation program at the University of Minnesota Duluth. Working in collaboration with the Duluth Public Schools, Fond du Lac Ojibwe Schools, Apple Computer, Texas Instruments, and Better Education, Inc., APT3 educators are working to increase student active participation and faculty collaboration through the use of wireless hand held communication response devices. This interactive session will demonstrate classroom pedagogical and group interaction applications enhanced through the use of these devices.

The objectives of Technology for Participation are to provide participants with:

- An opportunity for educators to experience hand held communication response devices
- The pedagological theory supporting the use of these technological devices
- The opportunity to become familiar with two types of software applications for increasing student participation.

- A venue for discussion about possible research about and applications for hand held communication response devices.

This session is applicable for beginners through advanced technology users.

APT3 educators will demonstrate and facilitate the use of two types of interactive infrared response devices: Classroom Performance System (CPS) and Performance Response System (PRS). Both systems support real-time interaction in traditional classroom settings through teacher questioning and anonymous individual student response. Immediate feedback is provided through graphic and text display. Additionally, each software application allows for saved and tracked digital student records.

CPS and PRS promote active participation for each student in an environment where only the teacher knows the answer each individual student provides. This type of anonymity decreases student anxiety, which in turn promotes better student engagement of the content of the class, rather than a fear of being incorrect. Additionally, teachers who apply PRS or CPS technologies in their classrooms provide themselves with a means to accurately diagnose student learning in a meaningful and formative way. Further, CPS and PRS technologies can be used for collaborative learning that encourages teamwork. Finally, due to the record keeping features, these systems diminish administrative teacher tasks, allowing for time generation, a valuable commodity for any teacher.

During this session participants will experience both systems. Additionally, information about a current research project, The Use of Interactive Instructional Technology to Facilitate Classroom Instruction, by Robert L. Lloyd, Ph.D. will be summarized for participant review and discussion.

This interactive session can accommodate 30 participants. The materials needed include the following:

- Internet access
- A digital projector and screen
- An easel, flip paper and markers
- A power strip with a long cord

TOPS and STAT: Two PT3 Bridges for the Digital Divide

Jennifer Kidd, Old Domimion University, US
David Kidd, Brunswick County Public Schools, US

Aligning Credentialing with Technology Training (ACTT Now) is a Preparing Tomorrow's Teachers to Use Technology (PT3) project partnering Brunswick County Public Schools, a k-12 district in rural Southside Virginia, with Old Dominion University's Darden College of Education. It is intended to counter the effects of the digital divide felt so profoundly in this region. ACTT Now consists of five major components:

(1). An internship program for Old Dominion's pre-service teachers
(2). A field-based masters degree program for Brunswick's uncertified and provisionally certified teachers
(3). Technology Opportunities for Parents and Students (TOPS): An evening technology-training program for Brunswick County community members
(4). Student Technology Assistance Teams (STAT) and
(5). Technology Training for Old Dominion's Methods Faculty

Despite the dismal statistics of its community, including one of the highest illiteracy rates in Virginia, Brunswick County Public Schools has emerged as a leader in technology. Through the innovative leadership of the technology department, Brunswick County has acquired technology resources parallel to those in the rich districts surrounding the nation's capital. Four instructional technology specialists and the director of technology work to help teachers integrate these new tools into their classrooms and curricula. Now in partnership with Old Dominion University, Brunswick has improved resources with which to accomplish this mission.

Old Dominion University's Darden College of Education has been a technology leader for the past decade. Its Teletechnet program brings 4-year degree program to students in remote areas throughout Virginia and the nation. Previously focused on the development of the urban area of Hampton Roads, the Darden College of Education now has an opportunity to expand its reach into the surrounding rural communities that are greatly in need of educational and economic resources.

This paper will focus on two ACTT Now initiatives aimed specifically at increasing the technological proficiency of Brunswick's population: TOPS and STAT. Technology Opportunities for Parents and Students (TOPS) offers free technology classes for adult community members in Brunswick County and entices them to participate with free dinner, child care and nightly raffles prizes. While parents and grandparents are learning basic computer skills, their children are engaged in crafts, games and technology activities of their own. What makes TOPS truly a learning experience at all levels is the instructors. Brunswick teachers participating in ODU's field-based masters program serve as the adult and student instructors in the TOPS programs, helping the teachers to reinforce their own technology skills and building a stronger bond between the community and the schools. Providing a needed service to their community, Brunswick teachers take pride in their efforts and contribute to the emergence of a technology culture in the county.

Student Technology Assistance Teams (STAT) likewise focus on helping different populations simultaneously. Many good teachers are reluctant to use technology in their classrooms. STAT provides in-classroom support to teachers when and where they need it. At the same time, STAT students learn responsibility and earn respect from their teachers and peers as the take on new roles as technology helpers. STAT encourages Brunswick's students to explore information technology jobs and programs, a field where undoubtedly, a significant proportion of future jobs will lie. Working as part of STAT, students gain valuable and marketable experience that will give them a head start toward a future career.

Through the efforts of the ACTT Now project staff, STAT and TOPS are working to bridge the digital gap in Brunswick County. As works in progress, these two initiatives are experiencing successes and setbacks. The paper will explore both. Data collected by the project manager and ACTT Now's external evaluator will be presented to analyze the effects of these two initiatives on the technology literacy and the self-efficacy of Brunswick's population.

Web Portal Strengthens Partnerships for Enhanced Teacher Preparation

John A. Kinslow
Ellen Newcombe
Marlene Goss
Lesley Ann Welsh
Rose Marsh

West Chester University of Pennsylvania
PT3 Partnership for Excellence Program
Recitation Hall, Room 310
West Chester, PA 19383
pt3@wcupa.edu
(610) 436-3108

Abstract

This paper and presentation follows the development of a web portal for a PT3 project based at West Chester University of Pennsylvania. Through work with school, business and community representatives, WCU is in the process of strengthening partnerships that enhance pre-service teacher education and building an on-line community of learners among the members of the partnership. Included in the portal community will be pre-service and in-service teachers, WCU faculty, and other project partners. The portal design facilitates ongoing communication and support for teachers whether they are new to teaching, have not yet taught or are experienced veterans. This paper discusses the development of the web portal and outlines the key decisions in establishing its design and in choosing the technology used to implement it. Also, it describes the creation of a community of learners among the partners and the evaluation of outcomes from the portal implementation.

Introduction

West Chester University (WCU) of Pennsylvania graduates 600 new teachers each year. WCU together with their P-12 partners, share a sense of urgency in preparing WCU graduates to meet the challenge of educating P-12 students successfully in today's digital age (Carlson & Gooden, 1999). To meet current educational challenges, the partners recognize that the teacher preparation program must evolve into one that: models the effective use of technology, requires online learning, and expects that pre-service teachers will use technology daily as a productivity and communication tool. Also this should be a program that engages pre-service teachers in the best practices related to content-specific, technology-based solutions; provides pre-service teachers with field experiences that engage them in authentic effective uses of technology with P-12 students, and teachers; and consistently engages pre-service teachers in high-quality professional dialog and reflection through online communities throughout their preparation into their induction. Building on the extensive work of WCU and its partners through a number of initiatives (including a 1999 PT3 Capacity Building Grant), this strong P-16 partnership plans to develop a "21st century" teacher preparation program.

There is nation-wide, urgent need for technology-savvy teachers who are able to effectively integrate technology for improved teaching and learning environments (Carlson & Gooden, 1999; Green, 1998; NCES, 1999). Recent studies show, when used intelligently as a tool, technology can help to leverage improvements in K-12 classrooms (SIIA 2000 Report; Milken Exchange, 1999; Valdez & McNabb, 1997). The United States Department of Education, through its *Preparing Tomorrow's Teachers with Technology* (PT3) initiative is supporting the improvement of technology integration in teacher education programs, as are organizations such as the National Council for Teacher Accreditation (NCATE) and ISTE. The CEO Forum, a U.S. business-education collaborative, has recommended that teacher training in computer technology become a mandatory component of licensure by 2002. Locally, in Pennsylvania, this need has been highlighted by evidence showing that simple access to technology resources is not sufficient for the creation of technology-enhanced learning environments (PA Link to Learn Initiative, 2001).

Through this PT3 initiative, cohorts of teacher candidates will authentically experience what it means to use technology as a learning, teaching, productivity, research, and communication tool. The four PT3 program goals focus on technology integration, partnerships for enhanced teacher preparation, university leadership, and communities of learners. The initiative is grounded in research and best practice and based in the reality of the P-12 classroom - critically important for providing pre-service field experience and the supportive environment needed for future technology integration (Bell and Fidshun, 2000).

Existing Partnerships, the Foundation

Many educators have identified that the collaboration between K-12 schools and universities as essential to school improvement. Neither set of institutions can achieve alone what they can when they join together to solve problems which impact both of them. (Goodlad, 1991). Over the past three years, WCU School of Education identified a strong group of partners that has agreed to work with WCU to improve teacher preparation in order to meet educational challenges. Current partners include 7 School Districts, 3 Regional Consortia, and 3 Regional Educational Organizations. Each partner has offered to engage in activities that enhance the preparation experience of our pre-service teachers. The activities offered by each partner depend upon its strengths and interests, for example, teachers from the West Chester Area School District will engage in on-line technology integration courses with pre-service teachers and WCU faculty members as partners. The School District of Philadelphia has offered to host pre-service teachers for field experiences in technology-rich classrooms. Teachers in several local school districts will work with two pre-service teachers to integrate appropriate technology into a lesson or curriculum unit. Pre-service teachers will benefit from enhanced field experiences focusing on the use of technology in real classrooms; teachers in those classrooms receive assistance with technology. The current partnerships built around common interests in effective technology integration and a willingness to support improvement in teacher preparation will be extended and strengthened by development of the portal.

Portal Design and Content

The word portal implies a gateway; an Internet portal is a web site that provides entry into a comprehensive and well-organized collection of content, tools, and value added services. The portal concept is becoming increasingly important as the amount of educational information and resources grow. Educators need quick access to web resources that meet their needs and interests without having to wade through information that is not suitable. Portals can tailor information to different educational audiences with varying interests. Our portal will have specific web pages for pre-service teachers, K-12 teachers, and university faculty and content that is directed to each role group.

Portals also, provide tools that make communication between partners easier. If the PT3 partners can communicate easily at the portal site, they can exchange information that will assist them to more effectively integrate technology and strengthen teacher preparation programs. Portals will supply the tools and resources that support learning communities.

Development Process and Technical Considerations

Development of this portal has taken place over the course of six months and the website will continue to grow and be refined as a tool for the building of the WCU PT3 community. Initial work on the site began with brainstorming sessions that included the ideas of key faculty, teachers, project directors, evaluation team members and the project coordinator. These early ideas and a timeline for their implementation were originally scripted on paper, and then later committed to electronic text forming a set of homespun web pages. An important understanding, learned early on in the development of this web site, was to consider the portal user at all times, from the sequence of pages and the path a user would take through the descriptive text and databases that lay behind each button or choice a portal user might make.

In the beginning, two web site development firms were interviewed and meetings were held with these groups that actually helped the development process, if only through the thought experiments that ensued. One of these firms, a local commercial website company, was selected based on the successful work they had done with a for-profit educational site for K-12 students. Unfortunately, it quickly became clear that their experience with teaching and teacher-preparation was very limited and although our initial work together was helpful, this firm was not retained beyond phase one.

Finally, though collaboration with another PT3 Grantee at the Miami Museum of Science, an agreement was made with their in-house, web site development team. By working with this group who intimately understand teacher preparation, and technology integration through their own work, we have been able to make much faster progress in the development of this site. Many of the types of databases, JavaScript, and other coded programming needed to support an on-line community, have already been used in the Museum of Science site and with some alteration will be useful in the WCU portal as well. An early lesson learned when developing a web portal is that it is helpful to find technical support professionals who understand the key issues and content of a particular project. Without this already-existent shared understanding of the work that a portal is to accomplish, much time will be needed to bring developers "up-to-speed", creating problematic and costly delays in development.

Partnerships Transformed into a Community of Learners

WCU will use its new web portal to strengthen its partnerships by creating a learning community in which partners collaborate, conduct joint projects, review and critique ongoing work and share challenges and successes with other members of the teacher preparation community. In other words, partners will collaborate in a setting, the portal, where they build their future by learning to "implement our best ideas of today" (Jilk, 1999). Technology will serve as the catalyst that enables the partners, which may be distant in time and place, to work more closely with one another to solve problems and build new futures (Reil, M. & Fulton, K. 2001). The web portal now being created links the teacher preparation partnership to enhanced learning with technology. Pre- service teachers who have this collaborative experience during their professional training are more likely to engage in learning communities as they continue to develop as education professions (Slowinski, Anderson, & Reinhart, 2001) Resources such as lesson plans based on the ISTE/NETS standards, integration strategies for teacher preparation programs developed in this project, and mentors for tech users will be available on line. This portal will also serve as the electronic "meeting place" for identified project members and will be a gathering place for collaboration and exchange of ideas. Students from the George Washington High School of the School District of Philadelphia will be responsible for online technology support to the WCU PT3 Partnership for Excellence through the web site. We will disseminate project findings, announce face to face meetings, share resources, materials, advice and connect the entire PT3 Partnership for Excellence membership through the Web Portal.

Early Outcomes and Next Steps

At the time of publication, the WCU PT3 web portal is still in the second phase of its development process. Databases to support in-service, pre-service and faculty members have been designed and are now being configured. Pathways from page one through page fifty-one have been thought out and submitted to the webpage developers using *Inspiration* as a concept-mapping tool. Colors have been selected for the web site, and a functional site should be available for partners within the next two months (2/02).

Next steps for the development of this portal, which will likely be organic or continuous in nature, include "fleshing out" content descriptions for each web page, adding partner information, adding students at the beginning of the Spring semester, and encouraging in-service teachers to sign-on as hosts and collaborative partners for our pre-service teachers. As we reach toward our goals, we plan to enhance and expand our pre-service teachers field experience, and not simply teach *about* educational technology integration -- but teach *with* technology in this university and in the partnering K-12 classrooms with the students we serve. When faculty model effective technology use, students can become more effective teachers. The energy level is up in the WCU School of Education for technology integration and positive change, and our new *PT3 Implementation* grant will help to sustain our efforts. Tracking the use of this web portal will allow us to see longitudinally the concrete results of an extended, forward-looking effort.

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Preparing Preservice Teachers to Use Technology: Program Experiences and the Research

Denise Schmidt, Iowa State University, US
Clyciane Michelini, Iowa State University, US
Deb Versteeg, Iowa State University, US

Teacher preparation institutions all over the world are focused on providing experiences for preservice teachers so they will learn to use technology and then meaningfully integrate those technologies into the learning process. Because of its complexity, this task has been quite challenging for most teacher education programs. It challenges all teacher educators involved in preparing preservice teachers to think critically about the role of technology throughout the entire teacher education curriculum and the quality of field experiences the undergraduate students have in K12 schools. To adequately prepare preservice teachers to use technology in their own classrooms, teacher education programs must develop comprehensive models for technology integration that include meaningful uses of technology to improve and renew the teacher education and K12 curriculum.

Iowa State University has designed a technology-infused teacher education model. The goal of this comprehensive model is to prepare cohort groups of preservice teachers who are ready for leadership roles and who have had technology-enriched course and fieldwork throughout their teacher education program. This model's design is based upon the successful Project Opportunity cohort model developed previously at Iowa State University and uses John Goodlad's model of simultaneous renewal as a guiding theoretical framework (Goodlad, 1994).

In this teacher preparation model, a cohort of preservice teachers begin taking all of their professional education and methodology courses as a group starting their sophomore year. In addition, a three-year relationship with a school district is established, so students can participate in field experience opportunities in classrooms each semester. It is anticipated that these students will accumulate over 250 hours of field experience in schools prior to their student teaching experience. This model also provides extensive professional development opportunities for inservice teachers at the partner school sites. All facets of the model are designed to improve the quality and increase the quantity of field experience opportunities for students in the teacher education program.

A research agenda has been designed to examine the impact this comprehensive model has on the preparation of preservice teachers at Iowa State University. The cohort students have completed two surveys, Survey of the Use and Integration of Computer-Related Technology (Schmidt, 1995) and Cultural Diversity Awareness Inventory (Henry, 1991; Phillips, 2000), to provide baseline data in these areas. Additional data are being collected through focus group interviews, journals, and classroom observations. Results to date will be shared.

In summary, this technology-infused teacher education model addresses the challenge of helping preservice and inservice teachers define and implement technology applications that will expand and enhance curriculum in K-12 schools and will model comprehensive uses of technology to facilitate teacher education renewal.

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The NC Catalyst/SAS inSchool™ Partnership: Universities, Public Schools, and Business Working Together to Help Faculty and Cooperating Teachers Integrate Technology in Teacher Education

Carolyn Sneeden – University of North Carolina
Marjorie DeWert – SAS inSchool

Abstract:

In 2000, the University of North Carolina system received a Preparing Tomorrow's Teachers to Use Technology (PT3) grant from the US Department of Education. The statewide grant, titled NC Catalyst, is aimed at strengthening North Carolina's administrative, human, and technical infrastructure to ensure that all teacher education candidates are ready, willing, and able to use technology to enhance teaching and learning when they graduate from our 15 public teacher education programs.

A major focus of NC Catalyst is helping university faculty and cooperating teachers develop the knowledge, skills, and dispositions they need to integrate technology into their teacher education programs and field experiences. To accomplish this goal, each of the teacher education programs in the University of North Carolina system provide professional development opportunities for their faculty and cooperating teachers.

SAS inSchool has partnered with NC Catalyst in this important undertaking. As part of the partnership, SAS inSchool provides each teacher education program in the University of North Carolina system with an annual license to all of its curriculum software for secondary students as well as to Curriculum Pathways™ a curriculum resource for secondary teachers that provides quick and easy access to high quality, standards-based lesson plans, teaching ideas, and web resources.

Through the NC Catalyst /SAS inSchool partnership, we are helping university faculty and cooperating teachers meet the challenge of preparing the next generation of secondary teachers for our state's public schools. In this panel presentation, we will present NC Catalyst from four perspectives: that of the system-level grant coordinator, university faculty member, a cooperating teacher, and a business partner.

We will:

- provide an overview of NC Catalyst professional development efforts and related evaluation data to-date
- present an overview of SAS inSchool products and describe our unique, problem-based, collaborative approach to professional development
- share examples of how university faculty and cooperating teachers are using SAS inSchool products in teacher education programs and field experiences
- present and discuss the lessons we've learned about how universities, public schools, and business can work together to achieve mutually beneficial goals

Never Bowling Alone: Building Social Capital and Professional Knowledge Through Educational Technology

John J. Sweeder, Ed. D
Department of Education
La Salle University
United States
sweeder@lasalle.edu

Maryanne R. Bednar, Ph. D.
Department of Education
La Salle University
United States
bednar@lasalle.edu

Abstract: This paper maintains that teacher educators who infuse a multi-layered reciprocal cognitive apprentice "idea technology" (Ryan, Sweeder & Bednar, 2002) into teacher preparation programs will build social capital (Putnam, 2000) and enhance professional knowledge among graduate preservice teachers, teaching assistants, novice and veteran certified teachers, and university faculty. These 5 groups participated in a two-week summer immersion teaching practicum that included 65 middle-school children. A quantitative and qualitative survey was distributed to all pre- and in-service teachers as well as university faculty. Each questionnaire was analyzed systematically to determine the extent to which social capital had been built using the aforementioned idea technology. Results suggest that study participants formed strong bonds across both horizontal and vertical social networks (Driscoll & Kershner, 1989), bonds that, in turn, fostered professional development with respect to technology usage, leadership skill, collegiality, and personal reflection.

Introduction

A well-connected individual in a poorly connected society is not as productive as a well-connected individual in a well-connected society. – from *Bowling Alone* by Robert Putnam (2000)

Our paper argues that teacher educators who incorporate a multi-layered reciprocal cognitive apprenticeship model, an idea technology (Ryan, Sweeder, & Bednar, 2002), into their pre-service teacher preparation programs, build social capital and enhance professional knowledge in a variety of powerful ways. "Social capital refers to connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them" (Putnam, 2000, p. 19); likewise, social trust, an element of social capital, not only "promote[s] productive behavior," but also serves as "the cornerstone of reciprocal action…" (Coleman, 1988, as cited in Smylie & Hart, 1999, p. 423). Social capital comprises good will, fellowship, sympathy, and social intercourse among individuals who make up a collective unit. When pre-service and in-service teachers have opportunities to make connections with all parties involved in a professional development school (Mittleton, 2000) or in an immersion program such as a six-week summer practicum (Sweeder & Bednar, 2001), they are more likely to refine their professional decision-making abilities dealing with issues such as classroom management, lesson planning, and technology use (Wilen, Ishler, Hutchison, & Kindsvatter, 2000).

In our secondary education graduate immersion program, educational technology is deployed using an specifically-tailored cognitive apprenticeship model (Woolfolk, 2001) with five distinct, yet interrelated groups: graduate pre-service teachers, a graduate teaching assistant, newly certified secondary teachers, veteran certified secondary teachers, and university faculty. Our multi-level apprenticeship model was created to support the preservice teachers in their initial endeavors, to provide additional learning opportunities for the newly certified teachers, and to offer renewal opportunities for the veteran teachers involved.

Eleven graduate students, who possessed little, if any, classroom teaching experience, matriculated into our two-course, six-week integrated summer practicum. They were each responsible for creating and teaching a unit of study to classes of middle-school students who attended the enrichment program component of the practicum. One graduate assistant, who had successfully completed the summer practicum the previous year, served in a support role to the graduate students. Three newly certified teachers, our curriculum assistants, who had recently completed their own successful student teaching experiences, served collectively as a technology support system for the practicum. Three veteran teachers, our university supervisors, served as pedagogical content knowledge experts (Shulman, 1987) and provided midlevel supervision for the graduate students as they developed and taught their daily classes. Two university faculty served not only as experts in technology, adjustment, and instructional methodology, but also as universal problem-solvers across all five apprenticeship levels.

At the conclusion of the practicum experience, all participants completed a "Building Social Capital" survey wherein they reflected upon the degree to which they had established connections or bonds with each other during the six-week program. The anonymous survey included two different types of questions: ones requiring Likert-type responses and ones requiring brief narratives.

Results

Table 1 presents the participants' mean responses (*M*) to the Likert-type questions, with respect to their perceived growth in social capital, "the construct being measured" (Mason & Bramble, 1997, p. 309). The pre- and in-service teachers and university faculty were required to circle Likert-like ratings in response to a series of statements. (For example: "In my estimation, I have built social capital with the university supervisors: to a great extent, somewhat, not sure, a little, or not at all.") After the surveys were collected, the five Likert ratings were numerically converted. For instance, "to a great extent" was converted to a 4, "somewhat" was given a 3 rating, "not sure" was awarded a 2, "a little" was deemed a 1, and "not at all" received a zero.

	Graduate Students	Graduate Assistant	Curriculum Assistants	University Supervisors	University Faculty
Graduate Students	$M = 3.88$	$M = 3.88$	$M = 1.88$	$M = 3.33$	$M = 3.77$
Graduate Assistant	$M = 4.00$	*Not Applicable*	$M = 1.00$	$M = 4.00$	$M = 4.00$
Curriculum Assistants	$M = 3.00$	$M = 3.66$	$M = 3.66$	$M = 4.00$	$M = 4.00$
University Supervisors	$M = 3.50$	$M = 4.00$	$M = 4.00$	$M = 4.00$	$M = 4.00$
University Faculty	$M = 3.50$	$M = 3.00$	$M = 4.00$	$M = 4.00$	$M = 4.00$

Table 1: Mean ratings (*M*) for perceived growth in social capital: 4 represents greatest growth, while 0 represents no growth.

The following question stem was used in prompting the participants as they crafted five, short-answer narratives: "To what extent, if any, have you benefited personally and/or professionally from the connections or bonds you established with the" graduate assistant, curriculum assistants, fellow graduate pre-service teachers, university supervisor, and university faculty. All written responses were reviewed to identify common themes or "thought units" (Glaser & Strauss, 1967). "Thought units" were then analyzed, and subsequently categorized using a systematic cognitive framework (Sweeder & Bednar, 2001, October)

– an idea technology – namely, Woolfolk's (2001) six common features for cognitive apprenticeship models. (See Table 2.)

Cognitive Apprenticeship Features	Total Number of "thought units"	Survey Thought Unit Example	Who Said What About Whom
Feature 1. *modeling*	31	"I learned more by watching and trying to model your actions."	Curriculum assistant re: university faculty
Feature 2. *coaching*	28	"She gave great feedback with helpful and practical suggestions."	Graduate student re: university supervisor
Feature 3. *scaffolding*	14	"Great resource person to bounce ideas off of and talk to."	Graduate student re: graduate assistant
Feature 4. *articulating*	18	"Both were extremely helpful in just observing their example and listening to the advice they gave the preservice teachers. More specifically the technical aspects Dr. Sweeder gave in producing the PowerPoint and video presentations, e.g. what makes a good shot."	Curriculum assistant re: university faculty
Feature 5. *reflecting*	19	"This experience has been such a positive one. It was easy for me to dwell on what went wrong. You did not let me do this. You showed me my strengths and helped me to overcome many of my weaknesses."	Graduate student re: university faculty
Feature 6. *exploring*	10	"Professionally, I've gathered newer ideas that I would definitely incorporate into my classrooms (such as approaches to discipline and novelty in teaching style)."	Curriculum assistant re: graduate students

Table 2: Total number of "thought units" for each of the six shared cognitive apprenticeship features.

Discussion

We believe that the multi-layered reciprocal cognitive apprenticeship model is a particularly effective mechanism to enhance professional development, because it fosters not only *horizontal* but also *vertical* social networks amongst the various groups (Putnam, 1993, as cited in Driscoll & Kerchner, 1999). To illustrate this point, the mean social capital ratings for each group reported strong connections with members within their respective groups. For instance, one horizontal network, graduate students with graduate students, produced a 3.88 mean rating. Another horizontal network, curriculum assistants with their fellow curriculum assistants, established strong relationships (M = 3.66). Several groups, however, indicated that they believed that they had built similarly strong connections with other participants along vertical networks (Driscoll & Kerchner, 1999). For example, the curriculum assistants indicated that they each had built social capital with the university supervisors (M = 4.0) and the university faculty (M = 4.0), while the university supervisors indicated similar 4.0 mean ratings with the curriculum assistants, the graduate assistant, and the university faculty.

Social capital was not as strong between two distinct groups: the graduate students with the curriculum assistants (M = 1.88), and the graduate assistant with the curriculum assistants (M = 1.00). The curriculum assistants had very specific technology roles during the practicum experience, and even though they spent a portion of their time assisting technology-related issues in the graduate students' classrooms, they spent a more substantial period of time assisting technology issues related to the overall practicum. This may limited the number of opportunities to develop connections with the graduate students and the graduate assistant. In addition, the graduate students and graduate assistant may have viewed the curriculum assistants with their newly earned undergraduate degree as having less legitimate power (Wilen et al., 2000).

In light of our findings, we believe, as do Etcheverry, Clifton, and Roberts (2001) that "because students are strongly influenced by their interactions with each other, it is important for university professors to attend to the social structural characteristics of the educational environment vis-à-vis students' interactions in their classrooms" (p. 36). Extending their findings using an undergraduate population, we found that our graduate students, as well as the supporting in-service teachers, were similarly influenced by their interactions with others; hence, we put our emphasis upon establishing a multi-layered apprenticeship model so that each of our participants had multiple and varied opportunities to build social capital within our specific educational environment.

Our multi-layer, reciprocal model provided ample opportunities for all of the participants to refine their professional decision-making skills. This is supported by both the quantity and quality of the "thought units" elicited from their written comments. For example, the pre-service graduate students indicated that they believed that they had extensive opportunities to observe experts *model* (see Feature 1., Table 2) a practice, procedure, or attitude. The graduate students defined *expert* along both vertical and horizontal relationships associated with the building of social capital. Several indicated that they viewed the lone graduate assistant as an expert because " she went through the practicum the previous summer" and, thus, they valued what she had to say. As one would expect, graduate students pointed to both the university supervisors and the university faculty as experts, e.g. "I benefited from their example and leadership."

There was strong recognition of the external support made available through *coaching* and *scaffolding* (Features 2. and 3.) by the different participants. The graduate students, for instance, indicated that they felt highly supported by one another. One commented, "We shared ideas and brought materials for each other"; while another wrote, " I was inspired by the variety of teaching methods [I observed]." The graduate students also indicated that he university supervisors were instrumental in supporting them through mentoring. "The focused feedback was what I really needed and I got it from each of the supervisors differently," stated one graduate student. The university supervisors commented about the individualized and contextualized scaffolding they received by the university faculty members. In turn, the university supervisors mentored both the graduate students as well as the curriculum assistants. This mentoring was reciprocated when the curriculum assistants taught the university supervisors about the newer product technologies they used during the program (e.g., Sony Mavica Digital Still Cameras and Sony Digital 8 Camcorders).

The graduate students indicated that they felt they had ample opportunities to *articulate* (Feature 4.) their knowledge both formally and informally. Six of them specifically stated that they valued the "lunch and free periods" where they were able to discuss events that occurred in their classrooms. Others indicated that their journals, as well as their interactions with the graduate assistant, the university supervisors, and the university faculty were all critical in helping them to *reflect* on their progress (Feature 5.). Finally, the university faculty enhanced their professional knowledge. One commented that it was "professionally and personally invigorating to watch the 'little Sweeders' [a sobriquet that the graduate students invented for the curriculum assistants]. I caught their wave and am *exploring* new ideas for next year " (Feature 6.).

At the conclusion of the enrichment program we produced two multimedia presentations highlighting the middle-school students' experiences during the practicum. The first, an electronic slide show, was created using PowerPoint; the other, an edited video production, was created using a Sony Digital 8 camcorder and MGI's popular *Video Wave III*, a piece of inexpensive, nonlinear editing software. Both productions were projected onto a theater-sized screen and amplified by "surround sound" for added emotional impact. Not only were these productions warmly received by the middle schoolers, but the shows also spawned a multimedia parody that the curriculum assistants spontaneously (and surreptitiously) created. Featuring adults only -- the graduate students, the graduate assistants, university supervisors, and university faculty -- this lampoon provided a further example of the social capital built amongst all of the participants.

Conclusion

We believe that teaching, like the sport of bowling, is seldom as engaging – or productive – when performed alone. To paraphrase Robert Putnam, "A well-connected [teacher] in a poorly connected [school] is not as productive as a well-connected [teacher] in a well-connected [school]." Thus, during our summer practicum experience, we created a school community (a microcosm of our larger society) where mutual trust and reciprocity helped to de-isolate our novice teachers and lubricate the social intercourse amongst the pre-service and in-service teachers as well the university faculty. *No one* in our summer enrichment program "bowled alone."

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Collaborating Across Boundaries to Form Technology-infused Learning Communities

Kathe Taylor, The Evergreen State College, US

The term, "learning community" has many meanings and is often used in a general way to describe any community of learners. Our PT3 catalyst grant adopted a definition of learning communities that was very specific and consistent with a curricular approach common to The Evergreen State College. We asked faculty in teacher education courses to create technology-infused learning communities by purposefully restructuring curriculum to link together courses and create an interdisciplinary experience for students that faculty would collaboratively plan and perhaps team teach. Technology would be an integral part of the community.

How technology was integrated into the learning community experience was left in part to the discretion and creativity of the faculty. We did specify two requirements, however. One stipulated that students would have opportunities to participate in an electronic learning forum. The second asked the faculty to create opportunities for preservice students and Generation www.Y students to work together on technology-related projects. Generation www.Y is a program designed to train K-12 students with the technology, collaborative and pedagogical skills necessary to help teachers integrate technology into learning.

Fundamental assumptions of this project were that it would be beneficial for students aspiring to be teachers to 1) experience learning that was collaborative, authentic and integrated; 2) view K-12 students as sources of knowledge, particularly in the areas of technology and learning; and 3) acquire and apply technology skills in context.

Nine colleges of teacher education and 16 K-12 schools were part of the consortium that tested these assumptions. And, as might be expected, nine different learning community models emerged. The story of each learning community is not one we can tell in an hour-long presentation. But stories told from different perspectives might offer a glimpse into the benefits and challenges a technology-infused learning community can present. A panel will also model the very nature of the collaboration that this project has been about.

In this panel presentation, five individuals—two teacher education faculty members, a Generation www.Y teacher, a teacher education student, and a Generation www.Y student—will discuss the following questions:

1. How was technology integrated into this learning experience, and what were the benefits and challenges of teaching and learning about technology in this way?
2. How did you participate in this learning experience both as a learner and as a teacher?
3. From your perspective, how can this type of learning experience contribute to the education of a teacher?
4. What role did technology play in building community?

Each participant will preface his or her remarks with a brief description of the learning community he or she has been associated with.

Building Successful School and University Partnerships: "Finding the Fit"

Dr. Nancy Todd, Professor, Eastern Washington University
Dr. Linda Kieffer, Associate Professor, Eastern Washington University
Patti Dean, Technology, Director, Cheney School District

The PT3 partnership between Eastern Washington University (EWU) and the Cheney School District (CSD) has emerged as being exceptionally collegial and productive. The partnership has been a catalyst for systemic change in the district beginning with the entire curriculum being re -examined and developed with a base of technology integrated in all areas.

Key district personnel readily attribute the new focus on change to the opportunities provided by the Preparing Tomorrow's Teachers for Technology program. As stated by the Technology Coordinator, "Cheney School District teachers need help with integrating technology across the K-12 curriculum. EWU teacher candidates are providing a significant amount of help to our teachers."

Like other universities, Eastern Washington University (EWU) has worked with many school districts in Washington State, as well as with the Cheney School District with varying levels of commitment over the years. The CSD of 3500 students surrounds this regional university in a small town of about 8000 permanent residents. We asked ourselves, is there anything about this partnership that would be applicable to other partnerships? What are the unique features of this partnership?

In thinking about these questions, we kept returning to the concept of "finding a fit" among school district personnel, education faculty, and teacher candidates. Questions such as "What is it you need? How do our institutional goals work together? How can we help?" have been continually asked by all parties.

We found that there were some key elements that help find the fit, such as administrative commitment, accountability, and communication.

Administrative Commitment.

While the university and school district have been close neighbors for over 100 years, cooperation between the two institutions was not always fruitful. About two years ago, we had the convergence of a new university president and college of education dean who are both committed to working closely with the local school district.

At the district level, the superintendent has also committed to work closely with the university. Because of the size of the district, it has little hierarchy. A superintendent, assistant superintendent, technology coordinator and curriculum coordinator make up the district level administrative "team." The partnership has been so successful that this group has designated the district technology coordinator to spend 50% of her time working on integration of technology in school district classrooms in which teacher education candidates have field experiences. All teachers have direct access to the Technology Coordinator.

Mutual Accountability

Cheney School District will be implementing new technology student learning targets in the fall, 2002. Teachers will be expected to demonstrate proficiency in the learning targets that are scheduled for mastery as their respective grade level. In addition, teachers will be evaluated on the presentation of a technology-integrated unit of instruction. "Classroom teachers hold the key to the effective use of technology to improve learning. But if teachers don't understand how-to-employ technology effectively to promote student learning, the billions of dollars being invested in educational technology initiatives will be wasted." (NCATE)

Cheney teachers are developing skills in technology integrations in two ways: 1) They have the opportunity to participate in the Intel Teach to the Future program where they receive 40 hours of free technology training. 2) Teachers may participate in the PT3 grant which partners an EWU teacher candidate with a classroom teacher to create and deliver a technology-integrated unit of instruction meeting technology standards (ISTE). After jointly delivering a module of instruction, they will evaluate the positive impact on student learning. An extra pair of hands for planning and implementing has been an asset for many teachers. The district technology coordinator assists with planning for all teacher candidate placements that relate to technology initiatives, as well as evaluating results of each of the projects. Results are communicated to the candidate's professors.

Working with teachers and technology together, EWU candidates are gaining experience and insight into how classrooms work when technology is infused. These experiences are the "laboratory" for what is discussed in teacher education courses. Teacher candidates are better prepared to use technologies in classrooms. Schoolteachers and education faculty are more willing to try technology with an extra pair of hands. Being able to assist classroom teachers integrate technology has been valuable in being able to have these hands-on experiences, rather than, say, develop theoretical lesson plans one might use "someday." As a growth opportunity it helps students stretch in a professional environment by trying out new technology activities with kids to find what works and what does not.

Continuous Communication

Communication of successes is an important element. A professional video was produced that consists of interviews with Cheney teachers and pupils. The video portrayed successful projects that we facilitated by teachers and teacher candidates working together. The video was used in October 2001 at faculty meetings in each of the district schools to sell PT3 partnerships with teachers who had not yet participated with EWU candidates helping with technology in their classrooms. Hearing testimonials of fellow teachers, who admitted on tape to being technophobes, many teachers responded, "If so and so can do that with an extra set of hands, I might be able, too." Seeing local success was inspirational to teachers and encouraged them to give technology a try. It was well worth the production cost of the video.

Continual communication is necessary between key players from both university and school (i.e., CSD Technology Coordinator and PT3 Project Directors), to clarify, re-examine, track progress, and make recommendations. How are we affecting the K-12 pupils? The district teachers? The EWU teacher candidates? In particular, the university personnel look for ways the university candidates can fit in and enhance the CSD technology goals. CSD personnel are also committed to providing teacher candidates with quality classroom experiences. And, importantly, neither institution is being prescriptive to the other. This mutual respect is an underlying aspect of "finding the fit."

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PT3: Connecting Educational Technology Integrated Curriculum in Higher Education with K-12 Schools

Robert Z. Zheng, Ed.D.
Educational Studies Division
Marian College, USA.
rzheng@mariancollege.edu

Abstract: The teacher education in schools, colleges and departments of education (SCDEs) faces the challenge of how to prepare future teachers to teach competently in a digital age. An important question has been raised: how to prepare preservice teachers to transfer their tech-rich experience in higher education to K-12 settings? This paper will address the issue by examining the ways to (1) redesign teacher education programs, (2) improve pre-service teachers' use of the technology through a K-16 networked learning environment, (3) establish partnership with local schools. The notion of "Virtual K-12 Classrooms" will be introduced and the way of how such classrooms can be used to establish a K-16 networked learning environment will be discussed.

Introduction

In less than a decade there will be over two million new teachers entering the educational arena. How do schools, colleges and departments of education (SCDEs) meet this new challenge? How do SCDEs prepare the future preservice teachers to teach competently in a digital age? The existing teacher education programs in many SCDEs do not seem to have answers. Yet as a way of meeting the imminent challenges ahead, the teacher education programs in SCDEs have begun to offer computer specific courses as a tentative solution to the problem. However, such an approach does not change the already aggravated situation: the limited exposure to appropriate models of computer use in the classroom prevents the preservice teachers from effectively integrating modern educational technologies into K-12 classrooms (Vannatta & Beyerbach, 2000).

Although huge efforts have been made to improve the status quo of using technology in teaching and learning, approximately $70 million per year has been spent in Wisconsin in the area of professional development for use of instructional technology, the results have not been satisfactory. A recent survey made jointly by Wisconsin DPI and Cooperative Educational Service Agencies (CESAs) indicates that 15.6% of teachers do not know how to use modern learning technologies in their classrooms, 6.8% of teachers have used technologies which have little or no relevance to the individual teacher's operational curriculum, 42% of teachers employed technology either as extension activities or as enrichment exercises to the instructional program. The survey shows that only 18.8 percent of teachers are able to integrate educational technology into their curriculum to some extent with an emphasis on higher levels of cognitive processing. Only 16.9% teachers can integrate technology into their curriculum at various levels from mechanical to routine (Lohr, 2000).

To face the challenges and prepare future teachers to become technologically competent to teach in the 21st century, Marian College proposed a systemic change in undergraduate teacher education by aligning technology integrated curricula in higher education with K-12 schools and establishing a K-16 networked learning environment that enables preservice teachers to teach effectively in a tech-rich setting. The project was supported by the *Preparing Tomorrow's Teachers to Use Technology* (PT3) Grant from the U.S. Department of Education. The purpose of this project is to bring a systemic and fundamental change in teacher education.

The Study

Starting from mid 1990s, Marian College began to embrace the idea of using technology in undergraduate teaching. It worked closely with K-12 schools to substantiate a change in the use of technology in K-12 classrooms. This effort was supported by an earlier federal grant Goals2000 which resulted in some positive changes in terms of technology use at Marian and its partner schools. However, like other SCDEs the undergraduate program at Marian College offers technology-specific courses as a remedy for the lack of technology proficiency in students. Such an approach may develop basic computer skills in pre-service teachers who may become "aware of the impending use of technology in their future classrooms, but they were unsure of how technology could be used" (Vannatta & Beyerbach, 2000, p.144). Moreover, our recent alumni survey suggested that Marian graduates were not quite prepared to use technology in a variety of instructional settings. We believe that such a problem originated in large part from the existing curricula in SCDEs. Being fully aware of the seriousness of the problem in K-12 education, Marian College therefore, proposes that:

(1) There must be a fundamental change in the teacher education curricula.
(2) Educational technology must be fully integrated into every education course.
(3) Partnerships with K-12 schools must be established so that pre-service teachers can be exposed to various technology uses in K-12 schools.

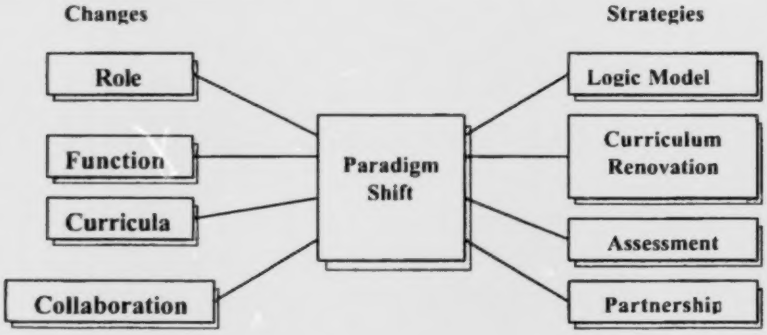
How to start and what change must be made to trigger a paradigm shift in teacher education in terms of technology integration? First, we examined the difference between the existing and the new approaches in the use of technology; Secondly, we looked at the strategies that will trigger a paradigm shift in technology integration; Thirdly, we created ten virtual K-12 classrooms in which pre-service teachers would engage in various learning activities as the K-12 students do and transfer what they learn in virtual K-12 classrooms to real K-12 classrooms.

Existing Approach vs. New Approach. Analyses were done to distinguish the existing use of technology in teacher education from the new approach in terms of the role, function, curriculum, and collaboration of technology in classrooms and schools. The following diagram shows the differences:

A Paradigm Shift in Technology Infusion

	Existing Approach →	New Approach
Role	An extension, add-on	Integral part of instruction, related to learning objectives
Function	Productivity tool, low level thinking	Both productivity and mindtools, higher level thinking
Curriculum	Focus on individual course renovation	Focus on systemic change in teacher education
Collaboration	Occasional, sporadic collaboration with K-12 schools	Sustained efforts to build K-16 learning environment

Strategies for Change. The paradigm shift in technology integration in undergraduate teacher education is defined by the changes needed and strategies for such changes. As has been discussed above, the areas need changing are the role, function, curriculum, and collaboration of using technology in schools. To make sure such changes occur in teacher education, we develop strategies in each needed area: we developed a logical model that identifies the resources, the technology activities, the customers impacted, the short-term, mid-term, and long-term outcomes for the changes. In curriculum renovation, we develop a technology renovation road map that indicates the steps from simple application to effective technology integration in teaching. We also developed an assessment model that monitors the steps of technology integration. In partnership, we tried to establish a K-16 networked learning environment by working closely with out partner teachers in K-12 schools.



Virtual K12 Classrooms. Part of this project is to establish ten virtual K-12 classrooms. Instead of placing preservice teachers in the computer labs - a common practice that prevails in most traditional SCDE curricula - the preservice teachers will learn how to integrate educational technology into content area in a regular classroom equipped with high-end computers. Such technology-rich classrooms will simulate the ideal K-12 classroom learning environment in which preservice teachers will engage in various learning activities as the K-12 students do.

Partnership with K12 Schools. In addition to learning in a virtual K-12 classroom, the preservice teachers will have the opportunity to practice technology integration in real K-12 classrooms through partnership programs. The pre-service teachers will use technology to teach their clinicals and participate in various K-12 related courses and practicums, including students teaching. In so doing, Marian College and its partners will create a K-16 networked learning environment in which the preservice teachers will be fully exposed to various modern learning technologies and will learn how to infuse those new technologies into teaching and learning. The preservice teachers who are merged in this K-16 networked learning environment will develop a better understanding of the use of various technologies in K-12 schools, and hence will effectively integrate educational technology into subject areas.

Findings and Conclusions

This project is still in its trial stage. Five undergraduate faculty were involved. Seven courses have been revamped for technology and curriculum integration. The change affected 115 pre-service teachers. Four partner school teachers joined the seamless curriculum development between higher education and K-12 schools. The initial implementation indicates that (1) the project has profoundly changed teachers' and students' perception of the use of technology in classrooms, (2) technology is no longer regarded as an add-on or extension to teaching and learning, (3) more and more teachers and students use technology as a cognitive tool to engage in higher level thinking rather than something as electronic paper and pencil, and (4) preservice teachers know better how to integrate technology into various learning settings. Both the college faculty and cooperating teachers commented that there has been a great improvement in the quality of the lesson plan developed by pre-service teachers and the teaching they did in K-12 schools.

Our study shows that offering computer specific courses does not solve the problem in existing undergraduate teacher education, particularly in technology integration. A fundamental and thorough way for the change is to revamp the existing curricula, redefine the role and function of technology, and establish partnership with local schools as a path for educational renewal (Goodlad, 1984). In order to reduce the gap between higher education and the K-12 schools in terms of technology integration, a seamless curriculum between the two ends needs to be created so a transfer of learning experience and knowledge between both settings can be realized.

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PRESERVICE TEACHER EDUCATION

Models of Teacher Development for ICTs Integration: Examples from the 2001 SITE Proceedings

Peter Albion
Department of Curriculum and Instruction, Purdue University, USA, palbion@purdue.edu

Avril Loveless
School of Education, University of Brighton, UK, A.M.Loveless@brighton.ac.uk

Abstract: This paper identifies papers from the 2001 SITE conference which may serve as examples of strategies described in a forthcoming report on Models of Teacher Development for the Integration of ICTs in the Classroom. It provides convenient means of amplifying understanding of the models and obtaining guidance for future implementation. In addition it makes recommendations for presentation of future work in the field.

Background

The need to prepare teachers for integrating Information and Communications Technologies (ICTs) is widely recognized and much can be learned from considering various initiatives already undertaken around the world. It was in that context that Professional Group 5.2 met at the IFIP World Conference on Computers in Education 2001 in Copenhagen, to consider the topic, *Models of Teacher Development for the Integration of ICTs in the Classroom.* A report of those discussions will be published early in 2002 (Downes et al., 2002).

A key task undertaken by PG 5.2 was to identify models of teacher development for ICTs integration in pre-service teacher education and continuing professional development programs. For those charged with preparing teachers to integrate ICTs, the value of the list of models would be increased if they could easily locate examples of the models in use. Tables listing the models in the report are supplemented by illustrative examples, but space did not permit a comprehensive list of examples. Hence there is a need for a more extensive list of examples.

The annual conference of the Society for Information Technology in Teacher Education (SITE) is a large meeting with a focus on ICTs in teacher education. Although the majority of participants at SITE are from the USA, there is a significant and growing international attendance. Many of the hundreds of presentations at SITE conferences report on practices for preparing teachers to integrate ICTs. Hence, the SITE proceedings should be a rich source from which examples of the PG 5.2 models might be identified. This study sought to examine the proceedings of the 2001 SITE conference (Price, Willis, Davis, & Willis, 2001) with a view to assessing whether they include examples of the pre-service teacher education models listed in the PG 5.2 report (Downes et al., 2002).

Method and Results

The 2001 SITE Proceedings (Price et al., 2001) totaled 3175 pages comprising over 700 papers and were published on CD-ROM as PDF files. Searches of the full text of the proceedings were conducted using the search facility in Adobe Acrobat Reader with search terms selected from the proposed models (Downes et al., 2002) and, where such terms proved unsuccessful, selected synonyms. As terms were located, the papers were scanned for relevance and, where appropriate, noted for closer examination. In selecting papers for consideration, preference was given to those that included a thorough description of practices corresponding to the models. Table 1 matches papers with models. To conserve space, the papers are identified using the first author and page number from the SITE proceedings.

On examining the selected papers, it was evident that programs commonly included multiple models and the list of papers was progressively reduced to form a minimal set of 11 papers that included all 15 models. There is no implication that the papers identified herein are the best or only papers that exemplify particular models listed in the

PG 5.2 report. Some models were notably less common and the papers identified for some had little useful detail. For example, online collaboration with students in schools was the subject of a roundtable at the conference (Goldman 2965) but, although it is mentioned in a section summary, there is no paper in the proceedings.

	Models for pre-service teacher development in ICT integration (Downes et al., 2002)	Abate 1823	Becket 1858	Bennet 2969	Espinoza 408	Goldman 2965	Heyns 58	Hung 879	McCaughey 708	Regan 1716	Rubio 1746	Schmidt 2080
A	Separate compulsory ICT subjects-skill acquisition				X							
B	Separate compulsory ICT subjects-curriculum/pedagogy				X						X	
C	Diffusion-modeling and use across course (with integration across various subjects)	X							X		X	
D	ICT Electives-skill acquisition							X				
E	ICT Electives-curriculum/pedagogy											X
F	Face-to-face use with children expected as part of learning experience or assessment tasks within particular subjects				X						X	
G	Online use with children expected as part of learning experience or assessment tasks within particular subjects			X								
H	Planning, teaching and evaluation of use of ICTs for learning expected as part of professional experience requirement			X	X						X	
I	Modeling by classroom teacher expected as part of professional experience	X										
J	Online collaborative/team interactions with students in schools for projects/learning-virtual practicums					X						
K	Online interactions with teachers/professional communities as part of core learning experiences		X									
L	Partnerships with schools so that student teachers, classroom teachers and teacher educators engage in inquiry or development projects around the use of ICTs for teaching and learning		X									X
M	Faculty professional development	X							X			
N	Flexible delivery, student-centered approaches to teaching and learning									X		
O	Partnerships with industry: curriculum/software development programs						X					

Table 1: Models of preparation for ICT integration in pre-service teacher education (Downes et al., 2002)

Conclusions

Based on the contents of Table 1, it seems fair to conclude that the 2001 SITE proceedings include all of the models identified by PG 5.2 for pre-service preparation of teachers for integrating ICTs. However, it seems that many teacher education programs use combinations of the models, presumably because they offer different benefits.

The search for papers matching the PG 5.2 models was sometimes hampered by differences in terminology. For example, PG 5.2 used "professional experience" in reference to pre-service teachers but the only use found in the SITE proceedings was to the experience of professionals. The nearest equivalent appeared to be "field experience". Such instances suggest that the usefulness of the SITE proceedings would be enhanced by the adoption of an agreed vocabulary of keywords. Such an addition would be worthy of consideration for future SITE conferences.

This initial review of one conference community's proceedings is part of a wider ranging review of examples to support the report, *Models of Teacher Development for the Integration of ICTs in the Classroom*. This will inform and raise issues for future evaluations of the experiences of teacher development with ICT.

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Portuguese Student Teachers' Experiences, Perspectives and Expectations Regarding the Use of the Internet: The Impact of a Preservice Program.

Conceição Almeida, University of Minho, Portugal, calmeida@iep.uminho.pt
Helena Martinho, University of Minho, Portugal, mhm@iep.uminho.pt
Floriano Viseu, University of Minho, Portugal, fviseu@iep.uminho.pt
Carlos Morais, Instituto Politécnico de Bragança, Portugal, cmmm@ipb.pt
Luísa Miranda, Instituto Politécnico de Bragança, Portugal, lmiranda@ipb.pt

Abstract: This paper reports on one specific Portuguese university's student teachers' opinions, experiences, perspectives and expectations regarding Internet usage. Data was collected using a questionnaire which was anonymously answered by 189 student teachers from 9 different preservice programs. Some differences were found between males and females and between the diverse program groups concerning opinions about the Internet and how they use it and expect to use it in the future. Some reflections are made about the effectiveness of our students' technological preparation.

Introduction

The growth of the new information technologies and their spreading uses in education have been enormous. Educators' concern with mathematics teacher education (Grouws and Schultz, 1996) along with the increasing availability of both virtual information and modes of communication (Hughes and Hewson, 1998) led us to rethink mathematics teachers' pre-service education. Furthermore, as collaborative work (Wallace, Cederberg and Allen, 1994) as well as the use of technology (Balacheff and Kaput, 1996) have long become two of the focuses of the recommendations for mathematics teachers preparation and professional development, we cannot but envision its context within a framework of new information technologies. The avalanche of available resources on the Internet as well as one's access to it, is rapidly changing both one's views of a worldwide community and one's conceptions of Internet usage (Schrum and Lamb, 1997).

Making changes and breaking barriers require courage and creativity. This seems particularly true for the people responsible for teacher's in-service and pre-service education. The Internet seems to be the answer to the problem of finding and giving information, because it is easy and fast. However the large amount of available information brings new demands on the teachers for whom being able to select what is relevant becomes critical. Therefore the intervening agents in the teacher education process must contribute to open up perspectives so that students take advantage of all the information that is available, both in their lives and in their careers. In Portugal there has been research on the Internet usage in the context of both the mathematics classroom (Morais et al., 1999; Almeida et al., 2000; Ponte et al., 2001) and the professional development of teachers of mathematics (Ponte et al., 2001; Ponte, 2000; Miranda et al., 2001; Almeida et al., 2001; Almeida et al., 1999). However more has to be known about our students' Internet experiences and how they may influence their perspectives and expectations. Only with this knowledge may we seek further action into creating new learning communities as well as helping our prospective teachers to fully integrate them.

In this paper we will talk about one specific Portuguese university's student-teachers' experiences, perspectives and expectations on Internet usage.

Sample and Data Collection

Our data stem from a questionnaire for which there were 189 anonymous responses from our 2000/2001 academic year 360 entire student-teachers population. The sample's ages range from 22 to 44 with mean 24.74, mode and median both 23, and the third quartile 25. There were 159 females and 30 males distributed by a total of 9 pre-service education programs. Only 29 of the respondents reported having had previous teaching experience. From a total of 181 who reported having a computer at home, 92 say that they are connected to the Internet. Most schools where the student teachers do their teaching practice have computers and Internet which can both be used by teachers and students. Table 1 shows the distribution of students by pre-service programs and sex. There is 1 missing answer from a female student.

Pre-service Education Programs	Females		Males		Total	
	n	%	n	%	n	%
Biology and Geology	18	11.4	1	3.3	19	10.1
English and German	18	11.4	1	3.3	19	10.1
History	11	7.0	4	13.03	15	8.0
Mathematics	40	25.3	12	40.0	52	27.7
Physics and Chemistry	20	12.7	7	23.3	27	14.4
Portuguese	10	6.3	1	3.3	11	5.9
Portuguese and English	22	13.9	1	3.3	23	12.2
Portuguese and French	8	5.1	1	3.3	9	4.8
Portuguese and German	11	7.0	2	6.7	13	6.9
Total	158*	100	30	100	188	100

Table 1: Distribution of student teachers by pre-service programs and sex

During their 5-year pre-service education programs all prospective teachers have the same general education courses, along with courses specific to each program: *History and Philosophy of Education* in 1st year; *Psychology of Education* and *Pedagogical Practicum I* (*Teacher-pupil interaction analysis*) in 2nd year; *Educational Sociology, Curriculum Development and Teaching* Models and Pedagogical *Practicum II (Technology)* in 3rd year; *School Organization and Administration* in 4th year. As far as technology preparation is concerned, only the Mathematics and the Physics/Chemistry students have more than just the *Pedagogical Practicum II (Technology)*: Physics and Chemistry students also have an *Introduction to Informatics* course in their 1st year; the Mathematics Education students have an *Introduction to Programming* course in 1st year and *Informatics in Teaching* in 4th year. In their 4th year all students have a didactics course specific to their area.

What student teachers think and feel about the Internet

The student teachers answered a nine-item semantic questionnaire. In each item they were to indicate, on a five-point scale, their inclination (or neutrality) towards one of two opposite adjectives. For analysis purposes, items were code so that in each of them 1 is the most negative opinion and 5 the most positive opinion. Table 2 summarizes the results for the entire sample.

The Internet is	N	Min.	Max.	Mode	Median	Mean	Std. Dev.
Boring -- Fun	185	2	5	4	4.00	4.01	.75
Hard -- Easy	184	1	5	4	4.00	3.53	.97
Useless -- Useful	185	1	5	5	5.00	4.52	.79
Uninteresting --Interesting	186	1	5	5	5.00	4.39	.75
Complex -- Simple	184	1	5	3	3.00	3.33	1.00
Unimportant -- Important	184	2	5	4	4.00	4.14	.71
Harmful -- Beneficial	184	2	5	4	4.00	4.12	.75
Discouraging -- Motivating	185	1	5	4	4.00	4.02	.84
Confusing -- Clear	183	1	5	4	3.00	3.37	.95

Table 2: Summary of all student teachers answers to the semantic questionnaire

It can be seen that, in general, student teachers characterize positively the Internet in all items considered.

Differences between males and females

Lack of homogeneity of variance (found by Levene's statistics) induced us to use chi-square tests to find differences between males and females in each of the 9 items of the semantic questionnaire. However care must be taken as there were cells with expected values less than 5. Males and Females generally agree that the Internet is useful, interesting, important, beneficial and motivating. But males seem to find it funnier, easier, simpler, and clearer than their female counterparts do. Figure 1 shows differences between males and females.

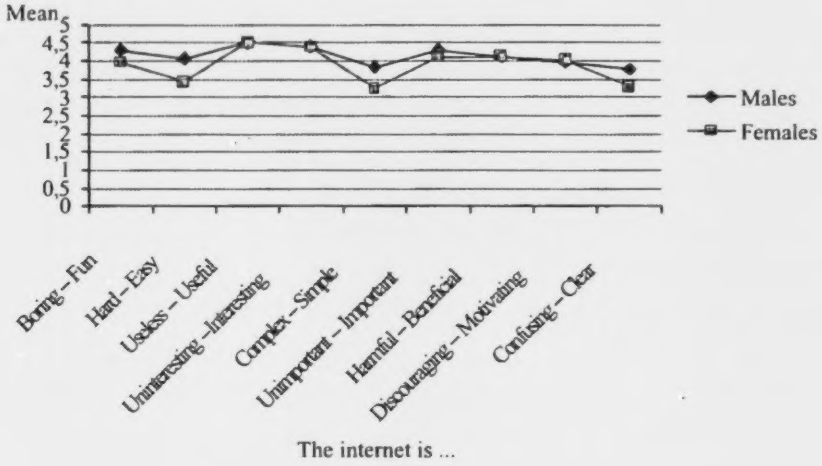

Figure 1: Differences between males and females

Further investigation into this matter shows that, when asked to indicate simple words to describe advantages, disadvantages and difficulties, females' answers are more consistent than those of males. Furthermore they refer more frequently to the ease of access to information and of communication as advantages of the Internet, while being costly (not being for everybody) and giving access to obscene information are indicated as disadvantages. Too much information, assessing/selecting the right information not being so easy, lack of information in Portuguese, and technical issues (like software installation and working with chat and e-mail) were the difficulties most referred specially by females. As far as these female-male differences are concerned we hypothesize that causes may be socially bound.

Differences between education program groups of student teachers

For the semantic questionnaire and he education programs it was found that the degree of heterogeneity was not significant in any of the cells at the .05 level. Therefore a one-way analysis of variance was used to find whether student teachers from different programs had different views of the Internet regarding the nine items of the semantic questionnaire. There were significant differences only in the *Complex – Simple* (F=3.499, p<0.001), and *Confusing – Clear* (F= 2.365, p<.019) items. Some differences were also observed in item *Hard – Easy*, although significance was not clear (F=1.799, p<0.80). Figure 2 shows the means plots for these three items.

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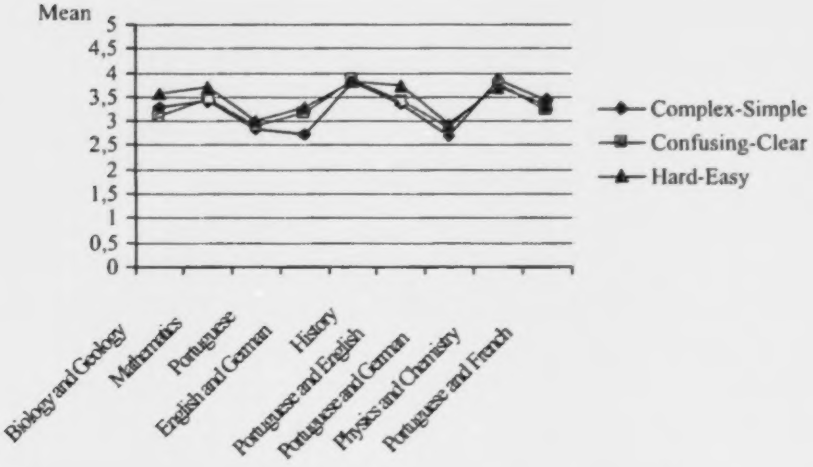

Figure 2: Means plots for the Hard – Easy, Complex – Simple and Confusing – Clear items

Internet usage by student teachers: perspectives and expectations

From the other items of our questionnaire we can see that these student teachers' global usage of the Internet seems to have increased from the 1st to the 5th year. One factor which cannot be ignored is the growth of computer and Internet facilities in our campus. More and more the Internet is being used as a means of communication even at the official level. Students now also have to enroll for the exams on the university web page.

In their answers to the questionnaire most student teachers reported never having used the Internet to chat, to construct a WWW page, to communicate with colleagues from other schools. Most also admitted having seldom discussed with their colleagues about Internet applications in teaching. Most also denied ever having used the Internet in someway by suggestion or requirement from the part of their school or university supervisors. In general it seems that the Internet was not a very frequent presence in the student teachers' lives. However they expressed the idea that in the future they will frequently use the Internet: mostly to search for bibliography and for information about their field of work, and to find ideas for their teaching. They also think that they may quite often show things from the Internet and suggest sites to their students. It is revealing that the Internet is not yet used by student teachers as a potentially fast and efficient means of communication, but that they expect to use it in their future professional lives. However to construct web pages does not seem to be in their future perspectives.

Conclusions

From our investigation we can infer that in general the university's student teachers have high expectations and quite favorable opinions about their Internet future usage. It can be seen from our data that a high percentage of students with a computer at home are connected to the Internet. However they report a very limited actual use of the Internet as a means of communication and interaction in their academic activities.

Surprisingly for us mathematics educators, this is also true for our mathematics student teachers. Considering the contents of the mathematics education program, we would expect the mathematics student teachers to be better acquainted and to feel more comfortable with computers and particularly with the Internet. Therefore we should reflect on the weak effect technology courses seem to have on students and on what the causes of found differences may be. Also we should not forget that there is a longer history of computer usage in mathematics education than in any other field. This fact had previously led us to expect

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that the mathematics student teachers would feel more at ease with computers and with the Internet than students from other programs. But such does not seem to happen. Why? Might there be too much pressure on the mathematics students teachers? Knowing mathematics, knowing about calculators and about computers, dealing with kids' negative attitudes towards mathematics in their teaching practice, and a lot more, all seem to take too much time and energy to leave any room for new cyber discoveries. Might there be also a reflection of faculties' own ideas and expectations about the Internet? These are questions that we cannot answer now.

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Technology Lesson Plans for the Elementary Methods Class

Mary Kay Bacallao, Ed. D.
St. Thomas University
16400 NW 32nd Avenue
Miami, Florida 33054 U.S.A
mbacalla@stu.edu

Paula Sanders
Welleby Elementary
3230 Nob Hill Road
Sunrise, Florida 33351 U.S.A.
sanpau@mediaone.net

Carol Wilson, M.A.
Sandpiper Elementary
Sunrise, Florida U.S.A
Carolwilson2@yahoo.com

Abstract: Written Lesson Plans with the National Educational Technology Standards: Professors, Pre-service Teachers, and K-6 Teachers Worked Together to Perfect Lessons that Work in Schools with Children from Ethnically Diverse Backgrounds Technology enhanced K-6 lessons are now available, "hot off the press," at this session. They are engaging, creative, focus on critical thinking, and contribute new knowledge to the field of technology in teacher education. Eight subject area teams spent a year using technology in their classrooms. The teams included Reading/Language Arts, Math, Science, Social Studies, English as a Second Language, Exceptional Student Education, Curriculum, and General Methods. After a year of research in the field of technology in the classroom, the team members began to write content area lessons based on the National Educational Technology Standards. Selected pre-service teachers and professors cooperatively wrote the lessons. The lessons were sent through an outside peer review process. K-6 teachers in several public and private schools in South Florida field-tested the lessons. Tried and true, these lessons will spark your interest in using technology in teacher education.

History of the Project

The main goal was to infuse technology into all aspects of pre-service teacher education training. We have set out to accomplish this by professional development and team accountability. Each of the eight teams was assembled with pre-service teachers, professors, and K-6 teachers. They have received at least 50 hours of professional development related to technology in their subject area. They have also been working together in their on line team area to reflect on the practical use of technology in their classes. The number of postings per group were tabulated and viewed over time. The actual postings for each group are included as documentation of the thoughtful reflection that each team has participated in.

On-Line Presence

Information about our project may be viewed at: http://garnet.fgcu.edu To view these discussions, one may register for the PT3 Fall and/or spring courses and create an identity. Once this is done, posting will be enabled for the viewer. Our website also contains information that documents our workshop activities with our partners. Our website is located at: http://coe.fgcu.edu/PT3/home.htm.

Interdisciplinary Partnerships

We have fostered relationships among other departments by recruiting professors from other disciplines to be participants on the subject area teams. We began with professors from Communication, Guidance and Counseling, Math, Science, and English. Several of the professors we originally recruited have resigned due to the differences between their professional fields and teacher education at the elementary level. We have, however, retained a few professors from other departments.

K-6 Teachers Relate with Professors and Pre-Service Teachers

We have addressed the need for collaboration with K-12 teachers by placing eighteen K-6 teachers from five elementary schools on the subject area teams. This has been an essential part of our project as professors and pre-service teachers relate with classroom teachers on a regular basis. Four of these K-12 teachers serve as team leaders.

Journey to Technology Integration and Meaningful On-Line Communication

We began the project in early fall. We scheduled two orientations, one at STU and one at FGCU so that all participants would know what they were required to do for the year. It was presented, but after a few weeks it was apparent that some of the participants were not posting weekly in their on-line team areas as they were supposed to. Because we had two separate orientations, many of the team members never did get a chance to meet. In order to get the participants to post in their team area, we first tried sending them many reminders. That worked with some people, but not all.

Another problem we had was that the reflective postings were not quality postings. Some team members would cut and paste information from other sources or just refer the team to a website without any reflection on how that site could be used in their classroom. In order to get some quality control, we defined what we believed to be a "substantive posting." We told the participants that it was: "A substantive posting requires content that reflects participant's actual understanding or use of technology in the classroom. This awareness grows out of the participant's direct experiences with the literature, professional development experiences, personal experience, or direct responses to other substantive postings."

After this, the quality of the postings improved significantly. We also changed the weekly posting requirement to 14 substantive postings per semester. This enabled the participants to "catch up" if they were behind. It quantified our requirements. Our next step was to issue contracts to all our participants, which we should have done at the outset.

Another barrier was the distance between STU and FGCU. One is on the east coast of Florida and one is on the west coast. During the second semester, we initiated team leader on-line chats. Those chats were helpful in bringing the team leaders together. Individual teams also decided to have on-line chats. We also had a team leader meeting in person. It was the best thing for us. We were all able to talk about our goals for next year and come to an agreement on the contracts we will offer the participants year 2. Team leaders will meet monthly next year, alternating between on-line chats and in person meetings. All the participants will meet together at the beginning of year 2. There was resistance to bringing all the parties together from FGCU, but it is needed and will be done.

Reflections from K-6 Teachers: Carol Wilson and Paula Sanders

I. "Do-able" Lessons for Elementary School Teachers
   A. How to Start a Lesson?(Activity Vs. Lesson)
   B. How to Create a Good Lesson Plan?
   C. How to Evaluate a Lesson?
   D. Where to Get Lesson Ideas?

II. Time Involvement and Equipment Issues-The Real Story! (Personal experiences)

III. BEACON Web Site overview with ISTE standards inserted; other sites, which contain quality lesson plans (Internet access and projector required)

IV. Examples of Teacher Created Lessons (provided by presenters)

V. Eye Openers that the Pt3 Experience brought to the classroom educators attention. (Personal experiences)

National Educational Technology Standard-Based Lesson Plans Are Written

The technology enhanced lesson plans for the Fall 2001 Semester are written and can be viewed on the BEACON database. The website for BEACON is www.beaconlc.org. Selected lessons will be shown at this session.

ESTABLISHING A MINOR IN INFORMATION TECHNOLOGY FOR PRESERVICE EDUCATION

Gouri Banerjee, Department of Instructional Technology
Emmanuel College, Boston, Ma., USA
banerjee@emmanuel.edu

Abstract: Increasing reliance on computers for teaching and learning places many additional demands on providers of preservice education. For small schools the challenges are particularly daunting. This paper briefly describes how a minor in information technology was conceptualized and offered. The minor has a strong hands-on focus, is flexible in sequencing, and allows students to choose where and when they take IT courses. In a very brief span of three years this minor has become very popular and appears to provide the educational and professional needs of a growing population of education majors.

The growing reliance on computers for both teaching and learning in the classroom has challenged the training of preservice education providers. A hotly debated issue on campuses today is what specific kinds of training in the field of information technology (IT) do preservice student's need?

Almost every institution and individual engaged in preparing teachers has asked questions about how to train adequately in a rapidly changing IT environment. For smaller schools, in particular, providing IT training to preservice students has been a significant challenge. This paper describes some major issues that arise and presents the outcomes of the introduction of a new program called the minor in information technology.

Since 1919 Emmanuel College, a Catholic institution in Boston, has prepared pre and post-service teachers for positions in suburban and city schools. Students are given a strong theoretical base in the liberal arts upon which their practicum experiences are built. This helps students develop those skills necessary to manage a sound, organized, and creative learning environment. Preservice undergraduate students are encouraged to develop a philosophy of education uniquely their own. At the same time students need a strong foundation in technology to better prepare them for teaching in the Internet linked, hardware and software rich computerized classroom.

Early in the process of designing the minor in IT in 1999, we conducted a college-wide survey aimed mostly at sophomores and juniors. We asked whether students preferred courses in IT or whether they would choose to take a more formal minor in IT. The survey indicated nearly equal interest in both. The department of instructional technology decided to offer a minor in IT starting in the fall of 1999. They developed a course structure which would prepare students to work directly after graduation by having a significant hands-on component. It was clear that if there was sufficient interest in the minor more courses could be added later on, but at the outset, the identification of a group of core courses was critical. In addition, it was felt that a minor in IT would attract varied interests, not just majors in the filed of education, and students needed a range of IT courses and choices to support their interest.

Our concern was to design a minor where all streams of students, with varying levels of preparation, would receive strong conceptual knowledge of, and, sound skills in computing. We designed a minor that was broad in scope, focused on hands-on skills, and flexible in sequencing. Students, engaged in the four-year bachelors program were required to choose five or six semester-long courses, each offering 4 credits. These courses included: a course called 1) computers for the liberal arts, and a course in 2) spreadsheets (freshman year); 3) communicating and problem solving with computers, 4) design and development of databases, 5) tools and techniques for using the Internet for research, 6) learning and leading with technology in education and the business environment (sophomore and junior years); 7) social and ethical issues in the use of technology and 8)information systems in the workplace (junior and senior years). A few students also chose to do individualized courses.

Our goals in designing this eclectic selection of courses included:

- A felt need to introduce the preservice education major to a wide range of computer concepts and related skills considered critical and essential for their work as classroom teachers and as IT skilled educators. Thus the first course, computers for the liberal arts, was a required course. Students were assessed in computer skills and a few, very few, tested out of this course. It introduced students to basic software skills in word processing, spreadsheets, presentation software, using email and web searching. It also provided a foundation in computer concepts related to hardware, software, networking and ethical issues in IT environments. For those wanting more skills in computing, the spreadsheet course offered greater depth in using formulas, functions and charting.
- To develop skills and attitudes in students appropriate for self-learning and exploration. Students could take courses flexibly during their sophomore, junior and senior years. They could also take courses at other colleges within a consortium without incurring additional fees. Online courses at their own expense were also permitted.
- To ensure that at all times the acquisition of these skills are seen by the students as relevant to the liberal arts education which they were concurrently receiving, courses in the minor were reviewed and evaluated each semester and adjustments made to reflect changes in the field of IT and state mandates for teachers.
- To allow students to gain a sufficiently deep understanding of emerging IT issues and to permit further specialization at the post service level.

In a brief three-year span, the minor in IT has become extremely popular. It offers in-depth IT instruction, significant time and energy invested in advising, and a careful selection of courses within a fairly small rotation of annual course offerings. Instruction in information technology continues to be very challenging due to numerous constraints: the availability of trained faculty, small budgets, classroom space issues, equipment maintenance, IT helpdesk support, overloaded computer networks and network security and management issues. Change and evaluation is ongoing, and an important component. For a small urban college this has been particularly hard given the limited resources available, and the high expectations set by larger institutions. Needed courses were introduced without total replacement of the existing programs in education. Numbers show that the minor in information technology, one of the most popular minors in the college today, clearly filled a much-needed educational and professional void and was successful in meeting preservice educational objectives.

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Models for Collaboration for Pre-Service Teacher Education Programs

Adis Beesting, Florida International University, US
M.O. Thirunarayanan, Florida International University, US

Within the last few years, national standards and guidelines have been created to ensure that tomorrow's teachers are prepared to address the challenges and expectations of a technological society that requires a seamless union between traditional core competencies and new information environments. Teacher education programs are able to address these needs by creating innovative programs and new partnerships that integrate technology within the context of the educational objectives of the teacher certification program. At Florida International University, successful partnerships have been created which address these issues by creating hands on learning experiences that reinforce the learning outcomes developed in the Information Literacy Initiative and the instructional objectives of the teacher education program.

The FIU Information Literacy Initiative seeks to partner librarians and faculty to prepare students to think critically and use information in ways that will enhance their academic, professional and personal lives. Librarians assist the students in the identification of information sources and the retrieval and selection of information; the faculty member creates assignments that require students to use both technology and critical thinking as they evaluate and use information available in print and electronic formats. The intent is to foster information literate individuals who understand the complexity of the information environment and can use the skills they have mastered as a means toward continued development.

The College of Education and the Education Librarian have built a close relationship that has resulted in the creation of library instruction sessions targeted specifically toward future teachers. When Information Literacy objectives are paired with the educational requirements of teacher certification programs, the resulting partnership can yield fulfilling results. One example of a successful affiliation takes place with the "Introduction to Educational Technology" course. Students attend library instruction sessions to research a topic related to technology in the classroom, which is then used as a basis to create a presentation on their topic in PowerPoint format. Students are encouraged to consult with faculty and librarians as they complete their project.

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Perceptions of Technology in Preservice Education Courses

Lisa D. Bendixen
Educational Psychology
University of Nevada, Las Vegas
libendixen@ccmail.nevada.edu

Lori Olafson
Curriculum & Instruction
University of Nevada, Las Vegas
lolafson@ccmail.nevada.edu

Neal Strudler
Curriculum & Instruction
University of Nevada, Las Vegas
Strudler@nevada.edu

Abstract: This study examined preservice teachers and their instructors' perceptions of the use of technology in their education courses. The current research was part of a larger evaluation project that examined the impact of the first year of Project THREAD (Technology Helping restructure Educational Access and Delivery), a U.S. Department of Education "Preparing Tomorrow's Teachers to Use Technology" (PT3) grant implemented in a large southwestern university. Participants (preservice teachers, N=273, instructors, N=12) completed a survey designed to measure perceptions of technology. Classroom observations and instructor interviews were used as well. Results indicate that instructors who implemented a high degree of technology in their classrooms and created more constructivist learning environments had significantly more positive student perceptions in terms of technology and its usefulness in educational settings.

Introduction

Preparing future teachers for rapid advancements in technology within our culture and the classroom is on the minds of many involved in teacher preparation programs (Becker, 1996; Garner & Gilligham, 1996). Much of the discussion surrounding this daunting task focuses on teacher knowledge and beliefs about teaching and learning. One definition of this states that, A flexible and adaptive use of technology also implies knowledge, skill, and dispositions beyond simple functional and procedural applications and toward the incorporation of technology in the very fabric of everyday teaching and learning (Gillingham & Topper, 1999, p. 305). How teacher preparation programs are taking up this challenge and affecting change is an important consideration for research.

This study examined preservice teachers and instructors' perceptions of the use of technology in their education courses. The teacher preparation courses in question are part of a College of Education that is making strides to incorporate technology standards such as ISTE (International Society for Technology in Education) into their programs. ISTE standards relate to the integration of technology into teacher education programs. These standards call for teacher candidates to demonstrate a sound understanding of technology operations and concepts as well as the ability to plan and design effective learning environments and experiences supported by technology (ISTE, 2000). In support of this goal, the current research was part of a larger evaluation project that examined the impact of the first year of Project THREAD (Technology Helping Restructure Educational Access and Delivery), a U.S. Department of Education "Preparing Tomorrow's Teachers to Use Technology" (PT3) grant that was implemented.

The purpose of the current study was to gather information regarding the self-reported views of technology and its use by students and instructors involved in a teacher preparation program. We expected that the more and varied technology implemented in preservice teachers' courses the more positive attitudes (both students and instructors) would be regarding the use of technology and its implications for learning.

Method

As was stated previously, this study was part of a larger evaluation project that examined a PT3 grant implemented in a large southwestern university. Participants (preservice teachers, N=273, instructors, N=12) completed a survey designed to measure their perceptions of technology adapted from a measure developed by Knesek, Christiansen, Miyashitak, & Ropp (2000). The items were organized into five subsections that included questions relating to the concepts of: 1) Experiences with specific technologies in class (e.g., "Experiences with e-mail."), 2) Technology topics addressed in class (e.g., "Using technology to assess student learning of subject matter."), 3) Attitudes toward computers in education (e.g., "Computers can help me learn."), 4) Attitudes toward student use of computers in education"), and 5) Attitudes toward information technology (e.g., "To me, electronic mail is important.").

In addition to the survey, classroom observations and instructor interviews relating to technology use were used as data sources. Observations took place during regular class time and during times when technology assignments were occurring. Faculty interviews were conducted face-to-face or via e-mail and consisted of five questions relating to teaching philosophy in general and the use of technology within the classroom. Observations and interviews were transcribed for subsequent analyses.

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Results

Two levels of analyses were completed.

Level 1

To examine if individual instructors varied in terms of their students' overall perception of technology, a One-Way Analysis of Variance (ANOVA) was run. This *Overall* composite score was obtained by collapsing the five subscores of the survey. This analysis showed a significant difference between the instructors on the Overall variable, $F(11,195) = 9.71$, $p < .001$. Post-Hoc Tukey comparisons of individual means showed that two of the twelve instructors had significantly higher, more positive, means than their colleagues.

Level 2

To gather information regarding the classroom environments and instructors involved, classroom observations and interviews were analyzed. More specifically, we were interested in why these two instructors stood out in terms of their students' more positive perceptions of technology found in Level 1 of the analyses. Thematic analyses (Bogdan & Biklen, 1998) of both the classroom observations and the interviews revealed interesting results. Varying degrees of technology use were found within the classrooms. Classroom use of technology in both instructor use and students use varied from very minimal use (e.g., using WebCT as a discussion tool only) to several instances of modeling and required student use of technology (e.g., using imaging devices and editing software). In addition to differences in technology use, our observation and interview data indicated that classrooms varied in terms of the learning environments created. For instance, a small number of classrooms kept a traditional format (i.e., frequent instructor lectures, little discussion, and multiple-choice exams) while others came across as being quite student-centered and constructivist in nature (i.e, frequent discussions and reflection tasks). Differences in class size were also noted.

In summary, what is important to note is that the two instructors who significantly differed from the rest of the group statistically (Level 1 analyses) also differed in the classroom environments they created. Along with several of the other instructors both of the instructors who stood out had technology incorporated into many phases of their course. Interestingly, where the instructors differed the most was in their approach to learning. Based on the data, both of the classrooms were more constructivist in nature than the rest of the group. More instances of opportunities for critical thinking and decision making were evident not only in technology infused situations but in these classrooms in general. In other words, along with increased technology use in the classroom a more student-centered, constructivist learning environment was required to obtain significantly more positive student perceptions of technology.

Discussion

Our results are consistent with previous theory and research indicating that technology use both by instructors and preservice teachers within the classroom is important in encouraging more positive perceptions of technology and its usefulness in educational settings (Carlson & Gooden, 1999). An additional and very important implication of our research indicates that not only is technology training necessary but a constructivist learning environment conducive to student involvement in technology is crucial (Jonassen, Peck, & Wilson, 1999; Scardamalia & Bereiter, 1996) as well.

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Videotape Series
The First Day: Teachers' Ideas and Experiences

Karen D. Benson, Ph.D
Professor of Teacher Education
College of Education
California State University, Sacramento
United States
bensonkd@csus.edu

Michaeline J. Veden
Executive Producer
University Media Services
California State University, Sacramento
United States
mveden@csus.edu

Abstract: Creating a First Day of School can be scary, confusing, and exhausting, but also exhilarating, energizing and satisfying. Because so many disparate and unknown components must be imagined, reflected upon, planned and organized, many new teachers often wonder, "Where do I begin? How do I even think about what is needed on the First Day of school?"

In response to student teachers' requests, and recognizing a need for information in this area, the College of Education and University Media Services at California State University, Sacramento, undertook the development of what began as a single videotape, the goal of which was to provide new teachers with an opportunity to learn from, and adapt, "first day" experiences of veteran teachers.

Production Overview

In the course of the production, a diverse group of six elementary classroom teachers, all teaching in multicultural/multilingual classrooms, were interviewed and three of them were followed while undergoing a first day of school. The wealth of material that was acquired during the production process lead to a series of six subject specific learning modules, all demonstrating how these teachers - diverse in ethnicity, age, experience, and teaching style - think about and implement the first day. Designed to accentuate the feelings and attitudes of the first day as well as to provide concrete activities and address the nitty-gritty details, the series shows intelligent, articulate teachers who share similar aims, but manifest them differently.

The video series has been field-tested with CSUS student teachers, teacher interns, and experienced teachers. The response in every venue has been overwhelmingly positive! Comments have included: "I feel inspired," and "I feel affirmed as a teacher."

"The First Day: Teachers' Ideas and Experiences", with accompanying Facilitator's Guide, is being distributed at cost as a public service to the field of Teacher Education.

Video Series Module Synopses

Module #1 Preview: Meet the Teachers
Module #1 functions as a preview to the entire series. First, we meet the six teachers, and then through excerpts from each module, we experience the flavor of the series, as well as intriguing examples of what's to come.

Module #2 Planning and Preparation
In Module #2 the teachers articulate their aims and how they plan for the first day. This module considers particulars such as arranging the classroom, offering choices to their students, developing guidelines for their groups, and connecting with families. It also shows a range of first day activities. Underlying all of the planning and doing is attention to taking account of students' needs and interests.

Module #3 First Steps Toward Building a Community of Caring Learners
Teachers know that communities are made, not born. As they aim to draw their students together into a learning community, the teachers pay attention to ways of communicating and building relationships with students and their families. In Module #3 the teachers talk about and we see first day activities that value the common needs and interests of children.

Module #4 Assessment and Reflection
With information gleaned from a balance of ongoing assessment and reflection, teachers come to understand individual students and the whole class, which leads to adjustments in their teaching. Module #4 emphasizes the value of embedding informal assessment and reflection in every aspect of teaching and learning. Formal assessments, which can provide useful information, are an accompaniment to this.

Module #5 Problem Solving: The Expected and the Unexpected
The First Day is a magnet for interruptions, only some of which can be foreseen. In Module #5, the teachers confront a range of typical intrusions, e.g. late students, and crying children. Then, one teacher deals creatively with some surprising events, including a beguiling bee and a hurting heart; while another responds to a student who needed her continual care and attention all day.

Module #6 Working with English Learners: The Story of Lyudmila and Julie
Module #6 differs from the first five in that its form is chronological. We follow the progression of a Ukranian girl who arrives at Kindergarten with her mother. Both do not speak English. Julie, her teacher, strives to create a safe, comforting space for Lyudmila, while providing for the needs of the whole class. We see a range of strategies and activities that support and include English learners, but also we see a compassionate teacher who builds on the Lyudmila's strengths. Initially worried and anxious as she enters Kindergarten, Lyudmila gradually, and dramatically, shifts across three hours toward finding her way into the group.

Acknowledgements

Any worthy production of this magnitude is built out of the many who contributed significantly in great and small ways. The idea to create a video about the first day of school was the brainchild of Marie Gallegos, a Phase I student teacher at the time. She collaborated as a full, equal partner in the entire endeavor, as did Richard Osborn, our director, who wrought his magic on the strings of video segments, which we brought to him. Foremost, we value the courage of the teachers and their students and their willingness to allow us to tape. We thank CSUS University Media Services and their staff, who not only funded and supported the project, but also believed in its value and importance. We are grateful also to our Special Sponsors for additional funding. Throughout the project colleagues, teachers, student teachers, and friends have given valuable time and feedback to us through field-testing and previews, as well as sustained support and encouragement.

ITPS: A Performance Based Assessment of Instructional Technology Competencies

Joseph Braun, Department of Curriculum and Instruction - Illinois State University, US
Rhea Walker, Department of Curriculum and Instruction - Illinois State University, US
Brent Simonds, Department of Communication - Illinois State University, US
Carl Wenning, Department of Physics - Illinois State University, US
Jill Thomas, Department of Geography - Illinois State University, US
beverly rich, Illinois State University, US

Illinois State University's Technology Learning Circle (TLC), a group formed in 2000 as part of a federal grant, developed an Instructional Technology Passport System (ITPS) designed to ensure that graduating teacher candidates are able to use instructional technology in ethical and effective ways, in compliance with national, state, and institutional standards, e.g. National Council for Accreditation of Teacher Education (NCATE, 2001) or Illinois State Board of Education (ISBE, 1999). The introduction of the standards afforded the faculty an excellent opportunity to develop a system of teacher education performance assessment that can help ensure that teacher candidates graduating from Illinois State University do so with the ability to meet technology standards in preparation for their work in schools.

This paper will describe the unique composition of the TLC, highlight the core beliefs and values that guided their work, and provide an overview of the design and development of the ITPS to date. While significant progress is being made in implementing the ITPS, the reader should note that this is considered a work still in progress. Thus, the paper concludes with a look at the next steps to be undertaken by the TLC in implementing the system to ensure that graduating students from Illinois State University as teachers in the nation's schools will be able to meet the standards for using instructional technology.

TECHNOLOGY COMPETENCIES IN TEACHER EDUCATION AND PERFORMANCE BASED ASSESSMENT

The composition of the TLC reflected a collaboration among various departments in Arts and Sciences with a role in teacher education, e.g, Physics, Geography, and Communication, together with Curriculum and Instruction faculty as they developed the ITPS. As part of its role in the federal grant that underwrote the work of the TLC, the committee was charged with the task of *"examining and implementing technology-related issues with regard to both K-12 educational settings and college teacher preparation programs."* The Technology Learning Circle has created a project to implement a standard set of instructional technology tasks that will serve as a basis of authentic performance-based assessments that all teacher candidates must complete successfully prior to graduation from Illinois State University.

Based in part upon committee expertise, review of the literature, and experiences at Alverno College – an institution recognized for its "Student Assessment-as-Learning" principle (Alverno College Institute, 1994) – the following core beliefs and values were adopted by the Technology Learning Circle and served as the basis for much of its work.

- Assessments must judge actual performance, not merely intellectual knowledge.
- Assessments can and should be an opportunity for learning.
- Assessments must include "corrective feedback" to the student.
- Assessments represent the learning outcomes of the teacher education unit.
- Assessments, because they represent a minimum of what all teacher candidates should be able to do, must be satisfied at the 100% level.
- Teacher candidates should be proficient in demonstrating their use of instructional technology.
- University faculty will provide a basic introduction to the various performance tasks, but students will be responsible for obtaining in-depth training as necessary.
- Learning is best when there are examples of expected outcomes and public criteria for performance.
- Development of the ability to self-assess is essential to becoming a life-long learner.

The TLC examined both internal and external technology standards, i.e. university-wide standards for students in regards to technology as well as the International Society for Technology in Education. From this examination were derived twelve consolidated indicators that, as integrated tasks, address the multitude of elements presented in the various standards. These indicators were reviewed by a panel of K-12 teachers as part of the development process. The consolidated indicators are general in nature, and relate what all teacher candidates should be able to do at a minimum under authentic teaching conditions. Arguably, any student who completes all twelve assessments encountered in ITPS rightfully can be said to have demonstrated the competencies required by the University and external accrediting agencies. The consolidated performance indicators are as follows:

1. The teacher candidate demonstrates knowledge of ethical standards in the use of technology.
2. The teacher candidate demonstrates the ability to use technology to work effectively and equitably with students challenged by a variety of physical disabilities (including the scanning of text, OCR, text -to-speech applications, image resizing, etc.).
3. The teacher candidate demonstrates an understanding of basic computer terminology and concepts, including fundamental understanding of basic computer operations and an ability to perform simple trouble-shooting tasks.
4. The teacher candidate demonstrates an ability to use a variety of instructional media effectively (e.g., DVD player, CD-recorder, laser disk player, VCR, digital still camera, digital video camera, smart board, document camera, and video projector).
5. The teacher candidate demonstrates the ability to use telecommunications effectively (e.g., e-mail, discussion groups, list servers, instant messaging, etc.).
6. The teacher candidate demonstrates the ability to create and edit the content of web pages, including the posting of the web pages to the World Wide Web (e.g, presupposes ability to use FrontPage, PageMill, DreamWeaver, or Netscape Composer, and inclusion of digital images obtained from a digital camera, etc.).
7. The teacher candidate demonstrates an ability to effectively use web browsers, including the utilization of search engines.
8. The teacher candidate demonstrates the ability to use presentation authoring tools (e.g. PowerPoint, Hyperstudio, etc.).
9. The teacher candidate demonstrates the ability to use idea development software (e.g., Inspiration, etc.).
10. The teacher candidate demonstrates the ability to use spreadsheets (e.g., Excel, etc.).
11. The teacher candidate demonstrates the ability to use database management software (e.g., FileMaker Pro, Access, AppleWorks, etc.).
12. The teacher candidate demonstrates the ability to perform desktop publishing (e.g., In Design, Word, etc.).

It was agreed that these consolidated performance indicators are subject to periodic review and editing in order to take into account the very significant ongoing changes in the field of instructional technology.

Associated with each of these consolidated indicators is an authentic performance-based assessment task that examines student performance and ensures program compliance with adopted standards. This system stipulates that all teacher candidates must demonstrate certain competencies, e.g. designing and manipulating a database to retrieve information or using a desktop publishing program to produce a class newsletter, at various institutional gateways, i.e. beginning of professional studies, student teaching, and graduation.

Students may acquire the knowledge of skills associated with any individual performer at different points in their teacher preparation beginning with their initial undergraduate coursework as freshmen. The TLC decided, however, that the first four performance indicators would be assessed prior to beginning professional studies and such assessment would be conducted at a center dedicated to the work of the TLC. This work includes not only conducting the performance assessments for the first four indicators, it also would be a source of training and retraining for those not successful in their completion of the assessment task. As students successfully complete the tasks at the various gateways described above, progress is posted to their electronic record for which we adopted the metaphor of a passport. That progress could be achieved through continuing assessment of performance based on indicators five through twelve which could take place within the context of a course assignment or through the proposed center.

NEXT STEPS

The next steps for implementing the ITPS include several critical elements for making the system workable. First, the process of faculty involvement in the curriculum mapping of where the indicators will be mastered is underway. This means that the Curriculum and Instruction program faculty in teacher education, i.e. early childhood, elementary, middle school, and secondary, will have to come to consensus regarding in which courses a particular indicator should be targeted. Upon completion of this curriculum mapping, the process will be repeated for other programs, such as those included in special education.

Along with the curriculum mapping of the indicators, the faculty in the various programs will have to be adequately prepared to use and model instructional technology in relation to the indicators that are identified within courses they are teaching. The university already has a staff development opportunities in place but these will need to be tailored somewhat to meet the particular needs of faculty. For example, it would not be assumed that early childhood faculty would use the same database or graphing program as would a secondary faculty member. While we would expect all faculty to develop the same proficiencies as expected of the students through the ITPS, in the short term we know the busy schedules of university faculty preclude everyone gaining such proficiencies at the same rate. Nonetheless, vital to the success of ITPS is an effective staff development program, as well as on-going technology support for the faculty.

Finally, the performance assessments need to be developed and refined. This step will involve development of authentic assessments by the TLC and, as with the development of the indicators, K-12 teachers will be included in a review process prior to implementation. The assessments must result in products or performances that can be used to document how students actually achieve the indicators as part of the NCATE re-accreditation process that will begin next fall.

Once in place, the model will serve teacher education students well. We believe that our approach is constructivist in nature, which is consistent with our philosophy of teacher education at ISU. It incorporates best practices in assessment and is consistent with the changes in accreditation developed by NCATE as we approach our re-accreditation. Finally, the process has involved faculty in such a way that a feeling of ownership for this curriculum development effort has developed beyond those of just the committee who created it. In general the faculty has readily embraced our work and to date there has been very little resistance. The committee eagerly looks forward to completing the above mentioned. of work.

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Successful Infusion Of Technology Throughout A Teacher Licensure Program

Dr. Gary Breegle, Department of Education, Belmont University, USA, breegleg@mail.belmont.edu

Dr. James Stamper, Department of Education, Belmont University, USA, stamperj@mail.belmont.edu

Abstract: For the past two years Belmont University's Department of Education faculty has infused 28 technology competencies throughout its pre-service teacher preparation program. These competencies are the competencies required for teacher licensure by the State of Tennessee. The technology course that pre-service teachers and interns were required to complete in the past is no longer offered. Now pre-service teachers and interns develop these competencies and demonstrate them by completing the technology tasks that are embedded into course assignments and into the internship. This paper describes the process we used to infuse technology throughout our licensure courses, and lists recommendations for strengthening the infusion based upon a survey of Belmont's pre-service teachers, interns and faculty.

Introduction

Some teacher preparation institutions have successfully infused technology into their programs (Cooper, et. al., 2000; Woodruff et. al., 1998). And yet, while incentives and resources to train faculty to infuse technology are available (Niederhauser, 2001), researchers continue to report that education professors do not model the use of technology in teaching their courses (Deal, 1999). The purpose of this paper is to encourage more teacher preparation institutions to follow Belmont's lead and successfully infuse technology throughout their teacher licensure programs.

Our Infusion Process

In 1999-2000, Belmont participated with Nashville Metropolitan Public Schools and another local university in a PT^3 catalyst grant (U.S. Department of Education, 2000). The grant specified that the Belmont faculty use an online self-assessment tool to rate their own technology skills. During a private interview, each professor (1) developed a list of personal technology strengths and weaknesses based upon the self-assessment results, (2) determined which technology skills were already included or taught in the professor's courses, (3) developed strategies to infuse (or further infuse) technology into the professor's courses and (4) identified special training and/or resources the professor needed to successfully infuse the technology. Belmont faculty subsequently approved a course matrix of infused technology competencies. Our education technology professor then coordinated the infusion and team-taught the competencies with the faculty in their courses, and moved the technology assignments in selected courses online using WebCT. Pre-service teachers were then required to access and to complete selected technology tasks online in WebCT in the first core licensure course (Foundations of Education), and in the Professional Development Site (PDS) 15 credit hour Methods Block course. Interns in Belmont's 15 month Internship program used WebCT to record daily journals, submit unit and lesson plans, and to complete other assignments for review and comment by Belmont faculty and PDS mentor faculty. They also completed a technology workshop in WebCT that taught them how to construct a web page for their students to use in the classroom, and how to use Microsoft's free software (NetMeeting) to videoconference their classrooms with other classrooms.

Assessment Of The Infusion Effort

In the fall 2001 semester, our pre-service teachers, interns and faculty completed a survey to help determine the extent to which infusion provided opportunities to develop technology skills, and how the infusion can be improved. Based upon the survey results, the following recommendations were submitted to the Belmont faculty:

- Since Belmont now has a new computer proficiency course that all entering students must complete during their first semester, infused competencies that are taught and/or verified in the proficiency course should not be taught in the licensure courses. However, skills that are required by the state of Tennessee and that are not taught in the proficiency course should be taught throughout the licensure courses, especially in the methods block course and the Internship,
- In the first core course, Foundations of Education, students should be introduced to WebCT because they will need to use it as they move through other licensure courses,
- Pre-service teachers and interns should be required to systematically demonstrate competencies in a broad range of assignments and practicums throughout their courses,
- Bi-weekly technology sessions should be conducted on site at the PDS schools. These sessions should include instruction on how to infuse technology into the curriculum, how to construct and maintain a teacher web site, and how to use a variety of technology resources.
- Since interns complete core courses during the summer before they begin their internships in the schools, these courses should include additional introductions to technology resources (e.g., computer projector, digital camera, videoconference software and hardware) and additional opportunities to construct lesson plans that include the use of technology resources.

Conclusions

At Belmont we believe that the following are necessary for successful infusion:

- First and foremost, a faculty committed to infusion as evidenced by its willingness to develop personal technology knowledge and skills, and to model the use of technology in their courses,
- Second, clear explanations by administrators and faculty to students about the infusion plan and why students are no longer required to take a stand-alone education technology course,
- Third, an understanding of and approval of the new role of the faculty member who teaches education technology as evidenced by an assigned workload, which includes time to plan and time to team-teach with other faculty members, and
- Fourth, a commitment to regular and systematic assessment of the infusion effort

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Simple and Effective – Teacher Roles Remain a Powerful Framework to Embed ICT Within the Practice of Teaching

Dr Christine Anne Brown
Faculty of Education
University of Wollongong
Australia
christine_brown@uow.edu.au

Abstract: Teacher roles of learner, manager, designer and researcher provide a simple framework to embed ICT within the practice of teaching. They have been used to convey the impact of information and communication technology within compulsory ICT subjects in the Faculty of Education at the University of Wollongong for five years. The roles have been adapted to suit students studying ICT on campus without simultaneous classroom access (Example A), to frame ICT on practicum (Example B), and to structure video vignettes of local teachers working with ICT (Example C). Each examples is explored in relation to the sequence or clustering of roles, their dependence on context, their relationship to an electronic portfolio, and the degree of support required. These fundamental roles facilitate communication among pre-service teachers, new graduates and experienced colleagues to enable professional development for *all* teachers.

Introduction

The integration of information and communication technology (ICT) in teaching practice provides a challenge for pre-service educators. If you maintain a separate focus on ICT you can be lured into emphasis on a skill set; embed ICT within all subjects and you run the risk of assuming "someone else has covered that." Couple with that simplistic dichotomy a range of interpretations of "integration" and you have a complex problem for pre-service educators who require not only big picture thinking of leadership, but also faculty wide support.

In its most basic form, integration can be met by development of student skills with ICT tools and these skills can simply be mapped across subjects in a degree program. Other more pedagogical interpretations of integration require substantial alterations to tertiary teaching practice, either through emphasis on student-centered activity design, the development of high quality on-line resources and interactive learning experiences, or whole program re-structuring as a consequence of use of ICT. Theory and practice can be linked through communication tools and communities established in a virtual environment that is capable of bridging the pre-service to school divide.

Within such complexity, it is often simple structures or ideas that resonate with different groups. In this case it is the anchor point of fundamental teaching roles – learner, manager, designer and researcher. The temporary separation of these four teaching roles permits a closer examination of associated skills, processes and ways of thinking. The teacher as *learner* must be a sophisticated and technologically literate information processor, with a considerable degree of self-regulation, internal motivation and a lifelong approach to learning. It is easy to see how this role instantly addresses student attainment of core ICT skills. The teacher as *manager* must be highly organized and logical, capable of great attention to detail with personal and teaching resources, student work, classroom layout and management and reporting of student capabilities. Since many capable learners struggle to organize or archive their own work and fail to see the virtue of developing a personal information management system that outlives short-term needs, the transition to managing the additional work of a class is far from minor. The teacher as *designer* must be able to creatively design student activities to meet a range of learner and system needs in a given environment. Activity design is problem-solving that draws on learning theory, on management experience and on interpersonal skills. The more a teacher moves from a didactic to a facilitator approach, the more flexible they must become as problem-solvers who are required to "think on their feet". The teacher as *researcher* must monitor practice, maintain a focus on professional development, collaborate with teaching peers and reflectively improve their practice. This demands feedback from students and fellow teachers and a willingness to accept constructive criticism.

Classroom reality weaves multiple teaching roles together in ways that are highly context specific. Since evaluation is an integral component of any teaching role, and assessment drives much of what is learned in schools today, assessment and evaluation are embedded within the roles. The four teaching roles of learner, manager, designer and researcher have been used as the framework for conveying the impact of information and communication technology within compulsory ICT subjects in the Faculty of Education at the University of Wollongong for the last five years. They have been adapted to suit students studying ICT on campus without simultaneous classroom access (Example A), to frame ICT use on practicum (Example B), and to structure video vignettes of local teachers working with ICT (Example C). Each of these examples is now explored in relation to the sequence or clustering of roles, their dependency on context, their relationship to an electronic portfolio structure, and the degree and nature of teaching support required (see Tab. 1).

Examples	*How roles unfold or relate*	*Influence of context*	*Relationship to electronic portfolio*	*Nature of Support required*
A. Students studying ICT on campus	Learner Manager Designer Researcher	Minimal background knowledge of teaching; Complexity gives team message	Portfolio takes a process approach – students begin to develop a professional archive with functional categories.	Intensive in tutorials with skill development and beginning of pedagogy Substantial support with file management
B. Students using ICT on practicum	Researcher Designer Manager Learner	Starting point of class and school research to design ICT-integrated activities with supervising teacher	Portfolio is a product (central report) with associated files – resources, lesson plans and student work.	Support largely from class teachers on practicum; support later with portfolio submission
C. Classroom-based video resources for students in A or B	Learner and Manager focus on the teacher. Designer and Researcher focus on students and student/teacher interaction.	Very dependent on the school as to ICT resources, infrastructure and teacher involvement with students	Trigger material for students and part of a professional portfolio for the teachers.	Video production and preparation for student viewing; ethics clearance with teachers and students.

Table 1: Relationship of teacher roles for ICT integration to context, electronic portfolios and student support

Example A: Students studying ICT on campus without classroom access

The core compulsory first-year ICT subject for all pre-service teachers in our Primary (elementary), Early childhood or secondary PE/Health program has changed dramatically over the last few years. The 1997 subject re-modeling of *"Information Technology for Learning"* geared to the state ministerial guidelines for the integration of ICT into classroom practice. Skills and pedagogy were translated into basic skill tests, design of lesson activities incorporating ICT, exam testing of concepts and resource support through a textbook and web site. Although the themes of learner, manager, designer and researcher were embedded in the lecture structure, it was not until the 2000 subject revision that these teacher roles became explicit.

In 2000 skill tests were replaced by paired student activities (database, multimedia presentation and web-based activity), the exam questions were unfolded weekly via asynchronous discussion so students could develop and share ideas, and a process oriented electronic portfolio was introduced. The aim was to functionally anchor skill development, allow students to develop file management skills within a designated folder structure, model the organization and collection of electronic student work, and allow students to choose a cluster of activities that suited their interest and degree. The choice of portfolio activities in the 2000 subject offering is presented in Tab.2, accompanied by the number of students who chose each option, and the subsequent options offered in 2001. Students were asked to choose one activity from each category.

2000 Portfolio categories	*No. of students attempting options in 2000*	*Options for 2001 based on 2000 figures*
Teacher as Learner		
A-My Learning Style	111	A- My Learning Style
B-Journal	44	*B –(new) Learning strategies in activities from 2000 (presented as a resource CD)*
C-Learning style of Peers	55	
Teacher as Manager		
D-Folders of related material	80	C – Folders of related material with a map showing relationships
E-Resources database	74	D – Resources database
F-Spreadsheet	19	
G-Contacts	37	
Teacher as Designer		
H-HyperStudio or CHP	48	E – HyperStudio or CHP
I-PowerPoint	106	F – Powerpoint
J-Classroom Layout	35	
K-Template for an activity	21	
Teacher as Researcher		
L-Web page of annotated links	189	G – Web page of annotated links
M-Database	11	*H – Further research on discussion forum question (new)*
N-Database	10	

Table 2: Portfolio options offered in 2000 and 2001 in "Information Technology for Learning"

Subject re-vision for 2001 was once again substantial. Lectures provided information, introduced themes, explored and modeled resources and allowed a core team of three lecturers to weave together coherent but diverse approaches to ICT integration. The exam was replaced by an online discussion activity that required students to contribute at least two substantial entries to the question of their choice, summarize and reference the work/comments of their peers, then draw some conclusions. The process of analyzing themes produced much deeper student processing of the pedagogy of ICT integration than previous exam answers, allowed students to identify many writing styles, use a powerful cognitive tool, and research and present data. Educational software review was re-introduced within tutorials, permitting groups of students to experience the technical issues of software installation, review the pedagogy and discuss classroom application. The electronic portfolio for 2001 remained anchored to the four roles, but options were reduced to two within each category on the strength of the popular choices made by students the previous year (see Tab.2). In addition, CDs of sample student work from 2000 were supplied within tutorials to help frame expectations and reduce over-reliance on any single example.

One constant from 1997-2001 is the sequence of unpacking teacher roles– begin with the learner (where they are at), follow with the manager (relate to practical issues in the classroom), progress to designer (creative application of pedagogy) and cap off with reflective and organized researcher. These four roles can be used to illustrate *some* of the diverse ways a teacher must think and operate (reduce initial complexity), and to allow pre-service teachers to accept that they may not be equally comfortable or proficient at all teaching roles. This provides a strong rationale for teaching as a team enterprise, particularly in an ICT-rich environment, given the potential complexity of the technology.

Students study this subject in the second session of their first year of a three or four year program, hence their school practicum experience is limited and they may not be fluent flipping between teacher and learner hats. Introducing the teacher as learner permits them to step straight into the teacher role as a novice, and models the idea of lifelong learning and professional development.

The four roles become explicit within the electronic portfolio, where the key emphasis is on assisting students to develop ongoing electronic information management skills that will permit them in their later years to take a product approach to portfolios for assessment and ultimately presentation to potential employers (Brown 2002). Students are asked to construct four folders to contain work related to teacher roles (see Tab.2).

The support students require has shifted progressively from the development of application skills to the pedagogical application of those skills, largely due to increased acceptance of the role of ICT rather than increased skill base. Peer tutoring is critical, and the use of fourth year students as demonstrators has been mutually beneficial. Surprisingly, basic computer skills are the most lacking - many students are highly competent using specific applications on their home machine, but have no understanding of how to transfer documents using portable media. The typical requests for a print copy or electronic submission through web-based course support systems bypass such file transfer and can mask inability to complete simple movement of documents in a non-networked environment such as might still exist within their first school placement. Emotional support is critical in this subject, particularly for both ends of the experience spectrum. Those with little past experience feel intimidated, while those with sophisticated skills in a limited range of applications may initially fail to realize their role is to help others learn to use ICT for learning in addition to maintaining and expanding their skill base.

Example B: students using ICT on practicum

The one-year Graduate Diploma of Education (GDE) program began incorporating a specific focus on ICT in 1997, when a 9-week series of lectures and tutorials was placed at the end of the annual subject "Pedagogy". In the following three years (1998-2000) a 6-8 week block of Pedagogy early in the year was allocated to ICT integration to allow for skill development throughout the year. The 2001 iteration adopted an extended approach to ICT as a stepping-stone to course redesign with an ICT backbone in 2002. Although the lecture series was placed in session one of the year, the bulk of student assignment work was due in second session, permitting a focus on ICT use within the major mid-year practicum. Lectures and tutorials were merely the source of resources, ideas and support for subsequent application in the classroom context. The four teacher roles were made explicit through the electronic portfolio as they relate to the teaching cycle. Students first *research* their school ICT environment, *design* activities with their supervising teacher, *manage* those activities and finally *evaluate* what they have learned (based on observations, supervisor feedback and collections of student work).

The brief nature of the GDE program relative to Example A, coupled with the ability to anchor ICT experience within the practicum necessitates that students jump straight into the teaching sequence. The electronic portfolio requires them to stitch their experience together in a structured report (product), accompanied by electronic folders containing resources, activities and student work they can archive for subsequent access (part of the ongoing process). The request for students to note all available resources means they have a record for future use, and the request for samples of student work models the need to look at student work to make a meaningful self-assessment of their performance. The key time students need support is during and after their practicum, so future plans to "backbone" ICT activities throughout the year seem highly appropriate.

Example C: video vignettes of local teachers working with ICT

The lectures and tutorials in Examples A and B do not occur at a time when students have access to the classroom. They often have trouble relating to the classroom context, and frequently question the expertise of a university lecturer relative to the school classroom context. One solution (tried 1998-2000) was to involve a range of classroom teachers as guest lecturers. Considering the diversity of courses in either of these subjects, it is very difficult to balance the range of needs against the internal coherence of a lecture set. The pair of lecturers in 2001 provided internal consistency - for classroom links in the future, we are pursing the collection of video cases from local schools.

The four roles are aligned to link pre-service and practicing teachers. The *learner* and *manager* focus on the teacher. The aim is to tap into the thought processes and reflections of the classroom teacher about ICT integration and the management issues involved in planning, monitoring and collating student electronic work. The *designer* and *researcher* relate to the interaction between teacher and students. What kind of activities do teachers design that seamlessly integrate ICT? Can we hear the teacher's reflections on what happened? How do students work with ICT? A case may represent one teacher, or a school group. Video vignettes feature teacher reflections on the use of ICT in the classroom (learner); equipment, layout and management of student work (manager); student activities with before and after thoughts of the teacher (designer); students engaged with ICT in individual and group work (researcher).

Every teacher and classroom is unique. This process begins a video vignette collection that can grow and be used flexibly for professional development of teachers generally (see Tab. 3):

	Teacher A	Teacher B	Teacher C
Learner			
Manager			
Designer			
Researcher			

Table 3: Potential combination of video vignettes as the basis of many class activities

One collection of vignettes could be the profile of a particular teacher, such as "Teacher A" (Tab.3). Alternately, the manager theme could be explored for comparison and contrast of a range of classroom environments with respect to technical infrastructure and resources. The value of the vignette structure lies in the re-usable nature of the individual elements that might find their way into web pages, onto a DVD or projected for discussion within a tutorial. They rely on the creativity of the activity designer to "come alive" from multiple perspectives for many educational issues. The teachers at the heart of the case studies are gaining valuable resources for *their* professional portfolio. This process also models the benefits to be gained from close observation and analysis of your own teaching. Monitoring and sharing cases provides many starting points for great professional development. Video production requires significant support to ensure high quality. The video editing and processing are complex, but may also be the most valuable part for either students or teachers. Alternately, students could capture the case studies.

Conclusions

If our goal is to support the prime endeavor of learning that is active, constructive, collaborative and intentional through transparent use of ICT, then we have to look at the fundamentals of teaching and transcend the particulars of technology. Teacher as lifelong learner, teacher as manager, teacher as creative designer and teacher as reflective practitioner appear to offer some promise. These roles may facilitate clear communication among pre-service teachers, new graduates and their experienced colleagues to allow for the concept of professional development for *all* teachers. Teaching in an ICT-rich environment tips the load for teachers and demands teamwork (Jones 2001). These roles provide a simple means of teachers dividing the labor, acknowledging that as classroom generalists we are naturally better at some things than others. The roles also provide a team structure for targeted professional development activities within a school. All teachers present a unique profile of proficiency with ICT. The real challenge may be to deal with the emotional issues surrounding effective teamwork (Luca and Tarricone 2001).

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The Design of a Computer-Based Review for the ExCET

Douglas Bump, Houston Community College, US

To be certified as a teacher in the state of Texas a candidate must pass the Examination for the Certification of Educators in Texas (ExCET). Students today spend four years or more in education programs taking courses intended to prepare them to become teachers. At the end of the program students must pass a test such as the ExCET that is a prerequisite for becoming a teacher.

Texas is now holding the teacher education program responsible for the success of teacher candidates on certification examinations (Hernandez, 1999). Universities may lose their teacher certification programs if their students do not pass the certification tests. Because of these consequences, colleges of education are beginning to prescreen students who desire to enter their teacher preparation programs, requiring students to meet specific GPA and basic skills standards before being admitted to the programs (Hernandez, 1999). There is currently a shortage of certified teachers in Texas and prescreening students who desire to become teachers has the potential effect of eliminating some people who could become very good teachers. There is a need to develop a computer-based examination, that can be used to prepare students for the ExCET and to study the effect of this computer-based examination on their ExCET scores.

Books and Manuals do not provide enough interactive preparation for the ExCET. Most ExCET preparation manuals today include examples of ExCET tests. These tests encourage students to take the whole test first and then check their answers. These manuals provide detailed written explanations of the answers at the end of the test. In an inefficient manner, students must turn back and forth in these books if they want to check their answers.

Computers-based education allows students to quickly compare their responses to the correct answers. Computers do not ridicule student's answers, and students can work at their own pace at each concept before they advance to the next. Computers can provide students instant feedback that can tell the student why their answer is right or wrong.

The purpose of the study was to design, develop, and evaluate a computer-based test that provides teacher education students with a review for the ExCET. The design and development process for the test was defined by a group of stakeholders that included the designer/programmer, teacher educators, an author of a print-based ExCET review, and teacher education students. This study provided information regarding the following concerns evolving throughout the development cycle: (1) content; (2) screen design; (3) feedback; and (4) evaluation.

The focus of this study was in four distinct areas: test design, test development, implementation of the test in an authentic context, and evaluation from students and faculty. The results are reported in both quantitative and qualitative measures that reflect feedback from surveys and test results. Constructivism was the foundation for both the design and development of the test, and participatory design guided the process.

The overarching principles of reflection and recursion were critical for this design model. Recursion provides the opportunity for stakeholders to revisit and rethink the materials in a cyclical method throughout the development of the software. Reflection provides the opportunity for all of the stakeholders to think about and reflect on the design and development decisions that have been made and change them when needed.

The idea for the program originated as the competencies and domains were introduced to teacher educators. The teacher educators noticed a need for software that would help students prepare for the ExCET. The development of the program incorporated the suggestions, propositions, and plans of teacher educators making these contributors an important part of the project. The teacher educators grew from being contributors to become stakeholders in the project. Students who participated in the trials made many suggestions as part of a formative evaluation. These suggestions made many improvements to the program which made the stakeholders feel that the program was their program. Finally when one stakeholder suggested that the future version incorporate video, ownership was divided evenly by all the stakeholders. The project is now a very important part of the ExCET review.

Using Problem Based Learning to Prepare Students for IT Leadership Positions in Schools

Dianne Chambers
Science & Mathematics Education, Faculty of Education
The University of Melbourne, Australia
d.chambers@unimelb.edu.au

Abstract

Teachers take on a wide range of roles in a school, yet most teacher education courses prepare students for only the role of classroom teacher. A problem based learning approach to teaching and learning and IT-based resources in a technology-rich learning environment are combined to provide undergraduate education students with an exciting and innovative way to learn about IT in schools. This paper explores how problem based learning and technologies are utilized to provide powerful opportunities for learning about IT in schools through: solving authentic tasks; taking on leadership roles; working as a team; and collaborating on solutions to authentic ill-structured problems. Students taking this subject have reported over a three-fold increase in confidence in tackling IT problems in a school, in addition to development of content knowledge and transferable leadership skills.

Introduction

The roles of a teacher include not only teaching and classroom activities, but also many other roles such as curriculum planner, decision maker, human resources manager, technology manager, team member, and team leader. A problem based learning (PBL) approach is used in the subject *Information Technology (IT) in Primary Schools* at the University of Melbourne. This approach enables us to project undergraduate students into their future role as teachers, to enhance their learning, and to prepare them for the varied roles of a teacher through authentic tasks and scenarios. The subject is supported by a website that includes a rich description of a fictional primary school [named 'Federation Primary School' in honor of Australia's centenary of federation in 2001] and its inhabitants in which the problems are set, and the subject is conducted in a technology-rich teaching space (see Arnold & Gruba, undated, for a description of the teaching space and the resources available in it). Although the teaching space was very well-equipped, this level of technology is not considered to be vital to running a program such as that described here.

This subject is part of the Bachelor of Education (Primary) [B.Ed.(Primary)] degree, which is a four year course of study and the principal vehicle for the education of primary (elementary/K-6) teachers at the University of Melbourne, a research intensive university in Melbourne, Australia. During the third and fourth years of the B.Ed. (Primary) degree students select one optional subject each year, allowing students flexibility to strengthen an area of interest or to broaden their knowledge. *IT in Primary Schools* is an optional subjects and runs over two semesters with a two-hour block each week. The tasks students undertake are designed to develop their content knowledge about IT and its uses in a school, to give students experience of working as a team, and to develop skills and knowledge about being a leader in the context of decision-making about IT issues in a school. It is considered that the leadership skills developed will be transferable to other roles of leadership in schools and elsewhere.

Using a PBL approach for this subject (first taught in 2001) was examined for a number of reasons — new graduates told us that in their first years of teaching they were made members of the Information Technology Committee (or equivalent) at their school (a big role for a new graduate!) and PBL appeared to be an excellent means of facilitating the transition of our students from the role of a student to that of a education professional. Thus, this subject gives our students experience in tackling the kinds of IT issues that they are likely to encounter when a teacher and to experience the roles of committee member and chair of a committee with responsibilities for developing a report with recommendations for a School Council or the principal. PBL allows students to develop both the content knowledge and the transferable skills required for the many roles of a teacher, with this subject having a particular focus on leadership roles.

Using PBL to Support Learning

Finkle and Torp (1995) describe problem based learning (PBL) as:

> *"a curriculum development and instructional system that simultaneously develops both problem solving strategies and disciplinary knowledge bases and skills by placing students in the active role of problem solvers confronted with an ill-structured problem that mirrors real-world problems".*
>
> Finkle & Torp (1995)

The subject employs a problem based learning approach (see also Stover, 1998; Stepien & Gallagher, 1993) and each problem is explored in a four week cycle (see Table 1). The students work in teams of four students and tackle four problems involving IT in a fictional primary (K-6) school over the course of the academic year (two semesters). The problems are: Integrating IT into the Curriculum; Developing a Three year IT Budget; Developing an IT Professional Development Plan; and, Developing a Three year IT Strategic Plan. For each problem the team prepares a written report that are the recommendations to the School Council and the team presents their proposal, as if to the School Council.

The role of the team is that of the school's IT Committee that respond to briefs developed by the principal or School Council. The team leader is in the role of committee chair and the team members act as committee members. Teams meet in scheduled class times once each week and may also meet – electronically or in person – outside scheduled classes. Students used telephones, email and short messaging system (SMS, on mobile telephones) extensively to communicate outside class times. As the year progressed scheduled classes were reduced.

The subject had no lectures or formal workshops about any of the content areas. The first two sessions of the subject were used for the class to discuss issues that would prepare students for this mode of learning, as this was the first subject the students had undertaken using a PBL approach. Discussions included how the subject would operate and students were directed to resources about problem based learning and the roles of team members and team leaders were discussed extensively and students defined the characteristics of a good leader and team member. These introductory sessions were time well invested and made explicit to all students what their colleagues saw as good team behaviors.

The class met for a two hour block each week with staff only addressing the whole group at the start of each problem (week 1) to raise general issues about the topic and field questions and in the class that teams presented their recommendations (week 4) staff chaired the session and managed the discussion and the students critiquing of presentations.

Week 1 (of 4 week cycle) • An introduction to the problem & a discussion that raises general issues related to the topic. This is supported on the subject's web site with notes, links to useful sites and articles, and supporting artifacts about the scenario for the problem.
Weeks 2 & 3 (of 4 week cycle) • Teams work on the problem, with staff available to mentor the teams. Staff & experts (principals, teachers, and others) are available (via email) to team leaders.
Week 4 (of 4 week cycle) • Teams present their recommendations to the group, the style is similar to a School Council meeting and students critique and discuss the recommendations of each team.

Table 1. Activities during the four week cycle of each problem.

Development of Leadership Skills

Students are assigned to the role of team leader on a rotating basis and are responsible for compiling and submitting the report and coordinating their team's presentation. This allows students to gain experience in working as a team and in leading and coordinating a team to meet a deadline. These are highly valued transferable skills for students to gain, in addition to the content knowledge developed. In the first sessions of the subject students, as a group, described the characteristics of a 'good leader' and the sorts of behaviors a good leader would have. Characteristics and behaviors of good team members were also described and discussed. This discussion was quite extensive with students drawing on both their positive and negative experiences of working with teams. Students were also encouraged to engage with literature about team leadership skills, team management and team participation via links on the subject's website.

During the course of the subject each student was team leader for one problem and the role was taken seriously by students and staff. At the conclusion of each problem students were required to reflect on a number of aspects of the problem including on how the team process had worked and how they would have handled the team had they been team leader. This reflection enabled students to consider how well the team leader had managed the group and to consider alternative ways the process could have been handled. The reflective process as part of the cycle is an important aspect of

PBL (Holen, 2000). Thus, although each student was team leader for only one problem, they had many opportunities for critiquing the leadership of others and projecting themselves into the role of team leader.
The following quote from a student at the end of the subject exemplifies some of the learning students had about working in a team and in leading a team.

> *The subject has many strengths, these included working in a team and having team-leaders. Having experienced four different teams, it was clear to see when a team had a leader with the right qualities. For successful leadership, organization, initiative, vision and negotiation is needed. At times the leader has to be frank and direct and keep things moving along. In successful team work, there has to be balance of roles and work load, there has to be sharing of ideas and there has to be a willingness to help out each other and be honest to each other about concerns that might be facing the team.*

Development of Content Knowledge

In this subject there were many aspects of knowledge development. Some of these are:

- Students developing a knowledge of the body of literature relating to IT in schools. For example, students investigated the research basis of different models of professional development when designing a professional development program for teachers in the school and had to investigate theories of learning when planning the integration of IT into classroom activities.

Although no 'content' was taught in this subjects it is believed that students' learning in this area was enhanced because the students themselves determined what they needed to know for each problem. Another powerful learning outcome was students developing the skills of finding and making sense of reliable information and applying it to a problem at hand.

- Students becoming conversant with currently used software and hardware and educationally sound ways these can be used in the primary classroom and becoming experts on current government Education Department policies and requirements regarding IT in schools.

It is acknowledged that the details of these are only ephemeral, but the skills in finding and evaluating this type of information are of ongoing value.

- The information literacy skills of students were greatly enhanced during the subject as students were given links to only basic sources.

As the year progressed the information literacy skills of the students blossomed, as did their confidence and autonomy in taking control of their learning. Students also developed a rich knowledge of useful and reliable sources of information about matters relating to IT in schools.

- Students developing a rich understanding of working in a team and in leading a team.

It must be acknowledged that not all team work was 'plain sailing' and for some groups difficulties did occur. These were viewed as learning opportunities and students involved were encouraged and supported in sorting out any difficulties as they arose.

- The richness of description of the fictional school, and the authenticity of the characters of the school meant that students developed some understanding of the complexity of working in a school and understanding the political and personal minefield that getting staff to use IT in their teaching can be!

Some staff members of the fictional were deliberately 'awkward', such as the teacher who saw herself as an IT leader in the school (because she had been an early adopter of IT), but had not changed her classroom practice in 15 years!

It must be noted that none of the content was 'taught' to the students— that is, there were no lectures or tutorials in which staff did traditional teaching about these content areas. Students developed their own knowledge in the various aspects of implementing IT to support teaching and learning in a school as it was required for each problem, which highlights the importance of well-designed problems. As the students defined what *they* needed to know to work through the problem they were in an optimal state for learning.

When students approached staff with questions about finding information or how they might tackle a problem, staff did not take on a didactic role at any stage and did not tell students where to find information or what the next step might be. If the problem was informational, staff modeled to students how they might go about finding out such information (but did not give the information to the student) or bounced questions back to the students to get them to find the next step. This methodology of scaffolding students worked extremely well. As the year progressed the scaffolding was progressively withdrawn as students developed skills and no longer required support to tackle the problems. By the final problem the class did not meet between weeks 1 and 4 of the problem (a staff member was available in his office if any help was required – it wasn't!) and teams worked on their own on the final problem. This is pleasing as these were final year students who will be practicing teachers within months of completing this subject.

Student Responses to the Subject

The subject was offered for the first time in 2001 (February to October 2001). Students responded very positively to this style of learning and developed skills and understandings not developed elsewhere in their studies. The first semester (February to June) feedback from students in the University's 'Quality of Teaching' survey (University of Melbourne, 2001) was excellent — average scores for the questions ranged from 4.4 to 4.9 out of a possible 5. These are substantially higher than the University averages. The results from the second semester of the year-long subject were even higher, with a 'perfect five' scored on four of the nine questions — this indicates that all students surveyed gave the highest rating for that question. Averages of other questions ranged from 4.6 to 4.9 — which are well above the university averages. That the response to the statement 'The subject was taught well' scored 4.6 in semester 1 and 4.9 in semester 2 is both pleasing and interesting, as there was no 'teaching' (but lots of learning!) in the subject. Student satisfaction with the subject is also suggested by an almost doubling of enrolments in the subject for 2002 as positive 'word of mouth' about the subject was passed onto the students of the following year.

The effectiveness of this approach to teaching and learning is indicated by the following quote, which is from a reflective piece from a student in the subject:

> *I had to think about the school's philosophy and charter, as well as think about what the teachers hope to achieve and what learning environment they want. These were not easy, they took strategic thinking – hence a strategic plan – I was constantly asking myself, is this really achievable? Is this realistic?*

The following quotes from students indicate the immense value that they found in this style of learning:

> *This is an amazing subject that has taught me an unbelievable amount of knowledge. When reflecting back on the year, I can see that I have grown personally, academically and professionally.*
>
> *Through this subject, I have been prepared to face the challenges that come with including IT in a school's curriculum in a direct hands-on fashion, in that I was forced to think of the problems in a realistic manner, and solve it in a practical and sensible way that would work in a real school.*
>
> *One of the things I really enjoyed was the problem based nature of the course. It gave me a sense of empowerment to know that we were directing our learning and were in control of it. That is how it really works from now on for us — that is, we need to have the skills to be able to go out and find things for ourselves.*

These comments from students' reflective writing indicate the very powerful possibilities of using PBL as part of the learning process.

Pilot Evaluation of the Subject

At the conclusion of the subject, as a pilot evaluation of the subject and the students' learning, a subset of students were asked to complete a series of simple questions (Table 2). This was undertaken both to inform us of students' perceptions of their own progress and to direct them in reflecting about their own learning. [As only twelve students were asked to complete these questions it is acknowledged that these data are preliminary and form part of a pilot study of the subject and its outcomes]. As can be seen (Figure 1) both the confidence and the content knowledge of the students surveyed increased substantially over the duration of the subject. Although these data are froma pilot study with a small number of students and are not suitable for statistical analysis or the drawing of major conclusions, data suggest that this subject has made a large impact on the students surveyed and, for these students, has contributed in their development as a professional and as a useful and valuable member of a school community. Thus, it appears that PBL can provide a rich learning experience for students developing both content knowledge of implementation of IT across a school and the transferable skills and knowledge for them to take up leadership positions in schools. [Further investigation of confidence in leadership roles will be made with currently practicing teachers and with other final year students.]

Questions
At the beginning of this subject my confidence level in taking on position on a school IT committee was ____ out of 10.
Now my confidence level in taking on position on a school IT committee is ____ out of 10.
At the beginning of this subject my confidence level in taking on a leadership role in a school was ____ out of 10.
Now my confidence level in taking on a leadership role in a school is ____ out of 10.
At the beginning of this subject my knowledge about issues a school IT committee would consider was ____ out of 10.
Now my knowledge about issues a school IT committee would consider is ____ out of 10.
At the beginning of this subject my knowledge about issues a leader in IT in a schools would need to consider was ____ out of 10.
Now my knowledge about issues a leader in IT in a school would need to consider is ____ out of 10.

Table 2: Questions from a pilot evaluation of students' perception of changes in their confidence and content knowledge

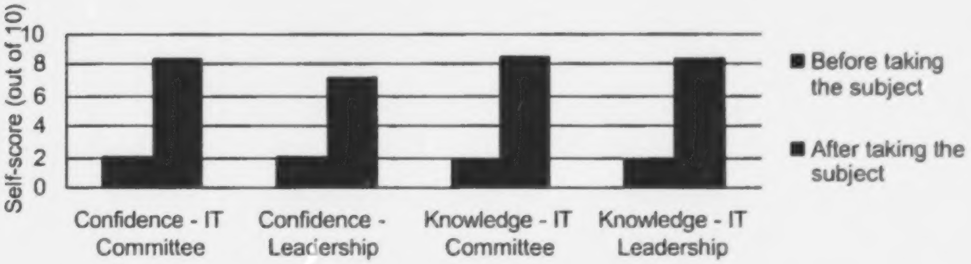

Figure 1: Students scores (averages) of their confidence and content knowledge before and after having completed this subject (N=12). [See Table 2 for the questions].

Conclusions

The resources and style of teaching used in this subject for undergraduate teacher education at the University of Melbourne allowed our students to investigate authentic issues involving IT in a school and to develop recommendations for a school. These experiences in working as a team member and being relied on to contribute, in leading a team and coordinating the process and the outcomes, and in presenting the findings to peers and staff give the students valuable opportunities to develop knowledge and skills in a way quite different to traditional university teaching styles. PBL, supported by appropriate technology and experts, has allowed our students to analyze authentic situations in a fictional school and consider alternative solutions or paths of action while working in a team. An element that strongly influenced students' experiences and learning is that students did not work on these materials alone, but rather discussed their findings with colleagues and worked as a team to arrive at conclusions. The need to reflect on observations and share with others and develop the skills required in being a successful team member will, we believe, serve our students well in becoming leaders in the rapidly changing environment of schools of the twenty first century.

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Preparing Tomorrow's Teacher to use the Information Technology: From InTech to PalmTech

K. C. Chan
Department of Natural Sciences, Albany State University, USA,
kcchan@asurams.edu

Samuel Masih
Department of Mathematics and Computer Science, Albany State University, USA

Bette Seeley
Education Technology Training Center, Albany State University, USA
bseeley@asurams.edu

Gerald Burgess
Education Technology Training Center, Albany State University, USA
gburgess@asurams.edu

A curriculum based on handheld and mobile technology called PalmTech is under development to prepare preservice teachers as well as inservice teachers to use handheld technology in the classroom. Currently all preservice teachers at Albany State University must complete a technology curriculum called InTech before graduation to master their technology skills. This new PalmTech curriculum is being developed to complement and extend InTech in areas not being covered by InTech. PalmTech, despite its limitations, has the advantage of short training time, easy to use, low cost, and taping into the emerging technology. PalmTech is mainly designed to explore areas of teaching strategies not easily implemented by the traditional desktop technology.

One of the major missions of the SOWEGA PT3 Project at Albany State University, besides technology infusion in the classroom and faculty development, is to train student teachers how to integrate technology into curriculum that they are using during the student teaching period and in the future classroom. The SOWEGA PT3 project partners with the Education Technology Training Center (ETTC) of Georgia State Data and Research Center on campus to provide every student teacher on campus intensive technology training through a vigorous program called Integrating Technology (InTech). InTech is a 50-hour course originally designed for Georgia K-12 Teachers by Georgia Department of Education to retrain inservice teachers in technology skills. The SOWEGA PT3-ETTC partnership helps modify the InTech curriculum to suit the needs of student teachers in the region. In the program, student teachers apply basic technology skills into K-5, Middle, or High-School curriculum according to their specializations.

To demonstrate their competence, each student at the end of the training must produce a CD-ROM and a Website that features everything that they have done for the InTech course. Practically, the student produces an electronic portfolio that can either be carried in his/her own pocket as a business card (actually a cd-rom in the size of a business card) or can be distributed as Web pages. The e-portfolio is not part of the requirement of the original InTech curriculum; but it is becoming a standard for the pre-service students because of the collaboration. In fact, it has become a requirement for all student teachers to complete InTech training before they are eligible for graduation since the partnership started two years ago.

InTech at Albany State University was launched in 1997, since then the technology has changed rapidly; inevitably the InTech curriculum has to be modified on yearly basis to reflect the change. But the change is still largely surrounding the desktop and its peripheral technology. The recent rapid growth in handheld technology that demonstrates tremendous potential in preparing tomorrow's teachers to use the technology effectively has largely been ignored. The SOWEGA PT3 project and the ETTC Center have decided to launch a new initiative to expand the InTech curriculum to include handheld technology for training preservice teachers. Since then a curriculum called PalmTech has been developed as an attachment unit to the InTech program. Now students not only are capable of producing an e-portfolio on the Web and on cd-rom; they are also capable utilizing the information technology via handheld computing devices such as Palms and other Pocket-PCs in the classroom to enhance their teaching.

In the presentation, both InTech and PalmTech curriculum will be shared interactively. A model e-portfolio and the power of PalmTech will be showcased by one of the student teachers who has participated in one of the InTech-PalmTech courses. The potential of PalmTech will be discussed and demonstrated through interactive activities. An assessment of the student's performance and reactions to new the PalmTech curriculum will be presented.

Moving Beyond Make Believe: On-Line Lesson Plan Collaborations

Cathy Cheely
Technology Department
Brunswick County Public Schools
United States
cathy.cheely@brun.k12.va.us

Lee Vartanian
ACTT Now Program (PT3)
Old Dominion University
United States
lvartani@odu.edu

Patrick O'Shea
Technology Department
Brunswick County Public Schools
United States
patrick.oshea@brun.k12.va.us

Dr. Dwight Allen
Darden College of Education
Old Dominion University
United States
dwallen@odu.edu

Abstract: Brunswick County Public Schools (Virginia) has partnered with Old Dominion University on a collaboration project aimed at bridging the gap between pre-service university methods courses and authentic classroom environments. Instead of merely writing theoretical lesson plans, based on make-believe scenarios, individual or small teams of pre-service students from ODU are paired with a teacher in Brunswick County from a similar grade/subject level. These partners are encouraged to write a technology infused lesson plan addressing Virginia Standards of Learning. Participants communicate through an online interactive message board that is supplemented by emails and other electronic message systems. The use of electronic communications allows the site administrators and methods faculty to observe and archive the communication flow and facilitate the collaborative process.

Introduction

In the field of education and technology, on-line collaborations are increasingly influencing instructional strategies. Through interactive web pages and e-mail, classrooms from different parts of the world can communicate with each other, work in unison on projects, and compare the results. Websites, such as iEARN (www.iearn.org), provide platforms, facilitating these inter-classroom collaborations—linking far-flung classrooms.

Teacher-to-teacher collaborations have also become prevalent components of the Internet. Early on, teachers were quick to see the value of sharing their lesson plans with others. An almost overwhelming variety of lesson plan pages have cropped up to meet the large demand of teachers (www.lessonplanz.com). List serves, such as the Teachnet site (www.teachnet.com/t2t), have become useful tools linking teachers together and allowing them to share their ideas.

In addition to list serves, e-mail, and teacher web pages, new platforms for on-line collaborations have emerged to facilitate actual asynchronous collaborations among different people. These sites allow participants to communicate in "rooms" designed for their group. In higher education, university classes use these on-line communication platforms to collaborate on course assignments.

The Project

The current project is a unique use of on-line communication platforms, in an effort to link pre-service student teachers with in-service teachers. It responds to the trend of methods classes requiring students to write lesson plans without a particular school, class, or student population in mind. Instead of merely writing theoretical lesson plans, based on make-believe scenarios, students write lessons for a specific classroom and teacher. These lesson plans are submitted to a pre-service teacher, who actually teaches the lesson. The project uses an on-line interaction platform to facilitate communication between collaborators and encourage the use of technology.

In this collaboration, methods students from Old Dominion University are paired with a teacher in Brunswick County from a similar grade/subject level. Pre-service and in-service teachers share information on the dynamics of the in-service teacher's classroom and the two work toward a mutual lesson plan. The pre-service student submits a lesson plan to meet the needs of the students in that individual classroom. Before being passed on to the in-service teacher, the plan is checked for technology integration by the site administrators. The in-service teacher receives the lesson plan, along with any supplementary resources, and videotapes it while being taught. Afterwards, the in-service teacher uses a rubric to evaluate the performance of the lesson plan.

Copies of the video and the comments of the in-service teacher are delivered to the methods teachers, who share them with their students. Once the pre-service teacher sees the video of their lesson being taught, they evaluate their lesson according to a rubric that assesses its strengths and weaknesses.

Faculty members are free to use the tapes as they choose. Some simply hand out their videos. Others watch them in class and conduct group assessments. One, in particular, handed out the videos to their students and asked them to pick out a five-minute portion of it to share with the class. The videos are archived in the College of Education's Resource Library and may be used with future methods classes.

Results

Fall semester 2001 was the first trial run of this project. Although it was something completely new to ODU methods faculty, students, and Brunswick teachers, it achieved an encouraging amount of success. Out of the 60 pairs of collaborators, only a few lessons did not get taught.

Methods faculty were initially somewhat apprehensive about the project. By the conclusion of the fall semester, they were overwhelmingly supportive. Aware of their role as the last trainers of these future teachers, the methods faculty were excited about the authenticity of the learning experiences. Students were exposed to a technology rich school division and a myriad of technology resources. They were mentored by veteran teachers and asked to plan with a specific audience in mind.

One problemteachers and students reported revolved around communication. Some found the message board and on-line communication too impersonal and preferred communicating over the phone. This issue is being addressed during the spring semester through an increased effort to prepare students and teachers to use the on-line communication platform.

Conclusions

The project provides a mutually beneficial relationship for both higher education and K-12 education. Old Dominion methods courses achieve a greater depth and purpose to their lesson planning activities. Old Dominion students have reported higher levels of technology usage. Students must regularly check messages from their collaborating teacher on-line and teachers expect technology to be infused in the lesson planning process. Pre-service students get additional 'real world' mentoring. Brunswick Schools benefit from the influx of new ideas that current pre-service teachers provide through their on-line interactions and lesson plans. Armed with improved strategies and the experience of the fall semester, the lesson plan collaboration project expects to continually see more positive results, as it tries to bridge the gap between pre-service studies and in-service teaching.

Educational Endeavors for PreK-12 Instructional Design: NASA Partnership Opportunities

Caroline M. Crawford
University of Houston-Clear Lake
United States of America
crawford@cl.uh.edu

Chris Chilelli
NASA Johnson Space Center
United States of America
chris.chilelli1@jsc.nasa.gov

Abstract: National Aeronautics and Space Administration (NASA) offers educational opportunities throughout the nation and maintains educational endeavors for PreK-12 learners as well as teacher education coursework in real-world environments so as to aid the university methods faculty in the real-world uses of NASA-related subject matter and focus.

Introduction

The integration of the National Aeronautics and Space Administration's (NASA's) real-world data and educational environments makes the curricular planning and implementation less focused upon purely theoretical matter and further focused upon the actual day-to-day understanding of difficult conceptual underpinnings of subject matter. This is of primary importance to teacher candidates, who must have such educational endeavors modeled to them as they move through the teacher education curriculum of study and before they are expected to develop curricular scope and sequences on their own.

Modeling is of primary importance within coursework, especially methods coursework for teacher candidates, as many instructors teach as they have been taught; the innovations available within today's educational arena must be focused upon in order to break free of the educational ineptitudes of years past and to refocus today's learners upon the importance of understanding theoretical matter within an environment of real-world, data-driven information environments. It is no longer a viable option to have theories available and memorized by learners; today's environment stresses the use and integration of information into understandable units that can be manipulated to glean the aspects of necessity and importance. Therefore, NASA partnership opportunities offer the real-world environment through which to maintain theoretical grounding of knowledge while reaching towards higher order thinking skills that are necessary within today's world. Teacher candidates must have opportunities to integrate the real-world data and information available through NASA into the instructional design process, so as to design and develop appropriate and successful lessons for their future learners.

Cross-Curricular Ventures

Within the educational environment of today's PreK-12 schools, there has been a growing emphasis upon cross-curricular activities. The theoretical underpinnings that emphasize such a learning opportunity is the clear understanding that all knowledge should be introduced to the learner as a whole, instead of offering "bits and pieces" of important information that the learner must understand and integrate into the "whole" on his or her own. Further, the cross-curricular learning opportunities emphasize the appropriate and successful development of the learner's conceptual framework of understanding, which is based upon the theory of cognitive flexibility and the learning opportunities available within a cross-curricular venue. Spiro and Jeng state that, "By cognitive flexibility, we mean the ability to spontaneously restructure one's knowledge, in many ways, in adaptive response to radically changing situational demands.... This is a function of both the way knowledge is represented (e.g., along multiple rather single conceptual dimensions) and the processes that operate on those mental representations (e.g., processes of schema assembly rather than intact schema retrieval)" (1990, page 165). Additionally, cognitive flexibility "is largely concerned with transfer of knowledge and skills beyond their initial learning situation" (Kearsley, http://tip.psychology.org/spiro.html, paragraph 2).

As such, NASA's engagement within the PreK-12 educational realm supports cognitive flexibility as well as the cross-curricular development of a learner's conceptual framework. The real-world opportunities that NASA offers to the learners is envisioned as supporting mathematics, science, history, English and language arts, geography as well as numerous other subject areas of emphasis, while supporting the hands-on research of the learners. The integration of technology at every conceivable point is also a supported venture, as technology has the ability to offer real-world data sets, streaming audio and video, graphic elements, Web sites presenting useful information and other interesting aspects that were previously unavailable.

NASA Educational World Wide Web Sites

Numerous Web sites are available through NASA's support of educational ventures within the PreK-12 arena. Such support of the young people is an area that NASA and the professionals associated with NASA have taken as their own personal opportunity to support the educational endeavors of the professional educators of the world's young people, as well as enrich the learning environments with the real-world learning opportunities that not only entertain but also meet important learning objectives. Following are merely a few of the numerous Web sites that support NASA's interest in PreK-12 education. As expected, there is a significant bent towards mathematics and science; however, other disciplines are also valuable and are integrated whenever feasible.

- Practical Uses of Math and Science: The On-line Journal of Math and Science Examples for Pre-College Education
  http://pumas.jpl.nasa.gov/
- InfoUse's PlaneMath
  http://www.planemath.com/
- NASA Spacelink
  http://spacelink.nasa.gov/.index.html
    - Spacelink: Mission Mathematics
      http://spacelink.nasa.gov/Instructional.Materials/Curriculum.Support/Mathematics/Mission.Mathematics/.index.html
- The Space Place
  http://spaceplace.jpl.nasa.gov/teachers_page.htm
- NASA Human Space Flight Metric Converter
  http://www.spaceflight.nasa.gov/station/reference/calc/index.html
- NASA-AMATYC-NSF Mathematics Explorations I and II
  http://cctc.commnet.edu/lta/
- NASA KIDS
  http://kids.msfc.nasa.gov/
    - How Much Would You Weigh on Another Planet?
      http://kids.msfc.nasa.gov/Puzzles/Weight.asp
    - How Old Would You Be on Another Planet?
      http://kids.msfc.nasa.gov/Puzzles/Age.asp
- LTP Glenn Learning Technologies Project
  http://www.grc.nasa.gov/WWW/K-12/airplane/index.html
- Space Science Data Operations Office of NASA/Goddard Space Flight Center: Space Science Education
  http://ssdoo.gsfc.nasa.gov/education/education_home.html
- NASA-JSC Distance Learning Outpost
  http://learningoutpost.jsc.nasa.gov/

Engineers and scientists in the field do not only support the availability of curricular experience; the inclusion and support of professional classroom educators is also an important element within each of the Web sites noted. The desire to enrich the learning experiences available within today's learning environment, as well as heightening the level of interest of young people within the fields of mathematics and science, are important elements towards the success of these programs.

Interactive Learning Opportunities

NASA and their affiliates offer numerous interactive elements through which to enliven the learning environment of the PreK-12 classroom environment, as well as higher education endeavors at the community

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college and university levels. The availability of such simplistic information as a lesson plan with integrated activities, through the time-delineated interactive activities with professionals working directly with the learners are available. Following is a short explanation of merely a few opportunities available.

World Wide Web Sites

Web sites developed by NASA and partnering affiliates emphasize numerous points of information as well as interactive elements. For example, PUMAS (http://pumas.jpl.nasa.gov/) "is a collection of one-page examples of how math and science topics taught in K-12 classes can be used in interesting settings, including everyday life" (Kahn, paragraph 1). This site emphasizes the design and development of examples that are primarily written by scientists and engineers, so as to make available peer refereed lesson opportunities to the education profession. It is noted by Kahn that "NASA program directors and other leading representatives of the scientific community have been asking working scientists to contribute to science education" and goes on to write that "part of the motivation for these requests is to encourage and train future scientists, the emphasis has been on helping teach basic 'science literacy' to all students" (http://pumas.jpl.nasa.gov/Short_Intro.html, paragraph 4). Some examples offered in the PUMAS Web site are as follows:

- Coastal Threat: A Story in Unit Conversions
- How Now, Pythagoras?
- Just what is a logarithm, anyway?
- Square Roots Using a Carpenter's Square
  (http://pumas.jpl.nasa.gov/examples/titlef10_1_1_1.htm)

For each of the activities available, the appropriate grade level(s), curricular benchmarks, and subject keywords are available, as well as the peer review timeline to ensure appropriate review of the subject matter and educational viability are met.

As well, simulation learning opportunities are available through NASA sites. One example of an innovative design is InfoUse's PlaneMath (http://www.planemath.com/), which is developed by InfoUse in cooperation with NASA. The PlaneMath Web site offers an interactive opportunity to learn mathematics and aeronautics, with an emphasis placed upon real-world style simulation activities. There is an opportunity for the students to work within the simulation atmospheres associated with the following topics:

- Applying Flying
- Pioneer Plane
- PlaneMath Enterprises

Further, the professional educator or parent has the opportunity to register their class at the Web site. Following are the opportunities available to the professional educator or parent:

- Activities for Students
- Help Me Get Started
- Links to Other Sites
- Parent/Teacher Info

Therefore, there is adequate support available through the NASA and NASA-affiliated Web sites to ensure an appropriate and successful learning opportunity

Real-World Data Sets

Real-world data sets are available through different venues associated with NASA. Such real-world data sets make available opportunities for learners to take theoretical models and formulas that are usually conjecture and may be perceived as having nothing to do with the daily world of a learner's reality, and move towards a cognitively viable conceptual framework of understanding. One Web site that offers real-world data sets is the NASA-AMATYC-NSF Mathematics Explorations I and II (Capital Community College, 2000) Web site. This site is maintained for educational purposes and states "The first Project emerged from a desire to create exciting mathematics classroom materials based on NASA space activities" (Capital Community College, 2000, http://cctc.commnet.edu/lta/history.htm, paragraph 1). The original idea was to focus the project towards two-year community college courses; however, this information is just as valuable and viable within secondary classroom learning environments.

Streaming Video and Instructional Television Interactive Sessions

There are numerous venues through which to actively interact through interactive sessions, such as streaming video, instructional television, and videoconferencing. For example, Spacelink (http://spacelink.nasa.gov/) offers annual series of television broadcasts and streaming video broadcasts free to all educational parties. The series integrates mathematics, science and technology through educational distance learning opportunities, with grade-specific subject matter. Distance Learning Outpost, through videoconferencing, allows students to interact with NASA personal through integrated Expeditions and Challenges. Following are a few of the opportunities available, by grade range:

- NASA CONNECT
  Grades: 6-8
  Subject Matter: Mathematics, Science, Technology
  http://spacelink.nasa.gov/Instructional.Materials/Curriculum.Support/Mathematics/NASA.CONNECT/.index.html
- NASA-JSC Distance Learning Outpost
  Grades: K-12
  Subject Matter: Mathematics, Science, Engineering, Geography, and Technology
  http://learningoutpost.jsc.nasa.gov/
- NASA Why Files
  Grades: 3-5
  Subject Matter: None Specified
  http://spacelink.nasa.gov/Instructional.Materials/Curriculum.Support/Mathematics/NASA.Why.Files/.index.html
- NASA Optics
  Grades: K-12
  Subject Matter: Science, Math
  http://spacelink.nasa.gov/Instructional.Materials/Curriculum.Support/Mathematics/Optics/.index.html
- Taking the Measure of the Universe
  Grades: 6-12
  Subject Matter: Measurement and Computation in Mathematics
  http://spacelink.nasa.gov/Instructional.Materials/Curriculum.Support/Mathematics/Taking.the.Measure.of.the.Universe/.index.html

The above-mentioned Web sites are merely a few of the numerous opportunities that NASA and NASA collaborations have made possible to the education profession. Along with the broadcast element, there are also additional flyers, lesson guides and Web activities available for each session. Reviews of the available interactive sessions easily meet course objectives. As well, NASA educational endeavors can also be requested specifically for a classroom's activities and objectives.

Meeting National Standards

Each discipline is supported by national organizations that emphasize the importance of standards at the national level. Through the association's development of national standards, there is a clear vision as to the importance of subject matter taught to teacher candidates as well as emphasized within the PreK-12 curriculum at specific levels through out the learner's progress. As an example, the National Council of Teachers of Mathematics (NCTM) has developed *Professional Standards for Teaching Mathematics* (NCTM, 1991) as well as *Principles and Standards for School Mathematics* (NCTM, 2000). Within each of these standards, at both the teacher candidate and PreK-12 learner levels, technology is a supporting factor towards the success of educational endeavors.

The "Technology Principle" is one of six principles that the National Council of Teachers of Mathematics (NCTM) designate as imperative for all teacher candidates to master (NCTM, 2000). The "Technology Principle" states that "Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning" (NCTM, http://www.nctm.org/standards/principles.htm, paragraph 28). However, it is ultimately the mathematics teachers, not the technological tools that have the ability to support the educational goals of each endeavor integrated into the curricular scope and sequence, that is the key to the success of the mathematical learning environment (Garofalo, Drier, Harper, Timmerman & Shockey, 1000; Kaput, 1992; NCTM 1991, 2000). The National Aeronautics and Space Administration (NASA) offers technological opportunities towards the support of educational endeavors and the ability to meld numerous subjects into innovative, real-world, interesting lesson opportunities for PreK-12 learners. Further, the support of NASA offers the teacher candidates opportunities towards successfully meeting NCTM's "Technology Principle" (NCTM, 2000).

Conclusion

The integration of the National Aeronautics and Space Administration's (NASA's) real-world data and educational environments makes the curricular planning and implementation less focused upon purely theoretical matter and further focused upon the real-world understanding of difficult conceptual subject matter underpinnings. Emphasis must be placed upon links between theory and practice within all specialization areas; further, the desire to develop cross-curricular endeavors is also extremely important. NASA and their affiliates should be commended for their efforts, as well as further integration of the available resources should be implemented within teacher education coursework, PreK-12 curriculum, and higher education curriculum.

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Coffee, kaliedescopes, roller blades, and ice cream cones: What poetic conventions tell us about teachers' relationships with and perceptions of educational technology

Dr. Clare R. Kilbane, Assistant Professor
Teacher Education and Curriculum Studies
8 Furcolo Hall
School of Education
University of Massachusetts Amherst
Amherst, Massachusetts 01003
413.577.2898
Kilbane@educ.umass.edu

Purpose

> *"Give me a lever, and a place to stand and I will move the earth."*
> Archimedes, 340 AD

Centuries ago, Archimedes recognized technology's power to both initiate and facilitate world altering change. Although his enduring metaphor places appropriate emphasis on the role technology plays in the change process, Archimedes' illustration fails to acknowledge that several important factors influence the speed, direction, and magnitude of efforts to bring about change.

At present, computer-based technology, is the lever of choice for many proponents of educational change. Research on efforts to improve teaching and learning with technology has revealed that several factors influence technology -driven educational change. Early research in the 1980s on the implementation of technology for the purpose of enhancing teaching and learning revealed that limited access to appropriate and adequate equipment was to largely to blame for the failure of change efforts. Once these problems were addressed researchers turned their focus to other problems. In the late 1980s and early 1990s, researchers focused on problems stemming from teachers' need for basic technical skills and various kinds of support (administrative, community, technical). Now that efforts have been made to address these aforementioned concerns, current research in the field revolves primarily around problems emanating from teachers' lack of knowledge about appropriate integration of technology. The research trend that emerges from examination patterns during the last twenty years is a movement from the investigation of technical and organizational forces influencing change to those more professional and personal forces (in humans) influencing change. If the trend continues, one might anticipate that the next realm of research will study the most fundamental human characteristics influencing efforts to change--individual beliefs and attitudes.

In other areas of educational research, teachers' beliefs and attitudes have been identified as factors critical to the success or failure of reform efforts (Fullan, 1991; Elmore, Peterson, & McCarthey, 1996; Tyack & Cuban, 1993). Although the research literature on teacher beliefs and attitudes toward innovations affecting such professional concerns as content area instruction (Battista, 1992), instructional reform (Holland, 1998), and multicultural education (Shaw, 1993) has grown dramatically in the last ten years (Richardson, 1996), a body of research investigating the effect of teachers' beliefs and attitudes on efforts to change teaching and learning using technology has not yet been developed. Information regarding the nature of teachers attitudes in regard to their relationship with technology and their beliefs about the relationship of technology and learning could be important for a variety of reasons.

This paper reports on a study exploring teachers' attitudes toward and their beliefs about the relationship between instructional technology and learning. It shares the information gained from an investigation conducted with some 26 preservice teachers participating in a semester-long technology infusion project. Teachers were asked to share their personal relationship with technology and their belief about the relationship of technology and learning using the poetic conventions of either similies or metaphors.

Information generated from this investigation revealed that teachers' attitudes toward and relationships with educational technology vary considerably. It communicates that these beliefs and attitudes are able to be influenced by participation in academic coursework and field experiences geared toward the integration of technology with instruction.

The study suggests that teachers beliefs and attitudes play a critical role in the speed, direction, and magnitude of efforts to integrate technology with instruction. It identifies concerns that might be addressed when attempting to facilitate teachers' adoption of technology in the classroom. Finally, it suggests that use of poetic convention was an effective method of inquiry for investigating teachers' beliefs and attitudes that might be used in future research projects.

Perspectives

Humans use poetic convention to explain objects, ideas, and relationships that often defy explanation in more simple terms. Metaphors and similes can be more economical than other manners of expression—using fewer words to paint a better picture. They enable the expression of feelings, thoughts, things, and experiences for which there are no easy words. And they are generous to readers and listeners as they encourage interpretation and further exploration.

In this study, preservice teachers were asked to use the poetic convention of similes and metaphors to describe their attitudes and beliefs about technology. This approach was employed because the researcher believed that the qualities of poetic convention mentioned above would aid teachers in recognizing their own views and sharing them with others. It was presumed that teachers might feel more comfortable using similes and metaphors than simple expression. It was also believed that teachers, who are known for their ability to be creative, might enjoy this creative approach and share more information about themselves if given the option to use descriptive language.

Methods and modes of inquiry

26 third-year preservice teachers from a large state school in the northeast participated in this study during the spring of 2001. The preservice teachers had recently completed basic undergraduate coursework in the arts and sciences and some foundational courses in the field of education. These preservice teachers varied in their amount of experience with technology but had no formal training to help them develop specific skills for using technology nor experiences teaching them how to integrate technology with instruction prior to this study. Preservice teachers participated in a pre-practicum placement taking place in an elementary school classroom (grades 1-5) that was located in one of four school districts (representing rural, suburban, and urban school settings). In these placements, they were matched with an experienced teacher (with a minimum of 3 years experience) who was considered a novice with technology. The preservice teachers spent two, 6-hour, school days during a 14 week semester in their placement.

During the semester when the study was conducted, the preservice teachers participated in a two credit course called "Technology as a Tool for Instruction" offered as part of their formal courses concurrent with the pre-practicum experience. In this course, students developed skills necessary for using three popular software programs- a multimedia program called Kid Pix, a spreadsheet program called Excel, and a semantic mapping program called Kidspiration. They also received instruction helping them develop an understanding of how technology might be integrated with instruction. This instruction included opportunities to write lesson plans in which behavioral objectives were considered a condition for learning, student interaction with technology was required, and where the technological resources utilized were limited to those found in their pre-practicum classroom.

As part of their experience in this course, preservice teachers were expected to share the skills and knowledge they gained as part of the technology course with teachers in their prepracticum placements. The preservice teachers completed assignments that required them to discuss their beliefs about teaching and learning, their experiences with technology, and their understanding of technology's instructional role with the teachers with whom they worked. In addition, preservice teachers were asked to plan at least one technology integrated lesson with their partner teacher and reflect on it during the course of the semester.

The preservice and inservice teachers were brought together once at the beginning and end of the semester for brief meetings. During these meetings, all were introduced to the project, expectations for the semester, and the idea of using poetic convention to describe the power of technology. The definition of two specific poetic conventions--similes and metaphors--were shared with the group. In addition, a quotation from Archimedes using a metaphor and other examples were shared. All of the teachers were given paper and asked to develop two comparisons (either a simile or a metaphor) describing their personal relationship with technology and their perception of the relationship between teaching and learning. Teachers were then asked to share their ideas with others.

Data was analyzed using a variation of the constant comparative method (Guba & Lincoln, 1989; Strauss, 1989). After being compiled following the two meetings, it was grouped into exclusive categories that were representative of emergent themes represented by all data in each category.

Data sources or evidence

Some 50 similes and metaphors were collected at the beginning of the semester from 23 preservice teacher participants. An additional 55 were collected at the end of the semester from 24 preservice teacher participants. In addition to grouping the data by category, analysis was conducted to determine whether preservice teachers attitudes and beliefs were influenced over the course of the semester. An open-ended questionnaire administered to preservice teachers at the final project meeting added data to the researcher's analysis that was used for verification purposes. Students metaphors were member-checked and the categorization of data using the constant comparative method was checked by a colleague who was not involved in the project.

Results and Conclusions

Eight themes were generated to reflect the perception that students had of their relationship with technology. The preservice teachers described their relationships as variable, unpredictable, evolving negative, difficult but promising, overwhelming, optional, and transformational. Seven themes were generated to describe students' perception of the relationships between technology and learning. These themes reflected students perception that: 1) technology should be an essential part of the learning process, 2) that technology merely enhanced learning, 3) technology had specific and particular roles to fill in the learning process, 4) technology should be used as a reward, 5)experiences using technology were addictive for students, 6)technology was useful in learning but not a personal preference, and 7) technology leads to learning. When metaphors created at the beginning of the semester were compared with those created at the end of the semester, some evidence of change in students over the course of the semester was present. This raised interest in future research to determine the source of this change.

Educational importance of the study

Efforts that focus on encouraging teachers to use technology in their classroom are more likely to succeed if teachers' beliefs and attitudes are taken into consideration. This study would suggest that preservice teachers beliefs and attitudes regarding technology can be influenced by experiences they have as part of their professional preparation. This study reports on one such model for integrating technology into professional preparation that might be of use to other institutions preparing teachers. In addition, this study reveals specific attitudes and beliefs preservice teachers possess in relations to educational technology. If taken into consideration during the design of technology infusion projects, the beliefs and attitudes shared here might improve such efforts.

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Impact of the Cognitive Apprenticeship Model on Preparing Pre-Service Teachers to Effectively Plan For the Use of Technology in Instruction

Fran Clark
Instructional Design and Technology
University of Memphis
United States
ftclark@memphis.edu

Deborah Lowther
Instructional Design and Technology
University of Memphis
United States
dlowther@memphis.edu

Abstract: This paper is a report of the findings of a study conducted to determine if the use of the Collins-Brown-Newman (1989) Cognitive Apprenticeship model in an instructional technology course based on the Integrating Technology for Inquiry (NteQ) model (Morrison & Lowther, (2002) would positively affect the pre-service teacher's: (1) beliefs/concerns about using the computer as a tool to enhance student learning, (2) perceived ability to use technology and integrate it into the curriculum in an appropriate manner, and (3) ability to effectively design lessons that integrate technology into the elementary school classroom. Findings indicate that this approach positively affects the pre-service teacher. At the end of the study, participants indicated that they felt confident in their overall ability to (1) use and effectively integrate technology into the elementary classroom, (2) use, teach basic skills, and design a lesson that included meaningful use of database, spreadsheet, Internet, and desktop publishing, and (3) manage a learning environment, which includes multiple computers.

Introduction

Newly certified teachers are often faced with a variety of expectations with regard to technology when entering their first teaching assignments. For example, school administrators may require them to integrate technology into instruction, parents and community members may expect them to have students use technology as it is used in the workplace, and students expect computer use to be part of their classroom activities. In order to make effective use of this technology, these beginning teachers must have the ability to use the technology resources that will be available. They must be able to design lessons that include meaningful student use of these resources, and be able to manage a learning environment that includes multiple computers. If new teachers are to meet these expectations and succeed in a technology-enhanced environment, it is imperative that they have the knowledge and skills needed to effectively use technology in an instructional setting and that they have the belief that using technology will be beneficial.

Although most teacher education programs now have at least one required course that focuses on technology, recent studies suggest that many of these courses have not been successful in preparing pre-service teachers to effectively use technology in the classroom (NCATE, 1997, Milken Exchange on Teacher Education, 1998). This lack of success is often attributed to courses that place a greater emphasis on the technology itself rather than how to use technology to enhance learning.

The current, most common model is Computer Literacy, which is more traditional and is based on a formal approach in which pre-service teachers learn to use the computer through a series of lessons and activities focused on the basics of hardware and software technology. The primary goal of this model is to produce computer literate teachers. It is assumed that once these skills have been developed, the pre-service teacher will have the competence and confidence to integrate technology into their instruction.

Unfortunately, this model does not provide pre-service teachers opportunities to see instructors modeling the use of technology like it should be used in K-12 classroom. Nor does it provide instructional strategies for the integration of technology into the curriculum, opportunities to observe technology being used by students in technology classrooms or opportunities to practice teach with technology.

As noted in the International Society for Technology in Education (ISTE) National Technological Education Standards (NETS) for Teachers (2000), graduates of teacher education programs are expected to possess a degree of instructional knowledge and skills that encompass both computer literacy and the effective integration of technology into the curriculum. The Computer Literacy model does not appear to provide the content and experience necessary for pre-service teachers to effectively use instructional technology in the classroom. Therefore, the problem becomes more of how do teacher education programs prepare teachers who can meet the growing expectations with regard to technology use in the classroom? In other words, how can the instructional technology course meet the ISTE NETS for Teachers (2000) within the current educational environment?

The Study

The purpose of this study was to determine if the use of the Collins-Brown-Newman (1989) Cognitive Apprenticeship (CA) model in an instructional technology course based on the NTeQ model (Morrison & Lowther, 2002) would positively affect the pre-service teacher's: (1) beliefs/concerns about using the computer-as-a tool to enhance student learning, (2) perceived ability to use technology and integrate it into the curriculum in an appropriate manner, and (3) ability to effectively design lessons that integrate technology into the elementary school curriculum. The Cognitive Apprenticeship model was based on the incorporation of modeling, coaching, scaffolding, articulation, reflection and exploration into an instructional technology course. This study used these approaches in the context of effective technology integration that focused on the pre-service teacher's use of the computer to locate, process, and present information.

If the Cognitive Apprenticeship model was to prove successful in a pre-service instructional technology course, other factors needed to be considered, as suggested by the "knowledge and skills" portion of the NETS for teachers (2000). This knowledge base includes: basic computer technology operations, personal and professional use of technology, and the application of technology in instruction. In this study, the approach taken to address these competencies was the Integrating Technology for Inquiry (NTeQ) model (Morrison & Lowther, 2002). This model aligns with the Cognitive Apprenticeship model and fulfills the NETS for teachers. With regard to the use of the Cognitive Apprenticeship model in an instructional technology course, the NTeQ model provides a realistic context for learning and encourages the use of the computer-as-a-tool. Pre-service teachers learn the same computer skills that teachers are expected to use in the classroom and apply these skills to real-world activities similar to those found in a typical technology classroom.

Method

The participants for this study were seventy-six education majors enrolled in a required undergraduate instructional technology course. The course included the following components: (1) supervised practice to learn and refine basic computer skills, (2) participation in simulated computer-based lessons where the pre-service teachers take on the role of elementary school students and the instructor models the role of the classroom teacher, (3) assisting elementary students as they use computers, and (4) collaborative and independent development of computer-based lesson plans and related student products. The course covered a broad range of computer applications: email, word processing, database, spreadsheet, Internet, desktop publishing, and multimedia presentations.

This study included one treatment (36 participants) group and one comparison (40 participants) group. Two course sections were randomly assigned to the treatment group and two were randomly assigned to the comparison group. A full cognitive apprenticeship approach, based on the Collins-Brown-Newman (1989) model, was used with the treatment group. This approach provided participants with real tasks that were typical of the conditions and contexts of a technology classroom. This group participated in three model integration lessons taught by the instructor, and a series of field experiences which included: (1) observing an elementary classroom teacher teach a technology-based lesson in a technology classroom, (2) interviewing an elementary classroom teacher who regularly integrates student use of computers into her/his instruction, (3) participating in two instructor facilitated model lessons with small groups of elementary school students, and (4) observing the implementation of a treatment group-created technology based lesson plan into an elementary school classroom.

The comparison group received a limited cognitive apprenticeship approach. Although both groups covered the same course materials and prepared the same final products, the comparison group sections were taught in a more traditional manner that involved reading about and discussing what happens in a classroom that integrates technology rather than experiencing what actually happens.

The measures for this study consisted of: (1) Pre-and Post-Stages of Concern (SoC) questionnaires, (2) Pre- and Post-Technology Needs Assessment (TNA) surveys, and a Final Lesson Plan Rubric. The SoC questionnaire is a 35-item instrument used to identify the seven stages of concern through which teachers pass when they are introduced to an innovation, such as integrating technology into the curriculum: awareness, informational, personal, management, consequence, collaboration, and refocusing. Participants rated the degree to which each item reflected her/his current concerns/beliefs using an eight-point Likert-type scale that ranged from (0) not relevant to me now to (7) very true of me now.

The TNA survey addressed the following topics: (1) background information, (2) overall level of computer ability, and (3) level of computer ability as an educator. The participants used a five-point Likert-type scale to rate her/his perceived level of computer proficiency from low (1) to high (5).

The participants were given an NTeQ (Morrison & Lowther, 2002) Final Lesson Plan template on the last day of the semester and they were instructed to design a lesson that appropriately integrated technology into the elementary school curriculum. This lesson plan was evaluated using a two-part Final Lesson Plan Rubric. The first part consisted of evaluation criteria for each of the NTeQ lesson plan components. Each lesson plan criteria was evaluated using a rating scale, (1) did not meet expectations to (5) highly exceeded expectations. The second part of the rubric assessed the overall quality of the lesson with a five-point assessment scale that ranged from (1) Poor to (5) Excellent.

Results

To determine if the use of a cognitive apprenticeship model in an instructional technology course affected the pre-service teacher's beliefs/concerns about using the computer as a tool to enhance learning, a 2 x 2 repeated measure (Treatment vs. Comparison) analysis of variance (ANOVA) procedure was performed to compare the results of the Pre- and Post- Stages of Concern Questionnaires. The results revealed a significant difference between the treatment and comparison group's mean percentile scores for the following stages of concern: awareness and informational at a significance level of $p<.05$.

To determine if the use of a cognitive apprenticeship model in an instructional technology course affected the pre-service teacher's perceived ability to use technology and integrate it into the curriculum in an appropriate way, a 2 x 2 repeated measures (Treatment vs. Comparison) ANOVA procedure was used to compare the results of the Pre- and Post-Technology Needs Assessment Surveys. No significance was found. Both groups' mean scores increased from pre to post in all areas.

To determine if the use of a cognitive apprenticeship model in an instructional technology course affected the pre-service teacher's ability to effectively design lessons that integrated technology into the elementary school curriculum, independent t-tests using a between subjects design were calculated for each final lesson plan component criteria and the Overall Lesson Plan Rubric. The results revealed a significant difference between the treatment and comparison group's Final Lesson Plan Rubric scores for the following lesson plan component criteria and the Overall Lesson Rubric at a significance level of $p<.05$: (1) matching computer functions to learning objectives, (2) specifying computer application function(s) and their required manipulations, (3) describing specific computer tasks, and (4) developing evaluations that reflected the learning objectives, as well as overall quality of the lesson.

Discussion and Conclusions

The conclusions of the study will be presented by discussing each component of the research question: Does use of the Cognitive Apprenticeship model in an instructional technology course based on the NTeQ model positively affect the pre-service teacher's:

Beliefs/concerns about using the computer-as-a tool to enhance student learning

At the beginning of the semester, self-concerns (awareness, informational, and personal) that dealt with the pre-service teacher's perceived ability to integrate technology into the curriculum were high for both groups. Task (management) and impact (consequence, collaboration, and refocusing) concerns were less evident. High self-concerns at the beginning of the semester are typical for nonusers who are just becoming aware of an innovation and therefore want more information about it and its consequences for them.

At the end of the semester, the treatment and comparison groups continued to have high self-concerns regarding management and impact, although the treatment group's concerns were significantly lower than the comparison group's. These results indicate that treatment group felt more comfortable in their perceived ability to integrate technology into the curriculum. Impact concerns increased for both groups suggesting that participants from both groups were becoming interested in how the use of technology in the classroom impacts students and in working with others.

Perceived ability to use technology and integrate it into the curriculum in an appropriate manner

The Technology Needs Assessment (TNA) Survey was given to the participants on the first and last day of the semester to assess their perceived ability to use technology and integrate it into the classroom. No significant differences were found between the treatment and comparison group's Pre- or Post-TNA mean scores, indicating that participants entered and exited the course at similar levels, however, both group's mean scores had increased in all areas from pre to post assessment. At the end of the study, the participants felt confident in their overall ability to: (1) use and effectively integrate technology into the elementary school classroom, (2) use, teach basic skills, and design a lesson that includes meaningful student use of database, spreadsheet, Internet, and desktop publishing, and (3) manage a learning environment, which includes multiple computers.

Ability to effectively design lessons that integrate technology into the elementary school curriculum

The results revealed a significant difference between the treatment and comparison group's ability to effectively design specific lesson plan component as well as develop an overall lesson plan that successfully integrates technology. These lesson components were: (1) matching computer functions to learning objectives, (2) specifying computer applications and their required manipulations, (3) describing specific computer tasks and, (4) developing evaluations that reflected the learning objectives.

The treatment group, in contrast to the comparison group, developed lesson plans that were more well thought out, cohesive, and based upon a meaningful and interesting problem. The learning activities within these lesson plans were age-appropriate, engaging and required multiple applications of critical thinking skills. These lessons required students to use a variety of computer applications to process data. Forms of authentic assessment were used to assess students.

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Incorporating NETS Standards into an Elementary Certification Program

Kenneth Clark, Georgia Southern University, US
Alice Hosticka, Georgia Southern University, US

This paper will present the design of a teacher certification program at Georgia Southern University that meets the NETS standards (the basis for the Georgia Technology Standards) for teacher certification. After an initial course that presents introductory knowledge and skills related to technology, the program area integrates into their courses applications of instructional technology. These applications include projects that:

- -integrate commercial software into a classroom activity.
- -use commercial software as a vehicle for total classroom problem solving in a one-computer classroom.
- -use spreadsheets and software to develop mathematically sound graphs for use in the classroom.
- -use digital images and presentation software programs.
- -use probe ware in science instruction.
- -create classroom materials stored on a CDR.
- -download and store materials from the WWW for classroom instruction.
- -deliver instructional units/lessons that use a variety of software, hardware and learning to support instruction.
- -implement lesson that build student content knowledge and skills with the use of a variety of modern technologies.

The details of the projects and how they relate to the general content needs for certification, as well as, how they help the student meet the technology standards required for certification will be illustrated.

Teacher Created Data Bases that Foster Scientific Literacy

Kenneth Clark, Georgia Southern University, US
Marti Schriver, Georgia Southern University, US
Alice Hosticka, Georgia Southern University, US
Jackie Bedell, Georgia Southern University, US

This paper will present the value of using a database to developing scientific literacy in an inquiry-based learning situation. The emphasis will be on presenting a model for developing databases for use in a K-12 classroom. Aspects of the presentation will include:

I. Science that can be developed using databases
  Help teachers provide an inquiry-based science program for their students
  Help teachers provide a classroom setting that will have the teacher as a guide and facilitator of student learning by providing the resource and questions
  The unifying concepts and Processes of Systems
  Content of life science: the characteristics of organisms; life cycles of organisms; organisms and their environments; populations and ecosystems; diversity and adaptations of organisms; behavior of organisms
  Show Students the abilities of technological design in scientific investigations
  Provide an understanding about science and technology

II. Considerations necessary for designing a database
  What information do you want to store
  What format you will retrieve information in
  Sorting features
  What population will be entering data and sorting
  Type of data, e.g. text, numerical, graphic, video, sound
  Organization of data

III. Classroom applications of databases
  Information retrieval
  Recognition of patterns and trends
  Analysis of relationships
  Testing of hypotheses
  Interpretation of data
  Critical thinking

The above issues will be illustrated with an in-depth look at eight data bases developed for use in a middle school science methods course. The content of the databases presented are: birds; plants; trees; animals; insects; fungus and marine organisms. Elements of design and classroom activities for pre- and in-service science teachers will be presented. The use of these databases in such a matter help certified teachers and public school students meet the appropriate NETS standards in a pedagogically sound manner.

Approaching Authentic Assessment: Two professors share their methodologies.

Brenda Dressler, Ph.D., Joanne Clemente, M.S.
Teacher Education Department
New York Institute of Technology
United States
bdressle@nyit.edu, jclement@nyit.edu

Abstract: Two professors share their methods of authentically assessing pre-service teachers. Instead of traditional midterm and end term exams, students in their classes must prove competence in real-world situations. In one class, Educational Foundations, pre-service teacher candidates participate in a simulated interview for a teaching position in which the interviewee must respond to questions and propose strategies to address current educational issues. Questions such as these are the basis for competitive interviews in New York State's school districts. In the second class, pre-service teachers (Tech Ambassadors) are partnered with P-12 teachers and must deliver researched, technology-integrated lessons to elementary students in their classrooms under faculty supervision.

Dr. Brenda Dressler: "Interviews with depth"

Teacher education programs have always viewed assessment as significant in the training of pre-service teacher education candidates. New accreditation standards are driving the teacher education program's assessment practices to focus on what its candidates can do in terms of standards and performance. According to NCATE's Program Standards for Elementary Teacher Preparation (1999) candidates need to be evaluated by traditional assessment instruments and performance assessment instruments that are integral to instruction and aligned with the standards. Data generated can then be used to assist the individual candidate and to improve the teacher education program.

Traditionally, except for student teaching, assessment in education courses consists of tests, quizzes and research papers. Prospective teachers are now expected to implement multiple assessment measurements in their classrooms. In this paper, I share a performance assessment method, "the interview" used with pre-service teacher education candidates in Educational Foundations.

A good assessment instrument must be congruent with reality (Wiggins, 1993; McClelland,1973). Performance assessments are regarded as more realistic because they measure higher-order thinking skills rather than just accumulating knowledge (Tuchman, 1993) The pre-service teacher candidates in my class will be asked questions on the performance assessment measurement that are often asked at an interview for a teaching position. The interview performance assessment used in Educational Foundations meets many of the characteristics of an effective assessment instrument.

The following items adapted from Margaret Jorgansen, in Reflections of Learning (1992) indicate that an effective performance assessment instrument should: reflect ideal instructional practices; involve the teacher as participant-observer; require collaboration; allow investigation; are motivational; facilitate response preferences; allow multiple strategies; have multiple solutions; integrate knowledge and processes; have relevance; have topic currency; have an appropriate level of difficulty; are feasible; are cost effective and tap higher order thinking skills.

The interview process provides candidates with additional modalities to explain what they have learned (Gardner, 1991). Throughout the semester, candidates write papers on educational and philosophical issues, field experiences, critique journal articles, present oral reports and have traditional paper-and pencil midterm and final essay exams (Part II). The interview process included in the final exam (Part I) provides an opportunity for candidates to develop a plan of action when faced with a new situation. In this assessment measurement ,the interviewer poses a "what if...scenario" and the interviewee must respond with a plan of action. This is a change in the methodology of learning from memorization of content to the potential to apply and understand knowledge and it a characteristic of an effective performance assessment (Jorgansen, 1992)

The interview performance assessment exam was developed in response to several needs: new accreditation standards in teacher education programs requires that multiple methods of assessment be used (NCATE, 1999); to create a final exam congruent with current educational issues and strategies studied in the course; to determine whether knowledge of issues and strategies can be adapted to other situations; to create a venue for pre-service teacher candidates to demonstrate orally and visually their knowledge, skills and their impact on the learning of students in their future classroom; .to create a performance exam that engages pre-service teachers to reflect on realistic, significant problems faced in the classroom and to design innovative solutions; and to prepare pre-service teachers for an interview for a teaching position and to prepare for the video tape teaching performance assessment required for permanent certification.

The Model:

Educational Foundations, a study of major educational factors that impact on the schools is the first course in the program taken by pre-service teachers during their junior year. . The topics emphasized are social issues, school governance and finance, cultural diversity, diverse learners and learning styles, inclusion, curriculum and instruction, legal issues, global education and technology integration in the classroom. Classroom observations and attendance at a school board meeting are required. During the semester, pre-service teacher candidates are assessed using traditional and alternative assessments.

The interview questions on the performance assessment measure are congruent with the topics studied in the course. Pre-service teacher candidates are given the interview questions and the rubrics for an oral presentation seven to ten days before the scheduled exam. To prepare for this interview, candidates engage in inquiry and problem solving and then develop strategies for responses. Examples of questions posed are:

1. What if.....? (I create the scenario and then you plan how it would be resolved)
2. What are your weaknesses? (2) (Pick one weakness and explain how you would turn this around to work for you)
3. How would you handle discipline/ school violence/ conflict resolution in your classroom? (3 strategies)
4. What strategies (4) would you use to involve ESL students in your class?
5. Describe in detail a lesson that you observed indicating the objective(s), activities addressing different learning styles and evaluation.
6. What strategies (4) did you observe or would you use to teach respect for diversity?
7. Give examples (2) of how you would integrate technology into the curriculum.

The pre-service teachers are informed that they will be asked three questions and that they can select the fourth question. All pre-service teacher candidates are asked the "what if" question and needed to respond with an analysis of the situation and a solution. The researcher designs a variety of situations such as "What would you do if a student arrives late to class?" or "What would you do if the student did not partipate in discussions?" Candidates complete an evaluation form on the interview process. After the exam is completed, the tapes are duplicated and the pre-service teacher candidate receives the original tape which can then be used for reflection and self-evaluation along with the rubric.

In summary, the interview performance assessment measurement has been administered for two semesters. The classroom settings were very different for each semester. In the first semester, two separate classes received the interview assessment with the instructor present. In the second semester, the class was located in three distance learning rooms on three different campuses with three different people administering the exams. The instructor interacted with the candidates and sometimes asked additional questions. The other proctors did not interact with the candidates in this way. Most candidates performed very well although some were uncomfortable with being filmed. In conclusion, the interview performance assessment measurement needs to generate more data to be evaluated.

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Joanne Clemente: TechAmbassadors –Authentic Assessment of Teaching Abilities

"Few teachers (20%) report feeling well prepared to integrate educational technology into classroom instruction." Thus states a report by the Department of Education entitled, Teacher Quality: A Report on the Preparation and Qualifications of Public School Teachers. Additional study by the Milliken Exchange shows that "Most institutions report that IT is available in the K-12 classrooms where student teachers get their field experience; however, most student teachers do not routinely use technology during field experience and do not work under master teachers and supervisors who can advise them on IT use." It further concludes that, "the most important finding of the survey is that formal stand-alone IT coursework does not correlate well with scores on items dealing with technology skills and the ability to integrate IT into teaching." The report recommends:

- "Student teachers need more opportunities to apply IT during field experiences under qualified supervision"
- "In order to provide models for change, researchers, professional societies, and education agencies should-on an ongoing basis-identify, study and disseminate examples of effective technology integration that reflect the current needs in both teacher education and K-12 schools." (Moursund, 1998)

In addition, a 1997 NCATE task force on technology in teacher education report found that "teachers-in-training are provided instruction in 'computer literacy' and are shown examples of computer software, but they rarely are required to apply technology in their courses…"(NCATE, 1997.) Some schools such as Southwest Texas State University have initiated programs that require assessment of pre-service teachers in the use of technology in their field based experiences in public schools. The initiative I describe, the TechAmbassador program, is the first step toward providing such experiences in the undergraduate teacher training program at New York Institute of Technology.

The Model

This paper is a report from the field to describe the outcomes of a second semester of the TechAmbassador Project. In the first year of the project, pre-service teachers were placed in several P-12 school districts in partnership with in-service teachers for the purpose of technology integration in the partner's classroom. Pre-service teachers attended a class on the college campus entitled, "Curriculum Articulation and Multi-Media" for which 20 hours of field experience was required. The initiative was enthusiastically received and executed, and further development was a natural consequence. In the second iteration, it was decided to limit the placement of pre-service teachers to one school and to convene the undergraduate class at the school itself (field-based methods course). More control over the environment, more convenient supervision and a closer relationship with in-service teachers was anticipated. However, permission to relocate the undergraduate class was not received from the college in time for the beginning of the semester. Adjustments were then made to conduct the college class on campus, as usual, and allow each student to complete their field experience at the selected school at a time when both in-service and pre-service teachers were available for collaboration.

At the start of the semester, as the professor teaching the course, I introduced the project to in-service teachers at the elementary school and explained the collaborative process. Teachers were enthusiastic about receiving TechAmbassadors, and enrollment had to be limited. However, there were some underlying issues that both helped and hindered this pilot project throughout the study that bear mentioning. While the computer lab in this school was brand new, the computers and the Internet connection were not. They were ported from an old location in the school and not well tested with the installed software. This network set-up had not been used very much for the two previous years, since the district made the unpopular decision to eliminate the only "Tech Teacher" position. In retaliation, the teachers at this school had been boycotting the lab. The principal at this school was instrumental in convincing the teachers that this TechAmbassador initiative would provide assistance for teachers while allowing them to maintain their position to district administrators that a "Tech Teacher" was an essential component for technology integration. Putting pre-service teachers into this troubled situation to "teach with technology" and assist these teachers thus became more challenging than anticipated for all concerned. First, the in-service teachers had very high expectations. They believed that since our college was an Institute of Technology, our pre-service teachers would be technology "experts" and able to trouble-shoot any hardware/software problems that arose. Some in-service teachers even expected the pre-service teachers to take students into the lab weekly. While our students may have had more experience than most college students, they were still only "students" and as such, needed more training in pedagogy, technology integration and classroom management. The purpose of this initiative was to enable a partnership that would provide such training for both student and teacher. In the end, the pre-service teachers were indeed very proud of themselves. They had been placed in "real" situations, faced with political, technological and pedagogical challenges, and rose nicely to the occasion. This was not a sterile, "college classroom" environment; rather, it was a real world experience with real problems, curricula and students to reconcile.

Some students had a difficult time with this format. Two students stand out in particular. One of these started out enthusiastically, feeling overly confident in her abilities to manage a class and integrate technology. This student did not prove to have the follow-through to carry lessons to completion and finished with poor evaluations. On the other hand, a student who started his observations rather late in the semester was threatened with being dropped from the course. Not only did he rally and truly commit himself to deliver exemplary lessons, he later wrote in his research paper, "This was a wonderful experience for me and I learned so much about getting ready to teach a lesson. I can now see that teaching does not just end in the classroom. Some lessons take lots of prep work before it can be taught. This class really showed me that teaching is what I truly love, and I can't wait to one day have my own class." This student was later asked by the principal to submit a resume for a future position. Another student produced two exemplary lessons, using Internet research and cooperative learning groups. What distinguished her work was her ability to calm the teacher who became frazzled when the computers were not functioning properly and later, her ability to refocus her lesson within ten minutes when her partner teacher did not have the class learn the appropriate background material as previously promised. Some students and teachers worked so well together. One teacher, in particular, gave students curricular material with which to work. This material happened to have contained web site suggestions, upon which my TechAmbassador built a lesson. She writes, "Research is the key aspect in writing a lesson. If the research is off, the lesson has the opportunity to fall apart." Since this in-service teacher was being treated for cancer and was absent more than once a week, the two partners developed a reciprocal and mutually beneficial relationship. The TechAmbassador says in her paper, "She has such great rapport with the students, they respond, respect and listen to her with their ears and minds wide open. Being in her class, I have learned so much. Everything she does with the students, she explains to me, how and why she did what she did. Seeing her teach makes me even more eager than I already am to become a teacher. I hope I am half as good as she is and that I can inspire someone like she has inspired me."

Within the course, I attempted to follow a pre-determined protocol. First, the pre-service teachers were sent to observe teachers in their normal environments. Each TechAmbassador had a partner teacher and visited the classroom for a least one hour a week to observe, participate, or assist as deemed appropriate by the host teachers. As mentioned above, each partnership took on different characteristics and some flexibility was needed. Some students merely observed quietly, while others attempted to take classes into the lab at the teachers' requests. Each week, in the college classroom, these students would discuss their experiences, learn how to develop technology-enriched lessons, practice new technology skills and prepare their upcoming lessons. Two "delivered" lessons were required in this course; one at mid semester and the other at the end of the term. Each lesson needed to be discussed in class, researched, planned using the NTEQ format developed by Morrison and Lowther. Through observations, assisting, researching and practicing, pre-service teachers prepared throughout the semester for these two benchmark performances. The purpose of such planning was not only to deliver technology enriched curriculum-based lessons, but to provide the in-service teachers with two well-documented, turn-key lesson plans for later use. This collaboration not only served as professional development inside the classroom but it allowed pre-service teachers to be authentically assessed by college faculty as to their understanding of and competence in meeting curricular needs. So, in this project, instead of taking midterms or end terms, students (pre-service teachers) received performance assessments of the lessons delivered in "host" classrooms (lab).

A rubric was developed by students together with me, the professor, to evaluate the performance of their two technology-enriched lessons. These rubrics were then used by students for developing their lessons, self-evaluations and professor-evaluations. Grades were based on adherence to rubric criteria, taking into consideration any circumstances beyond the students' control, i.e. lab inconsistencies. Criteria for evaluation included preparedness, enthusiasm, content knowledge, use of technology, classroom management, attire, speaking and listening skills, grammar and clarity, teacher interaction, and the quality and thoroughness of the lesson plan. These are criteria expected of a true professional. The rubric allowed students to think of themselves and their planned lessons in the light of professional performance, in terms that ranged from speaking skills and attire to technological and pedagogical competence. Lessons delivered that exemplified the integration of technology included: map skills using the Internet for research and Kid Pix for re-creation of map highlights; continent study utilizing Hyperstudio to create a mulit-media slide show; document based questions (on the Internet) used to study Native American culture; and Point of View writing using an Internet-based scenario and the Student Writing Center.

Flexibility often became a hallmark of this initiative. Students were challenged by circumstances and sometimes even the most practiced lesson did not proceed precisely as planned due to network configuration problems. At mid-term time, I was willing to participate in the lesson, helping the TechAmbassador to deliver a lesson; at end-term time, however, I participated to a much lesser extent and was less lenient on evaluation. While my objective was to fairly evaluate my students' performances, as a professional, I believed it was also essential to prioritize P-12 student learning. Thus, if P-12 students needed assistance, I provided it within reasonable parameters. Most P-12 students were actively and consistently engaged in the technology enriched lessons and looked forward to their computer lab time.

Pre-service teachers were also asked to submit several papers throughout the semester. From the first day, I referred to them as colleagues, as teachers with responsibilities to me, their partner teacher and to the P-12 students. They were initiated into the teaching profession by having to lead a class discussion on an assigned book chapter. They were evaluated on their summary of the content as well as their development of open-ended discussion questions based on the chapter readings. I was encouraging them to take a leadership role. In addition, they were asked to document their observations in their partner teachers' classrooms, reviewing teaching styles, students' behaviors and curricular goals. A journal of their weekly experiences was also collected for evaluation. These are perhaps traditional evaluations by college course standards. What distinguished the measure of their true learning as teachers was the authentic assessment of their teaching ability. This was done through the use of the rubric to evaluate the technology-enriched mid-term and end-term lessons.

In summary, pre-service teachers were provided an opportunity to enter a real classroom setting and integrate technology into the curriculum through well prepared, researched and delivered lessons. They not only experienced students behaviors but teacher conflicts and technology lab inconsistencies. I don't believe I could have provided a more realistic setting for authentic assessment of their abilities.

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VYGOSKIAN VIEWPOINT:
TECHNOLOGY and CONSTRUCTIVISM

Dr. Mary Ann Coe   Dr. Michael Land
Dr. Robert Redmon   Dr. Stan Hartzler
Dr. Martha Burger   Dr. Bambi Bailey
West College of Education
Midwestern State University
Wichita Falls, Texas
maryann.coe@mwsu.edu

Abstract

Views about constructivism in the classroom are varied and at times misleading. Ideas about integrating technology in to the curriculum are also varied and at times misleading. The authors present a clearer vision of the use of constructivism in the English, Math, Science, and Social Studies classroom by meshing Vygotsky's ideas about constructivism with the use of technology as a tool for learning.

Technology and Constructivism

Views of constructivism in the classroom are varied and at times misleading. Ideas about integrating technology into the curriculum are also varied and at times misleading. A clearer vision of the use of constructivism in the classroom by meshing Vygotsky's ideas about constructivism with the use of technology as a tool for learning is needed.

There are various views of constructivism - including: trivial, radical, socio/ cultural, critical and constructionism. The aspects of socio/cultural constructivism as seen through the writings of Lev Vygotsky will be addressed in this paper. The authors believe that by studying constructivism from this viewpoint the reader will get a clear view of this one perspective as it relates to the use of technology across the curriculum. The authors have future plans to study and report on other views of constructivism in relation to the use of technology in the learning environment.

The ideas presented in this paper reflect the use of technology to "infomate" not "automate" the learning process, such as: concept mapping, problem-based learning (including webquests), asynchronous communication (including email, discussion boards, and collaborative writing), selected database and spreadsheet activities, desktop publishing opportunities, and the use of the internet. Ideas for integration of constructivist technological learning environments in the English, Math and Social Studies classroom will constitute the remainder of this paper. Examples of these ideas, as well as those for the Science classroom will be an integral part of the poster session.

The Social Studies Constructivist Classroom

A marriage of socio-cultural view of constructivism with technology opens up myriad opportunities for students to develop ideas and construct meaning through social interaction facilitated by technology. In the absence of such a theory of learning, teachers often rely solely on textbooks to provide information, which has been processed, for students. Students are not constructing the knowledge for themselves.

Technology-mediated learning, however, offers opportunities far beyond the classroom walls for communication, collaboration, research, and publishing. With the textbook and curriculum guide as resources, a teacher can facilitate the learning process, which might begin with exploration of a topic and end with creation of a product, perhaps a web site or Power Point presentation. In the process, students guide their own learning, working their way through various internet sites that afford opportunities for interaction with actual social scientists (i.e. Africaquest, Greecequest, etc.), on-line discussion, problem-solving situations, virtual tours of places throughout the world, access to on-line libraries and data-bases, and even competitions and quizzes. Three of the many web sites offering incredibly diverse on-line projects are www.classroom.com, www.execpc.com and www.cssjournal.com. With imagination and desire, a teacher can whet the learning appetite of students who have previously been fed only dry textbook food.

The Mathematics Constructivist Classroom

Opportunities exist in mathematics for young children to discover important mathematics ideas using technology, in the context of shared experiences and development of terminology. LOGO, the programming language for creating designs using geometric transformations, can be the medium by which elementary children discover these transformations and use them to create tessellations. Children can also explore combining two or more transformations of one variety that accomplish the work of one transformation of another variety. Such activity can be used later as a model for composition of functions. Students can be encouraged to name the different transformations and to attempt to identify and name the types of tessellations that can be created.

Opportunities exist for secondary mathematics students to discover how "parent" functions are affected by systematic modifications in values of x before substitution, and modifications in values of the function after substitution. Using a graphing calculator, students can discover systematic effects of these modifications, and can learn to describe and classify them using terminology not normally associated with mathematics. The process can be reversed, with each student posing a graph for other students in a small group, and other students attempting to describe the equation of the given graph, by first describing parent-function modifications with the agreed-on terminology.

The English/Language Arts Constructivist Classroom

Vocabulary development is a central objective in every language arts classroom, K-12. Traditionally, students read and listen to words and definitions selected and provided by their teachers.

In a social-constructivist classroom where the teacher has infused technology into the teaching and learning environment, students collectively identify words they consider important and relevant from within their own life experience. These words may emerge from a number of sources, such as live conversation, television (video), movies, video games, web sites, e-mail, and a variety of print media. Then students construct an understanding of each word's meaning and appropriate use beginning by discussing what they already know about the words and the context within which they have encountered the words before. Students then mediate their personal understanding of these words by investigating ways the words are used and defined by others. This often begins by comparing published definitions from a variety of sources, including electronic databases. Students then seek a broader understanding about how the words might be used. One approach to understanding how words are used outside the students' daily discourse is the "find" function found in most text readers and editors. Students participate in an ongoing collaborative negotiation of meaning, sharing and challenging each other's understanding of the words as they emerge and evolve. Students then demonstrate an understanding of the words in authentic contexts, both spoken and written. This demonstration may be facilitated by technology in the form of electronic presentation, word processing, communication, and publishing. Students learn not only vocabulary in this process. They concurrently negotiate the value and use of various information and communication technologies. Technology is made available as a resource (much like dictionaries, textbooks, and the chalk board) to be used by the students as they solve problems, seek information and understanding, and find ways to apply what they have learned in ways that are both personally and socially meaningful. Teachers in such a classroom act as coaches and guides — mediating disputes, giving approval, and establishing the social framework within which the learning occurs.

Lev Vygotsky forwarded the notion that higher mental functions (the way we understand things – all things) are mediated (modified, limited, or enabled) by language. Thus it behooves students to work to construct their learning in a socio-cultural environment. The authors believe that this environment needs to be infused with the use of technology as a tool to help construct that learning.

Examining the Value of Technology in Creating and Assessing Narrative Pedagogy in Teacher Education

Marvin Cohen, Bank Street College, US
Helen Freidus, Bank Street College of Education, US

Abstract

This panel presents a set of practices which can be described as "technology enhanced narrative pedagogy". The presentations explore the ways in which combining technology with narrative practices in teaching and teacher education has proven valuable in helping:

- preservice and inservice teachers to identify, share, and extend their understanding of teaching and learning
- teacher educators to evaluate their practice and develop increasingly effective ways of meeting the needs of diverse learners

The practices will be described in sufficient detail so that others can participate in judging their validity for educating both pre-service and in-service teachers, as well as for self-study.

The presentations thus address two important issues:

- ways in which to create effective "technology - enhanced narrative teaching practices" that are useful in teaching and teacher education
- ways in which to create forums in which such practices can be rigorously interrogated for their value as well as their validity in the professional education of teachers and the self-study of teacher educators

Educational Importance

The use of technology enhanced narrative practice provides many as yet untapped opportunities for the conduct of research that is deeply relevant to teaching and teacher education. It provides access to diverse contexts and insight into the ways in which teaching and teacher education is situated in these contexts(Putnam & Borko, 2000). In this way, it facilitates the sharing of experiences and development of common understanding.

Narrative teaching practices have advanced because of the careful scrutiny and self-study of practitioners. New technologies can support and document such scrutiny.
The technology enhanced practices documented by these presenters and the dialogue generated by the presentations will create new forums for understanding and defining effective practices in teaching and teacher education.

Format: Interactive Panel

This interactive panel will be comprised of a series of presentations by teacher educators in the fields of special education, early childhood and elementary education, bilingual education, educational leadership , and reading and literacy. These presentations will describe the process and outcomes of a project designed to foster increased us e of technology by and for teachers and teacher educators. Particular emphasis is paid to diverse uses of "technology enhanced narrative pedagogy" including: digital video case materials, e-mail journaling, web based discussion forums and digital portfolio. Each presentation will address a common set of questions:

- How did the use of technology facilitate the implementation of narrative research and/or narrative teaching?
- How did technology support the learning process of the teachers and teacher educators involved?
- What unexpected problems surfaced?

After a brief presentation by each participant, the discussion will be opened to the floor. The audience will be encouraged to comment on the practices described and/ or share their own experiences. Dialogue will focus on the validity and usefulness of technology enhanced narrative practice in teacher education and professional development

Presentations

Increasing the Use of Technology in Teaching and Teacher Education

Our programs in teacher education and leadership have been working since 1997 to integrate new technologies and pedagogy in ways that prepare teachers to work in diverse and inclusive classrooms. To do this, teacher educators, themselves, needed to become more comfortable with the possibilities technology offered for extending teaching and learning. With support from private funders (Project EXPERT) and the federal government (Project DEEP), a program of technology based professional development for teacher educators was developed. Approximately 85% of our faculty now use new technologies in their work at the college, and 35 of our teacher education courses have had their syllabi, assignments and readings infused with technology-rich resources.

While this work has been very successful it has not been without significant resistance.
In this presentation, we will examine to what degree faculty participation in the projects has nurtured interest, overcome resistance, and led to achievement of both individual goals and projects goals .Data collected from peer review discussions, observations, and final project reports suggest that 2 factors have been central to the project's success:

- A carefully constructed cultural match - The identification of relevant connections between the uses of technology enhanced pedagogy and the institution's core values
- The role of the outside evaluators. - "Critical friends" who helped shape the project by listening to and questioning both project leaders and project participants.

Using Digital Video as a Tool for Advising and Rethinking the Teacher/Adviser (Supervisor)/Researcher Relationship

This paper presents a year-long study in which nine teachers from West Harlem in New York City were videotaped as part of a federally funded grant designed to prepare general education teachers serve the needs of English Language Learners. Digital video was used as a tool to help teachers narrate and reflect on their practices. In this presentation, we ask the question: Is technology-enhanced narrative pedagogy a feasible tool for stimulating teacher growth?

E-Journaling: Examining Intensity and Efficacy in Advisement (Supervision)Relationships

The reflective journal - sometimes expanded to "dialogue journal" - is a time-honored practice of educators who value student voice and increased student-teacher interaction. This presentation will report on how Journaling through e-mail has significantly altered the nature of many of those interactions. The ease and immediacy of narrative reporting - and response - bring the potential of far greater intensity and efficacy to the dialogues -- and the possibility of substantial distortion as well.

Web Based Discussion Groups: A New Lens for Examining Practice

This presentation will focus on the experience of one teacher educator as she engaged in a two year process of learning to use web-based discussion groups in graduate courses and staff development. Particular attention will be paid to the impact of this experience on the teaching of a graduate course in child development. Information that surfaced from the discussion groups led to changes in the content and structure of course assignments.

Digital Portfolio: Teachers and Teacher Educators Learning Together

This presentation reports on the collaboration of a teacher educator and a educational technologist in advising a graduate student in the process of constructing a digital portfolio that narrates her understanding of and competency in teacher education. Particular attention is paid to the ways in which each participant learned from the others throughout the process.

The many drafts of artifacts and captions replete with comments that led to the construction of the portfolio which can be viewed at
http://www.edc.org/CCT/BSC/work-bin/jsuesse/pmap.htm provide a rich data source.

Evaluators as "Critical Friends": Identifying and Supporting Promising Practices

This presentation will identify the ways in which the role of "Outside Evaluator" informed both the practice of those being evaluated and that of the evaluator herself. By extending the dialogue around the "narrative teaching practices", both insiders and outsiders were able to raise questions of the value and validity that surround these practices. These questions include:

- Are these technology enhanced narrative practices congruent with philosophy and practices across the institution?
- In what ways does the presence or absence of congruence impact
on the value of the practice?
- What implications does the congruence have for replicating these practices in diverse contexts?

The Teaching Observatory Concept: Embedding Zones of Interactive Technology into Teacher Education & Research Programmes

Do Coyle, Centre for Research into Second and Foreign Language Pedagogy, School of Education,
University of Nottingham, UK. Email: do.coyle@nottingham.ac.uk

Abstract

This short paper presents research in progress into the concept of a Teaching Observatory (TO) currently linking two sites but soon to expand to a national network. The TO set out to create a flexible multi-modal and multi-purpose interactive training tool for a post-graduate teacher education course (PGCE). The university site and sites in 'beacon' secondary schools are linked via a 6 ISDN large screen video facility with pan/zoom cameras and interactive whiteboards. Funded through the national Training School Initiative (DfES 2000), the TO project initially aimed to explore how an interactive training tool might be used effectively to enhance learning and teaching at different levels. It was soon evident that the TO offered many more inter-connected opportunities for pre- and in-service education and research than had originally been conceived. Set within a sociocultural framework, this case study explores and evaluates how different strands (zones) of the research can be woven together to inform the dynamic of an emerging TO concept.

Introduction to and uses of the Teaching Observatory

The TO concept had its origins in a pragmatic need for over 60 trainee teachers specialising in immersion/bilingual education (geography, history and science through French/German) and modern languages (especially German, Japanese and Russian) to have school-based experiences which could not be provided within the locality of the university of Nottingham, UK. It also intended to involve trainees in statutory ICT applications through the authentic use of technologies to enhance their own training experiences and thus prepare them well for incorporating a range of new technologies into their future teaching repertoire. In the initial phase of the project the university site, along with a beacon secondary school with a *section bilingue* near London, were equipped according to defined specifications (in consultation with Promethean, UK). During the initial experimental phase of the project, the TO has been/is being used for non-intrusive lesson observations in real time of expert teachers in their classes by large groups of trainee teachers; individual remote support by tutors and observations of lessons taught by trainees during their teaching practice; sharing interactive whiteboard applications between the two sites eg trainees creating electronic teaching materials; trainees experimenting with and teaching lessons to school students at a distance; interactions with learners and teachers by the trainees to discuss lessons and issues; teachers participating in mentor training via the TO; meetings between teachers, tutors and technicians; observation and research into *strategic* classrooms focussing on a target class of French learners and a similar class for German; using video recorded lessons to create training materials; observation and analysis of the use of the TO by a team of researchers investigating Fitness-for-Purpose for the Information Society Technologies Programme Eye-to-Eye project; exploring the use of *activote* machines by students to encourage the development of thinking skills as well as experimenting with interactive whiteboards to enhance literacy awareness.

Adopting a theoretical framework for investigating the Teaching Observatory

In order to classify and organise the different uses of the TO into a coherent research context, a sociocultural framework was adopted. Sociocultural theory supports a context-based communicative perspective on learning and teaching which foregrounds two crucial elements: learning though communication and the need for scaffolded environments to assist in co-constructing and negotiating meaning (McLoughlin & Oliver 1998). For technology to encourage and support interaction – a concept central to the TO - then building on the notion of collaborative learning and co-constructed understanding elevates the zone of proximal development (ZPD) to a pivotal position (Vygotsky 1978). The ZPD suggests that learning (through, with and from the TO) is a co-ordinated activity with all participants (expert and novice) responsible for solving problems. However, in this context it could also be argued that in some TO activities all participants are relatively novice since the TO constantly presents them with situations and problems never previously encountered. In other TO activity the roles of expert and novice are more clearly defined. The multifaceted nature of the TO therefore suggests that there are several sub-zones or strands which interrelate and interact to co-construct a cohesive ZPD. Common to all strands is the TO technology and its evaluation in terms of possibilities and limitations as a tool as well as a contributor to the scaffolded collaborative context it helps create. The strands are identified as follows: strand 1 - trainees and trainer/tutors; strand 2 – trainees and teachers in school; strand 3 – teachers and trainer/tutors; strand 4 – trainees and students in school; strand 5 – researchers and trainer/tutors; strand 6 – technicians/technology suppliers and trainer/tutors. The concept of the TO is thus being researched through the six component strands of its ZPD.

Case studies: researching six ZPD strands in the Teaching Observatory

The complexity of different strands and ensuing research demands lends the current work to a case study approach (Cohen, Manion & Morrison 2000). The table sets out parameters of the case study research:

Strand	Activity/Interaction in ZPD	Case Study Focus: Use of Technology in....	Data Collection Methods
1: Trainees/ Trainers	Observations lessons by tutor of trainee teaching face to face Creating lesson plans and materials	Effectiveness of lesson observation at a distance including pre and post lesson discussion/analysis Creating and evaluating electronic resources	Video recordings/ Analysis Tutor field notes/diary Trainee focus groups
2. Trainees/ Teachers	Observations of expert lessons, post-lesson discussion Trainees teaching at a distance	Developing observation, analytical and reflective skills Awareness raising of skills needed to be effective 'distance' teacher Evaluating the distance teaching experience	Video recordings/ Analysis/ Field notes Trainee Focus groups Collating/evaluating materials
3. Teachers/ Trainers	Systematic lesson Observations investigate teaching strategies	Enabling systematic non-instrusive observ Creating protocols for lesson observations Identifying effective teacher strategies Feedback to teachers to affect praxis	Cycle of observations Video recordings to create analysis/feedback & training materials
4. Trainees/ Students	Email communication	Fostering mutual mentoring/buddies Target exchange of emails	Target groups trainees/ students & questionnaires
5. Researchers/ Trainers	Observation & evaluation of TO use	Evaluating fitness for purpose Evaluating the tool	Video recordings Meetings/Reflection Ref i2i project
6. Trainers/ technologists	Technological development/support	Monitoring/evaluating whiteboard Enhancing targetted sound (for group /pair work) and use of activote	Field notes/ virtual meetings/training sessions/ reports

Interim reflections

The data collected so far is rich and complex – it touches on a variety of paradigms and methods. Whilst it is too early to publish outcomes, results thus far indicate that different uses of the TO will meet with differing degrees of success (Crook 1994, Hearnshaw 2000). All those involved are inextricably engaged in learning and reflection in the ZPD, since the nature of the work has provided all players with new experiences including the highs of innovation and the lows of frustration or disappointment. What is certain is that the TO is opening up complex new ways of re-conceptualising teacher education by extending its potential ZPD through the use of technology which supports quality interaction and collaborative learning (Jacobs & Rodgers 1997, Laurillard 1993).

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Views From Within an Online Learning Environment: Perceptions and Practices in a Teacher Education Course

Dorothy Valcarcel Craig, EdD
Department of Educational Leadership
Middle Tennessee State University
Murfreesboro TN
United States
dvcraig@mtsu.edu

Abstract: This paper presents findings of a study conducted on a graduate level Teacher Education course. Perceptions and practices within an online environment were explored and examined. Using a framework focusing on issues and trends in public education, graduate students engaged in online dialog, action research, and teleresearch. Findings indicate that the patterns of online use and teleresearch among participants encouraged the same practices in the K-12 environment and provided a model for technology use for teachers and students.

Introduction

Due to the demands of a dynamic, digital-savvy student body, the average teacher employed by a U.S. school system in many cases is required to infuse technology into classroom instruction. The average teacher educator typically is not required to take advantage of available technology. This can be somewhat attributed to the concept of academic freedom and in part to the fact that—although working within the teacher preparation environment—many university professors view the process of teaching and learning much differently than the K-12 teacher. Therefore in many cases unless the teacher educator is technology-oriented and forward thinking, technology is not fully utilized in typical classroom sessions. Jackson (1995) suggests that this is due to the fact that many university professors conceive of teaching as a well-organized syllabus supported by clear, logical, teacher-directed presentations. Educators at any level must remember, however, that teaching has value only if it promotes student learning. This learning must include conceptual growth, working collaboratively, and communicating. In addition, the main focus of teaching and learning must shift from content presentation to a combined, dynamic focus of how students approach learning, multiple styles of delivery, and ongoing inquiry (Jackson and Prosser, 1989; Ramsden, 1992).

Just as public school teachers must become conscious of: a) the technologically-literate student body, b) the intricate process of teaching and learning, c) the diverse learning needs of students, and d) multiple methods of delivery, the university professor preparing future teachers must also consider these factors when designing learning experiences. In the forward to The National Educational Technology Standards for Teachers (NETS, ISTE, 2000), the authors state that the educational system in the United States must produce technology capable kids—those who can live, learn, and work successfully in an increasingly complex and information-rich society. To do this, all educators must themselves be:

1. Capable information technology users,
2. Information seekers, analyzers, and evaluators,
3. Problem solvers and decision makers,
4. Creative and effective users of productivity tools,
5. Communicators, collaborators, publishers, and producers, and
6. Informed, responsible, and contributing citizens.

The NETS (2000) publication suggests that certain conditions must be present in order for the goals to be met. Included in the general preparation of teachers, university leaders must share a vision for technology use in all appropriate preservice and content courses. They must have access to current technologies—including software and telecommunications networks. Teacher education faculty members must engage in interactive sessions with colleagues to discuss, model, and design appropriate uses for technology. Last, teacher educators must incorporate student-centered approaches to learning and assessment. While technology is rapidly opening up more and more possibilities for students entering the education profession, little research has been conducted on the benefits of online learning and the development and effectiveness of the online university environment. Examining the work of Papert (1996) and Tapscott (1998) regarding technology utilization within the K-12 environment, prior research generates several questions regarding online learning within the teacher preparation environment such as: a) would the learning styles and preferences enrolled in a graduate level teacher education course be met via an online version of the course, b) would the environment invite and nurture in-depth discussion and inquiry typically part of an education issues course, c) would K-12 classroom technology experience assist with completing course assignments and requirements, and d) would technological literacy—if any—gained from the experience assist the classroom teacher as well as the future teacher in better utilizing the resources and technology for their own students' inquiry and learning experiences?

Project Description and Methodology

The study utilized these initial questions to examine, document, and provide a thick and dense description of how graduate students—both licensed teachers and future teachers—operated within an inquiry-based, technology-infused online learning environment via a course designed and offered using the CourseInfo online development program. Using a qualitative approach outlined by Bogdan and Biklen (1992), the researcher became a participant observer in conducting eight case studies consisting of students enrolled in a core education course and who were seeking either state licensure and/or the Masters of Education degree in Curriculum and Instruction. The self-selected sample represented those teaching in rural, urban, and suburban environments, those who were substitute teachers in local public schools, and those who were not yet teaching in a professional education environment. Each individual student completed inquiry-based readings and assignments, engaged in online discussions with each other, and conducted action research at local public schools by utilizing the components available through CourseInfo. These components included: a) Announcements Board, b) Course Documents which included handouts, articles, and online resources, c) Assignments Board, d) Online Discussion Board, e) Student Tools which included email links, online grade access and Student Drop Box, and f) External Links—additional Internet links to supplement textbook reading assignments.

Data sets were collected through student products; coded virtual field notes gleaned from student email, student-generated questions regarding selected topics in education, and asynchronous online discussion board postings; results and finding s from individual action research projects; research papers; and online course evaluation forms. The researcher engaged in prolonged engagement over a one-semester period during a spring semester. In addition to data collected by the researcher, the CourseInfo package provided additional information by way of generated reports to chart frequency of use, number of accesses per day/time/hour, and frequency and number of responses to Discussion Board topics. The study was driven by the following questions, which provided a framework for data collection in addition to providing the researcher with a set of overarching inquiry themes:

1. Would levels of technological literacy hinder or assist students in completing assignments, participating in asynchronous discussions, accessing documents, utilizing Internet resources, and exchanging products with the instructor and with each other and would these levels become evident in the patterns of student use and preferences that may emerge throughout the study?
2. Will inquiry-based action research assignments and requirements assist students in making connections between course content, relevant education issues, technology utilization, and their own immediate or future classroom teaching?
3. Would the online environment provided by CourseInfo compliment course content while providing an alternative learning environment for students and how will the findings from the study impact future course development and current practices in teacher preparation?

4. How will participation in the online course and technological literacy gained from the experience impact and assist the classroom teacher as well as the future teacher in utilizing resources and technology for their own students' inquiry and learning experiences?

Findings and Conclusions

Egon Guba (1978) describes qualitative research as a "discovery-oriented" process that minimizes investigator manipulation of data and setting and which places no prior constraints on what the outcomes of the research will be. This description became evident on the first of two on-site meetings held for orientation purposes in order to acquaint participants with CourseInfo online software and its components. It was during the first on-site meeting that participants expressed a strong desire to explore the online learning environment as an alternative to typical on-site graduate education, seminar-based courses. At the beginning of the semester, a total of ten students were registered for the course. The ten enrollees attended the first orientation meeting. However, after approximately one hour, two of the original ten decided that they did not possess a level of technological literacy they felt would be required to complete assignments. Ultimately, the two participants dropped the course opting to take it during a semester when it would be offered in a traditional manner. This focus on technological literacy and prior "computer-based" experience continued throughout the study and was often a source of participant-to-participant discussion.

In an attempt to offer insights into the milieu, general findings are presented in the chronological order in which they occurred. Data collection began at the initial orientation meeting where participants completed a demographic survey. This information enabled the researcher to begin building a "participant profile" of each student enrolled in the course. Data gleaned from the survey provided a brief explanation of where the participant was employed, what type of school system—if any—each taught in, years of experience, available technology, and the approximate physical distance from campus that participants would be working from (Table 1).

Table 1. Overview of Student Participants—Participant Profiles

Participant	Current Occupation	Yrs. Exp.	Technology	Distance
1 – CL Male	Middle School Teacher Social Studies/Suburban	3	PC/WIN 95	35 miles
2 – LA Female	High School Teacher Biology/Rural	2	PC/WIN 98	67 miles
3 – ST Female	Elementary School Teacher Grade 1/Urban	6	PC/WIN 98	45 miles
4 – JU Female	High School Teacher Geography/Suburban	27	PC/WIN 95	70 miles
5 – GI Female	Middle School Teacher Math/Suburban	9	PC/WIN 95	7 miles
6 – GL Female	Substitute Teacher K-12/Rural	0	PC/WIN 95	80 miles
7 – JA Male	Substitute Teacher K-12/Rural	0	PC/WIN 95	78 miles
8 – JE Female	Graduate Student	0	MAC	5 miles

In addition to the demographic survey, sample products were gathered on a weekly basis. Assignments, informational handouts, related readings, Internet resources, and themes for discussion were posted each Tuesday and were due on the following Tuesday. Assignments consisted of approximately three to four research-related mini papers, bi-monthly action research projects, reflections of weekly readings, and Discussion Board postings. Discussion Board postings were checked by the researcher on a daily basis. Participant postings and responses were printed and coded. Results from all action research projects were printed, copied, and summarized. Themes corresponded to weekly readings and enabled participants to further explore topics and exchange multiple perspectives with each other. Each participant selected an education issue to explore throughout the course of the semester. Three assignments related to the theme were due on the last day of the semester. The assignments consisted of: a) research paper, b) presentation of findings, and c) annotated bibliography. Study participants completed a summative Online Course Evaluation, which focused on their perceptions of the online learning environment, course content and assignments, and instructor-as-mediator effectiveness. Evaluation responses were examined, analyzed, and summarized. To further substantiate findings, reports were generated using CourseInfo Course Statistics to chart user preferences, frequency, and total number of accesses per participant and per component.

As participants worked through course assignments, it became evident that several of the education issues and themes were of high importance while others were of little or no importance. For example, Discussion Board postings focusing on equity and/or disparity in public school funding across the state as well as the nation ranked as most important with a total of 83 postings—including initial and follow-up responses. Throughout this particular discussion, participants referenced current problems that they were personally facing with regard to funding as well as the funding issue currently in debate within the state. Online discussion focusing on school integration issues was of equal importance to students. Participant #3, who at the time was employed by a large urban school system, related what was happening with school integration, problems with the magnet program, and school bussing issues which further provided a relevant description of urban problems to those participants teaching in rural areas. The experiences brought to the online Discussion Board assisted in connecting the reading assignments to current problems in public schools. The board postings also provided a non-threatening open-ended arena for exploration. Figure 1 provides an example of discussion.

Current Forum: Integration Issues
Author: Participant #3
Subject: Task 4.1

I teach a self-contained class of 20 first graders.
African Americans = 19 students
African American/White = 1
Females = 12
Males = 8

The racial population of my class is typical of the rest of the school. I have more females in my class than many of the other classes. My school has been rezoned as of this year. I don't anticipate any changes in our population unless we are given the needed funds to enhance our school as a Design Center and attract a more diverse group of students. The students are still bussed, but results remain the same.

Current Forum: Integration Issues – Response to Questions
Author: Participant #6
Subject: Re: Task 4.1

Dear Participant #3,
How much rezoning can take place when the white population of Metro is so small? There aren't enough white students to go around. The only solution to integration is to integrate the entire student population of Davidson County. Is integration the answer to the learning problems of students in Metro? Or must Metro look into other ways to improve the education of inner-city students? It might be the case that separate but equal will become the norm again. However, this "equal" will mean equal learning opportunities, but separate in inner-city schools.

Figure 1: Example of Discussion Board Dialog

Responses gathered from the summative evaluation indicate that all participants viewed web-related teleresearch assignments as most relevant and significantly useful. In addition, utilization of additional materials— web-related documents posted in Course Documents and online articles— were perceived as significantly useful in completeing future graduate courses. Although the action research projects were cited as the assignments that assisted in connecting the content with real-world education issues, only five of the eight participants cited these projects as most useful to them in their current teaching situation. The five who cited the projects as most useful were already teaching in a public school.

The study offered students an opportunity to experience an alternative to typical on-site teacher education courses. The online learning environment matched course content, action research, and Internet utilization while empowering teachers and future teachers to take charge of their own learning via self-pacing and preferences. Referring back to the overarching questions, the level of technological literacy that each participant possessed at the onset of the project seemed to provide the self-confidence needed to successfully complete the course. Based on responses, the inquiry-based design of the course matched with the online components assisted students in making a connection between textbook material, classroom experiences, and relevant issues currently of importance to public school educators. Although products, postings, and related assignments indicate that participants displayed a broad knowledge-base regarding issues relevant to education, it seems as though the design of the assignments and the nature of the action research process provided a means for increasing this depth. Responses from on-site as well as individual email inquiries to the instructor reveal that the inquiry-based nature of the assignments broadened knowledge and that the online environment provided a scaffold for increasing this knowledge. As participants accessed their assignments from their own classrooms, the process acted as a catalyst for public school students' discussions regarding online learning. The success of the online course prompted a further investigation of other courses contained in the departmental Masters' programs as possible courses for online development.

If educators must meet the needs of their digital-savvy students in the K-12 classroom setting, they must be able to utilize technology in a meaningful, relevant manner. The challenge of training and nurturing highly qualified, technologically literate teachers falls on the shoulders of teacher educators. If they do not embrace the challenge, the education system will continue to fall short in meeting the needs of a dynamic student body. By incorporating inquiry-based tasks, ongoing discussion and dialog, teleresearch, and classroom action research into the online learning environment, the teacher educator can create an enriching alternative to typical coursework.

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The Design of a Supportive Faculty Development Model: The Integration of Technology Within the University Faculty's Teacher Candidate Coursework

Caroline M. Crawford
University of Houston-Clear Lake
United States of America
crawford@cl.uh.edu

Abstract: The desire to integrate technology within the PreK-12 educational environment is a noble endeavor and may lead to the enhancement of student achievement. Teacher candidates are constantly striving to understand the learning environment and to meet these expectations, but do not have models from which they may glean appropriate knowledge, conceptual and instructional frameworking. The integration of instructional technology within the methods coursework aids the teacher candidates through a model of appropriate technology integration within a classroom environment, as well as further enhances their own achievement.

Introduction

The integration of technology within a learning environment, especially significant within a methods course for teacher candidates, emphasizes the significance of a student-centered focus. However, many methods university faculty have not had the opportunity to research the integration of technology at any significant length. This session offers methods faculty the opportunity to work with an instructional technologist who specializes in the integration of technology within a learning environment, to discuss and analyze significant elements associated with the integration of technology within a learning environment, and to critically consider the beginnings of a technology integration action plan for teacher candidate methods courses.

Information Versus Instruction

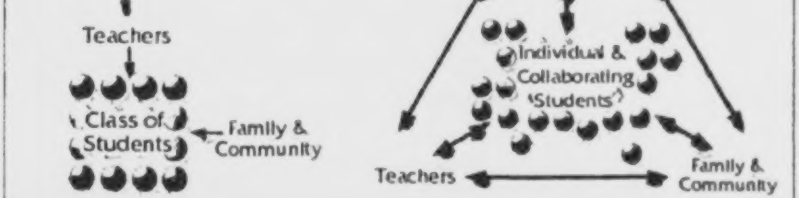
Information is a term referenced when discussing the knowledge communicated or received concerning a particular fact or situation; however, instruction is a term referenced when discussing the particular, deliberate composition of learning situation and environment that have been specifically formulated to support the realization of the learning objective or goal. Through this clearly delineated formulation towards the support of instruction is the opportunity towards the integration of instructional technology as a tool towards this instructional accomplishment.

Instructional Technology: A Definition

Instructional technology has been defined numerous ways, but the final delineation of instructional technology is towards the successful support of the learning goals for each delineated lesson. The Association for Educational Communications and Technology (AECT) has adopted the following definition of instructional technology: "Instructional Technology is the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning" (Seels & Richey, 1994). Through consideration of this definition, a clear understanding of the roles and processes pertaining to instructional technology can and may appropriately occur within an educational environment.

Teacher-Centered Versus Learner-Centered Learning Environments

Models of instruction are important elements towards a clear understanding of the philosophical and conceptual theoretical underpinnings within the learning environment. For this reason two main emphases, related to the structure of the learning environment and the information interrelated to such an arrangement is situated within such an environment, are noted; the teacher-centered model of instruction and the student-centered model of instruction. Below is a graphic clearly delineating the two significant models of instruction.



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As both models of instruction are imperative towards successful learning environments, the significant shift between the two is of a philosophical nature. Instructional technology is an important element within both learning environments, as the interactive element of the technology may be integrated in a teacher-centered or a student-centered situation.

Levels of World Wide Web Integration

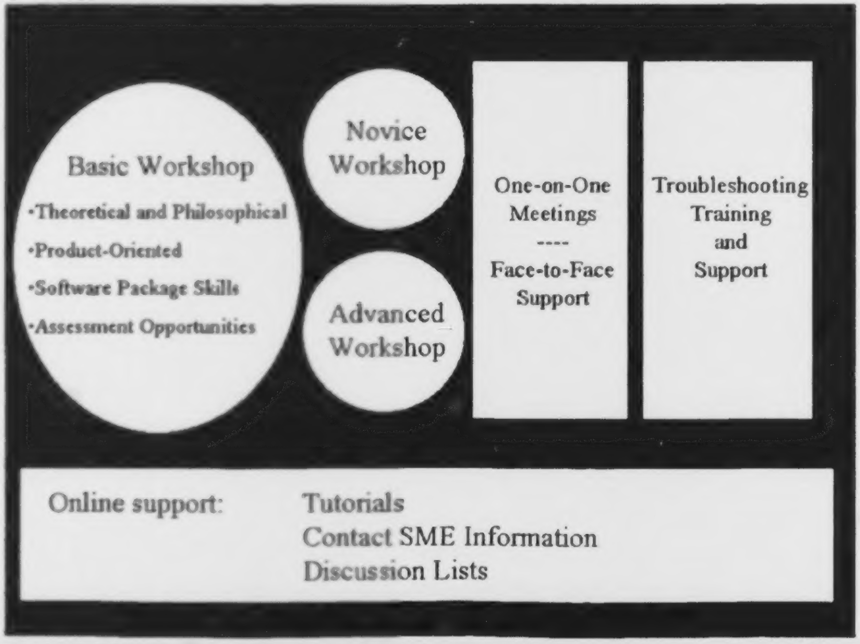
As the World Wide Web (Web) becomes a more important element towards the creation and manipulation of learning environments, it follows that the Web will be integrated into the learning environment at numerous levels. Following are ten levels of Web integration:

Level 1 Marketing/Syllabi via the Web
Level 2 Student Exploration of Web Resources
Level 3 Student Generated Resources Published on Web
Level 4 Course Resources on Web
Level 5 Substantive and Graded Web Activities
Level 6 Electronic Conferencing Course Activities Extending Beyond Class
Level 7 Repurpose Web Resources
Level 8 Web as an Alternative Delivery System for Resident Students
Level 9 Entire Course on the Web for Students Located Anywhere
Level 10 Course Fits Within Larger Programmatic Web Initiative
(Bonk, Cummings, Hara, Fischler & Lee, 2001)

Each level delineates the level of integration of Web resources, which in turn impacts the learning environment and the model of instruction implemented within the learning environment.

Professional Development Opportunities Model

An appropriate model towards the appropriate and successful implementation of professional development opportunities for university faculty must be delineated so as to support the university faculty's efforts towards the integration of instructional technology into the university coursework. Further, teacher candidates must have instructional technology appropriately modeled for them within their methods courses so as to develop a conceptual framework of understanding within specific specialization areas. As such, the following model for professional development opportunities is offered.


Basic Workshop
•Theoretical and Philosophical
•Product-Oriented
•Software Package Skills
•Assessment Opportunities
Novice Workshop
Advanced Workshop
One-on-One Meetings

Face-to-Face Support
Troubleshooting Training and Support
Online support:
Tutorials
Contact SME Information
Discussion Lists

Each professional development opportunity follows the model graphically delineated above. An introductory, basic workshop is offered to university faculty that is based upon a specific subject. Once the attendees have attended the basic workshop, then they have the option to attend a novice workshop that is actually the basic workshop in a smaller group setting, or an advanced workshop that delves further into the subject matter from the basic workshop opportunity. Additional support is necessary through one-on-one, face-to-face support meetings, as well as hardware and software troubleshooting training and support. While each of the professional development opportunities are occurring there is a level of online support that should remain an undercurrent, consistently available to the university faculty, that consists of tutorials, subject matter experts that are available for support and information, as well as discussion lists wherein the university faculty can discuss issues from the professional development opportunities and to develop a sense of community. That the university faculty are not, in fact, alone trying to integrate the instructional technology into their courses. Additionally, the online support further enables the conceptual framework development of the university faculty.

Learning Environment Interactive Activities

As university faculty delve further into the integration of instructional technology within the teacher candidate coursework, there are specific aspects that must be considered within the learning environments. The following interactive activities are important within any learning environment, whether it be face-to-face, Web-enhanced or Web-based:

- Learner – Content
- Learner – Interface
- Learner – Instructor
- Learner – Learner
- Learner – Self
- Learner – Community
- Instructor – Community
- Instructor – Content
- Instructor – Interface
- Instructor – Self

Each of the interactive activities should be carefully considered through out the instructional design of the coursework and appropriately integrated so as to ensure the successful and appropriate attainment of the course, as well as unit, objectives.

Faculty Resistance

University faculty have time-honored traditions associated with their instructional practices and there is the possibility that faculty may not find the technological innovations to be appropriate within their course learning environment. However, there is the possibility that university faculty may find it an uncomfortable proposition to consider the introduction of instructional technology into their coursework's instructional design. Fear factors are apparent and real for numerous persons who have the opportunity to integrate technology into their instruction. For example, the following factors may have an impact upon the integration of instructional technology. The fears associated with:

- change
- time commitment
- appearing incompetent
- inadequate instructional technology knowledge base
- technological lingo
- technological failure
- not knowing where to begin
- having to move backward to go forward
- reprisals (Rutherford & Grana, 1995)

are real and clear for numerous university faculty. These can not be overemphasized and must be carefully and delicately managed so as to ensure the university faculty will consider further implementation of instructional technology into the teacher candidate's methods coursework.

Faculty Implementation Barriers

As is well known, opportunities towards professional development opportunities have at least a few implementation barriers. Following are a few university faculty implementation barriers that offer obstacles for consideration.

- Specialization more important than technology
- Lack of knowledge and support personnel
    - Hardware
    - Software
- Time commitment
- Difficulty maintaining subject matter currency
- Technology integration viewed as risky
- Frustration surrounding technology use (Roberts & Ferris, 1994)

Each of these implementation barriers should be considered before professional development opportunities are offered, as the significant impact each aspect offers can not be overemphasized.

Reward Faculty Efforts

Rewarding university faculty efforts towards the integration of instructional technology into the teacher candidate methods coursework so as to model the appropriate and successful implementation of instructional technology into the specialization areas takes time and effort on the part of the faculty. Therefore, consideration towards faculty efforts and reward structures may be appropriate. Following are some areas of consideration:

- Displays of Admiration for Innovative Efforts
- Time Drain Compensation
- Positive Tenure Review Impact
- Incentive Programs
    - Interest
    - Motivation
- Financial Support
    - Hardware
    - Software
    - Course Buy-Out

The element of time is an important aspect for all university faculty due to the teaching, research and service triad of obligation and interest for each university faculty member. There are four main groups of university faculty who must be addressed through out the integration of instructional technology into the university coursework venture. The groups of faculty to address are:

- Early Innovators
- Cautious Innovators
- Hangers-On
- Negative Nay Sayers

Acknowledgement of the university faculty member's efforts also impacts not only the faculty implementing the instructional technology efforts within the methods coursework, but also the university faculty who are carefully considering the time and efforts towards integrating instructional technology into their courses. Positive efforts should be admired and rewarded at every opportunity.

Conclusion

The design, development and implementation of a supportive faculty development model is of utmost importance to the teacher candidates graduating from each teacher preparation unit. The integration of technology within the university faculty's teacher candidate coursework should be carefully considered and implemented with a clear understanding of goals and expected outcomes over a series of supportive professional development opportunities. The longitudinal study of university faculty progress is of utmost importance towards the further understanding and consideration of instructional technology, its integration and implementation within the teacher candidate's plan of study.

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Integrating computer technology into classroom learning: A comparative study of the perceptions of prospective principals and teacher credential candidates

Brenda Czech
School of Education
National University
United States
bczech@nu.edu

Valerie Amber
School of Education
National University
United States
vamber@nu.edu

Robert Scharf
School of Education
National University
United States
rscharf@nu.edu

Abstract: Both teachers and principals act as critical decision-makers as to whether or not computer technology is implemented in classroom learning. Yet, there is a limited amount of literature that examines, concurrently, teachers' and principals' frequency of use and confidence levels for a given productivity software, as well as their expectations for the integration of that software into classroom learning. This pilot study is an initial attempt to focus upon the above criteria to sketch a baseline profile for both teacher credential candidates and prospective principals to delineate the following: 1) to the extent that frequency of use of a given productivity software influences personal confidence level when using that software, 2) to the extent that a teacher's personal confidence level influences the probability that a given productivity software will be utilized in classroom learning, and 3) to the extent that a principal's personal confidence level influences a professional expectation of teachers to use a given productivity software in classroom instruction.

Using TrackStar to create standards-based modules

Anne Daugherty, University of Kansas, US
James Daugherty, University of Kansas, US

Dimensions of electronic learning for enhancing choral music rehearsals and choral music education courses include web-based rehearsal notes and links, web forms, electronic portfolio assessment, audio and video files, discussion boards, and electronic collaboration.

For the past three years, (fall 1999, 2000, and 2001) pre-service teachers in a choral music methods class at the University of Kansas engaged in a project designed to ascertain the feasibility of teaching teachers to develop electronic learning resources. A particular focus of the project was to design electronic learning experiences in conjunction with the National Standards for Music Education and specific examples of choral literature suitable for school choral ensembles. Specifically, the project sought to gauge the effectiveness of using models or templates that could readily be adapted for use with various real-life contexts and objectives.

In total, six fifty-minute class periods were devoted to the project, including brainstorming ideas, constructing the modules, and sharing the finished products. In 2001, "TrackStar" was used for the first time. Developed by HPR-TEC, TrackStar is a tool that assists users to create a "track," a composite work based on other people's original online creations. Benefits of using TrackStar include its ease of use--users can create a track in approximately 20 minutes. The design of TrackStar is such that users can access the material online, or via a convenient printable format. Further, TrackStar includes an automated link-checker that periodically checks Track links and e-mails authors with a list of broken links.

The purpose of the current project, then, is to evaluate the benefits of using a pre-programmed tool to assist students in developing their standards-based modules to ascertain if the tool further aids students to feel comfortable with designing their web-based work.

Integrating Technology into the Study of Teaching and Learning

Heather A. Davis, PhD., Department of Educational Psychology
Gail Ring, & Richard E. Ferdig, PhD., Department of Educational Technology
1422 Norman Hall, Box 117047, University of Florida, Gainesville, FL 32611
(352)-392-0723 (x 241), hdavis@coe.ufl.edu

Introduction:

In a report released September 1998, the US Department of Education reported, "Only one in five teachers… felt 'very well' prepared to work in a modern classroom. Specifically only about 20% said they were confident using modern technology or in working with students from diverse background." The focus of this study was to attempt to integrate technology into the study of Human Learning and Development. Data were collected across three semesters and at three separate university settings. As part of their course in Learning and Development, students explored the application of learning developmental theories to assessment of students' cognitive, social, emotional, and motivational needs as well as individual differences in learning. Furthermore, throughout the course pre-service teachers had opportunities to practice evaluating and developing instructional methods and materials to meet the group and individual needs of their students. The purpose of this paper is to describe attempts by the first author to:

1) Integrate technology-based instructional strategies into a pre-service teacher education course on educational psychology and child development,
2) To explore from a psychological perspective students' resistance to change in attitudes and behaviors toward technology,
3) To describe the impact of integrating technology, specifically on-line dialogue, on pre-service teachers' beliefs about technology, their interest and engagement in the course, and their mastery of course material.

It is important to note that my[1] experience and knowledge of *how* to integrate educational technology is limited to my understanding of potential social and cognitive factors that may underlie technology use (Eagley & Chaikin, 1993; Pintrich & Schunk, 1996; Guzzetti & Hynd, 1998). As a researcher of motivation and social relationships in the classroom, I have often observed teachers using videos, computers in their classroom, or computer lab-time as motivational rewards. Held over students like a carrots, teachers would grant or deny access to technology in order to encourage different social and intellectual behaviors in the classroom. As with most reward structures, students responded to the reinforcement but with certain costs to their motivation to learn and their relationship with their teacher (Kohn, 1993; Pintrich & Schunk, 1996). In my own classroom, I hoped to provide my pre-service teaching students with an alternative model for how to used technology in their classrooms. Specifically, I incorporated media into instructional presentations, utilized computer resources to increase access to course information and to design presentation tools, and integrated journaling activities with the electronic bulletin board (WEBCT) hoping to create an extended dialogue about and critique of the material. From a pedagogical perspective, I was the most interested in the on-line dialogue because I believed it would provide students with opportunities to engage in the co-construction of knowledge about learning and development.

Preliminary Findings:

As we suspected, students who became actively engaged in the on-line dialogue, posting and reading frequently, tended to report increased interest and knowledge of educational psychology, increased mastery of concepts, and tended to exhibit higher performance on the test. If you consider the frequency of reading and posting a reflection of students' engagement in the on-line dialogue, we found students who attended class regularly were the most engaged in the on-line dialogue. Furthermore, students who frequently read their classmates' submissions were more likely to continue to be engaged throughout the end of the semester. In additional~~ly~~, we found frequent reading at the midterm was the best predictor of students' final examination grade and final grade in the course. What is interesting is that students' frequency of posting on-line did not predict performance on either exam. Regarding students' perceptions of the WEBCT at the midterm and end of semester, we found students' who perceived the WEBCT as helpful were more likely to report increased interest in the course, increased knowledge of educational psychology, and were more likely to be engaged in the online dialogue (both reading and posting). Furthermore, students who actively read their classmates' ideas, were more likely to report increased interest in the course and increased knowledge about the material. Lastly, students who frequently posted and read items on the WEBCT reported the activity helped them to master concepts in the class.[2] To our disappointment, however, analysis of students' self-evaluations revealed students who held negative views of technology (low efficacy, low value) resisted becoming engaged in the dialogue more than was "required." Additionally, while many students saw "value" to the activity conducted on-line (journals), they did not see the value of the communication and co-

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[1] "I" refers to the first author.

[2] Correlations were statistically significant and in the moderate ($r_{(66)} \equiv .30-.35$) range.

construction of knowledge that occurred as a result of public discourse, nor did engagement with technology shape their views about effective means of teaching and learning.

Discussion:

These findings parallel those of Shallert, Reed, Dodson, Benton, Boardman, Amador, Coward, and Beth, (2001) as well as Burniske & Monke (2001). Across both programs of research, findings suggest the implementation of technology (e.g. using an on-line dialogue) is not enough to encourage meaningful engagement with and integration of technology in the classroom. Likewise, findings suggest students exhibit resistance towards change in their beliefs about and usage of technology. Findings across the Shallert et al. (2001), Burniske and Monke (2001), and my own data led us to ask: What factors shape psychological engagement in technology (Ferdig & Weiland, under review)? How can we get students to become invested, or committed to technologies used in the classroom that encourage public discourse (e.g. on-line discussions, electronic portfolios) (Burniske & Monke, 2001; Pintrich & Schunk, 2001)? How do we encourage lasting change in beliefs about the use, utility, and value of technology for the teaching and learning (Eagley & Chaikin, 1993; Guzzetti & Hynd, 1998)? The purpose of this paper will be to synthesize data across three semesters of technology implementation in a pre-service teacher-education course, to look across findings and examine sources of students' "resistance" to become engaged in on-line dialogue from a psychological perspective, and to describe the impact of technology implementation on pre-service teachers' achievement, engagement, and mastery of course material.

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Using Computer Based Modules to Prepare Pre-service Teachers for Future Learning in the School Classroom

Chrystal Dean, Lori Tyler, and Paul Cobb
Mathematics Education
Vanderbilt University
United States
chrystal.dean@vanderbilt.edu

Abstract: In the context of computer based modular design, we are currently investigating ways to bridge the gap between the university and the school classroom for pre-service elementary teachers. We have developed two authentic web-based cases in which pre-service teachers can investigate the process of supporting students' learning of significant mathematical ideas. In this paper we report on the results from our first pilot of the web-based modules in a master's level advanced teaching of elementary mathematics methodology course.

Mathematics methods courses should do more than try to inform future teachers about content and pedagogy. As teacher educators, we have a responsibility to prepare pre-service teachers for a career of future learning as classroom teachers. In the context of computer based modular design (Brophy, 2000), we are currently investigating ways to bridge this gap between the university and the school classroom.

In order to support the development of our students' identities as teachers whose focus is on the challenges they will encounter in school classrooms rather than as university students whose primary concern is to achieve adequate grades, we delineated four overarching goals for our pre-service elementary mathematics methods course. The first of these goals is that pre-service teachers will learn to make pedagogical decisions that are justified by focusing on students' thinking. In other words, students' reasoning should be at the center of teachers' decision making. The second goal is for the pre-service teachers to reconceptualize content of the elementary mathematics curriculum in terms of relationships between quantities. This goal is important as the future teachers have developed the belief that mathematics consists of rules for manipulating symbols as a consequence of their own experiences as students in school and in university mathematics courses. In contrast, we want them to come to view numbers not as mere symbols but as measures of an amount of some quantity. The third goal is for the pre-service teachers to both appreciate the importance of and learn to use coherent curricula composed of long-term instructional sequences that aim at significant mathematical ideas. The fourth goal is for the pre-service teachers to perceive teaching as a knowledge generating activity where they adapt, test, and refine instructional ideas and innovations that have been developed by others and have proven effective elsewhere. We attempt to achieve these goals by using what might be termed an emergent approach to teacher education (cf. Gravemeijer et al., 2000). In this approach, we develop conjectures about the pre-service teachers' interpretations, arguments, and strategies when we design instructional activities with the intention of building on their contributions to achieve the goals of the course.

The technological tools we have developed to support the future teachers' learning consist of two authentic web-based cases in which they can investigate the process of supporting students' learning of significant mathematical ideas. These modules each comprise a series of challenges for future teachers to explore. The *Patterning and Partitioning* module focuses on an instructional sequence that was taught in a first grade classroom over a five-week period and includes video-recordings of classroom episodes and of pre- and post-interviews conducted with the students. The goal of instruction in these lessons was to enable the students to develop a relatively deep understanding of elementary number concepts, with an emphasis on relationships between numbers up to 20. The second module, *Investigations in Teaching Geometry*, covers a three-day instructional sequence taught in a fifth grade classroom that focuses on informal explorations of volume. The challenges in this module allow future teachers to investigate both the various ways in which the fifth graders interpreted and solved the problems posed, and the role of the teacher in supporting and guiding her students' mathematical development. In the course, we coordinated the use of these modules with message board discussions (Bringelson and Carey, 2000). The use of the message board allowed the students to continue discussions initiated in class sessions as well as to debate new ideas that emerged.

The design of these modules is founded on a "challenge based" learning environment (Bransford, Brown, and Cocking, 1999; Brophy, 2000; Schwarz, Brophy, Lin, and Bransford, 1999; Schwartz, Lin, Brophy, and Bransford, 1999). Brophy (2000) defines modules as the combination of challenges and learning activities.

> A course using modular design divides up its content into learning activities that target specific concepts germane to that domain. Based on cognitive research, one effective instructional method is to anchor specific domain content around challenges that exemplify the utility of that content. The challenges will be the entry point into a series of learning activities designed to help students explore the concepts related to that challenge (p. 2).

Each of the modules begins with a brief overview to give the future teachers an idea of the mathematical topic being addressed together with background information about the students and the instructional setting. In the first challenge, we ask the pre-service teachers to identify essential aspects of the mathematical concepts being addressed and to speculate about what they think students will already know and what they can learn about the concept. By asking the pre-service teachers to make their thinking explicit, we gain insight into their suppositions and assumptions about learning and teaching is this particular content area. In addition, the pre-service teachers' initial thoughts serve as a benchmark that can support reflection and self-assessment (Schwartz, Brophy, Lin, & Bransford, 1999). Against this background, the pre-service teachers then tackle challenges based on short video-clips taken from classroom episodes or student interviews. In the *Patterns and Partitioning* module, for example, they compare representative excerpts from pre- and post-interviews of the same children. As the shift in the students' thinking is quite significant, they are intrigued about what brought about this change. This interest serves to motivate their engagement in the major challenge of the module in which they work in groups to investigate different aspects of the classroom during the five weeks of instruction. These aspects include mathematical tasks, classroom discourse, the role of mathematical tools, classroom norms, students' thinking, planning for instruction, and role of the teacher. For each aspect, the students have access to resources to support their investigation, assess their progress, and publish their final analysis online. Each group also presents its findings during a class session as preparation for the final challenge of the module in which the future teachers step back to investigate how the various aspects of the classroom that they have investigated relate to each other. In this challenge, the papers that they have published serve as the primary resource.

We have recently finished our first pilot of the web-based modules in a master's level advanced teaching of elementary mathematics methodology course. Overall, the feedback that we received from the future teachers in the form of surveys, message board postings, and class discussions has been positive and informative. Many of the future teachers indicated that they were initially skeptical about the value of the message board but came to appreciate this additional forum for discussion. After the completion of each module, the future teachers completed a survey to help us improve the modules and message board. The surveys asked the future teachers to focus on the modules as a means of supporting their learning and included the following questions:

1. As you have completed the challenges and engaged in the associated discussions on the message board, what are the most important things you have learned?
2. What problems and issues relating to the teaching of mathematics became important to you as you completed the challenges?
3. How could the Patterning and Partitioning/Investigations in Teaching Geometry module or the way that it was used in this class be improved?
4. To what extent did you find either set of modules to be repetitious after completing each? (This question was included on the second questionnaire.)

The issues that emerged from the surveys, message board discussions, and in-class feedback were relatively consistent. The future teachers commented that they were able to gain a relatively cohesive sense of how to sequence instructional activities. Equally importantly, they reported developing an appreciation for the importance of conceptualizing content in terms of quantities and their relationships, how to understand, assess, and support students' learning, being able to recognize in action the contrast between instrumental and relational understanding, and simply, making mathematics meaningful for all students. The following two observations are representative of the general thrust of the future teachers' comments:

> "The most value [to me] was the concrete set of lesson sequences which we went through in the class. Most of my other teaching and learning classes seemed to have glossed over the actual content and methods of teaching. This class gave me a good understanding of how to understand and teach numeracy, place value, geometry, and fractions." (J.D.)

> "The modules [specifically, geometry] provided a model teacher who was able to learn what students were thinking by asking the simple question, why? She explored the rationale behind both correct and incorrect answers, which helped her know their understandings, and sent a message to the students that everyone's thoughts were valued, not just students' right answers. Through asking about student thinking, the teacher also discovered that students took alternative paths to the right answer. As the teacher gained a better understanding of the students' thinking, she was then able to tailor her future instruction." (E.M.)

The future teachers also commented on the usefulness of the message board to continue discussions that would otherwise have been curtailed due to the time constraints of class sessions. As we have noted, the message board was used not only to continue in-class discussions, but also as a location for posting initial thoughts and assignments within the modules. The future teachers indicated that they felt comfortable communicating with fellow students on the message board. In addition, they appreciated knowing that their peers were dealing with similar issues as this made it easier for them to verbalize their thoughts about topics and concerns that arose from in-class discussions, readings, and assignments. It would therefore appear that the platform of the message board was relatively unobtrusive in allowing the future teachers to pose questions and receive constructive comments from one another between class sessions. These exchanges were also valuable to us in that they enabled us to develop insights regarding the future teachers' understandings as we monitored our progress in achieving the goals we had established for the course. We were able to document the extent to which they were developing an increased awareness of a teacher's ongoing decision making, ways of adjusting lessons, and the diversity of students' thinking and the process of their learning. Chat room facilities were included with the message board, but the future teachers did not take advantage of this opportunity. However, several commented that they wished the instructors had encouraged them to use this resource for communicating with each other more strongly.

The feedback we received about ways to improve the modules and how they could be used in future courses was substantial and constructive. A number of the students commented on the technical difficulties that they encountered, especially when attempting to access the modules from off campus locations. This was due to the limited bandwidth that some of them used to access the large amount of video included as a resource on each module. We made efforts to eliminate such technical problems during the course by providing each future teacher a CD ROM of each module so that they could view the video without accessing the website.

In addition to commenting on these technical difficulties, a significant number of future teachers indicated that they would have increased both the frequency and length of in-class discussions of their responses to the challenges. This suggests that the supplemental message board discussions were not, by themselves, adequate. Several of the future teachers also made observations about what they regarded as the limited range of video available as a resource. They wanted additional video-clips that captured the students' and teacher's perspectives on classroom events, as well as more examples of students' activity in the classroom. In regards to the last survey question that asked them about repetition between the two modules, the future teachers stated that they felt that several topics of discussion did overlap and that the major challenges in the two modules should be adjusted accordingly. The majority of the future teachers also volunteered that they had experienced difficulties in writing a group paper. However, from our perspective, this group challenge is justified with the reality of writing and publishing in any field, especially teaching. The future teachers' feedback therefore indicates that we need to consider developing additional resources to support collaborative writing.

Finally, several of the future teachers suggested reversing the order of the modules. We introduced *Patterning and Partitioning* before *Investigations in Teaching Geometry* due to grade level considerations. However, the future teachers said that both the shorter length of the instructional sequence covered in *Geometry* module and its mathematical content would have made their introduction to the use of modules and to instruction that focuses on students' thinking easier.

As is the case in any innovation or design change, we have developed conjectures about ways to improve or adjust the sequencing of instructional activities. As we reflect upon the course and revisit both the nature of the instructional activities and their sequencing, we have many changes to consider. As a consequence of using the modules, we found it impossible to focus on the specifics of teaching in as many mathematical contact areas as when we have previously taught the course. However, this limitation is, in our judgment, more than counterbalanced by a number of positive developments that we observed earlier in the semester than in previous iterations of the course. In particular, the students seemed to approach the activities in the course as future teachers rather than university students far earlier than we had witnessed previously. In addition, they moved quickly beyond the discovery/direct teaching dichotomy and developed a shared agenda that involved a strong sense of themselves as change agents. Our students, or rather, our future teachers, also appeared to develop an initial understanding of the subtleties and complexities of teaching mathematics early in the semester as they completed challenges in the *Patterns and Partitioning* module. This, in turn, led to an awareness that they needed to deepen their own mathematical understanding if they were to be effective teachers. These emerging interests and motivations enabled us to focus explicitly on important aspects of our instructional agenda as teacher educators relatively early in the course. As a consequence of using the modular web-based cases, we were therefore able to address more specific goals and objectives of the course in greater depth than had previously been the case.

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Preservice Teachers and Multimedia Design: A Portfolio of Projects

Thomas A. Drazdowski, Ph.D.
Director, Teacher Technology Center
King's College
United States
tadrazdo@kings.edu

Abstract: This paper will review the evolution of our "Multimedia Design" course for preservice teachers since its beginning in the Spring of 1996 and will highlight some of the 300 plus multimedia projects developed by our students to date for use in their clinical experiences, in particular their student teaching practicum. Attendees of this session will receive a CD-ROM of sample multimedia projects.

"It was the best of times, it was the worst of times." I think the author may have been describing life as a technology professor in a preservice teacher education program. My initial experiences with trying to integrate technology into a teaching curriculum dates back to the early 80's (Drazdowski, 1985) when I was the seventh grade language arts teacher on a middle school teaching team in Juneau, Alaska. Although the technology has evolved dramatically since the days of the old Apple IIe, the concept of infusing technology throughout the curriculum is still very pertinent to teacher education programs today. It has now been five years since the education division at my college began the metamorphosis of its traditional "Methods of Instructional Design" to a course in "Multimedia Design" (Drazdowski, 1997). What a strange, fine trip it's been. It has certainly made coming to work each day exciting, unpredictable, and for the most part fun for the instructor and students alike.

Although the education division continues to face many of the same barriers to implementing technology that are often cited in many national reports (CEO Forum, 1999; Milken Exchange, 1999), the division continues to make successful strides forwards. Students are using our portable wireless laptop lab of iBooks to create iMovies of public service announcements in their "Foundations of Education" course (Dills & Ayre, 2001), to create concept maps using Inspiration software in "Educational Psychology," and to investigate websites and webquests in their math and science methods courses. Electronic portfolios are on the near horizon. All education majors are also required to take a "Computer Applications for Educators" course that is closely aligned with NCATE and ISTE (2000) technology standards for beginning teachers. And students in the "Multimedia Design" course have designed and created some 300 multimedia projects for use in their various clinical experiences.

Below is a brief summary of some lessons learned through our technology efforts over the past decade: a.) a combination of required technology courses and infusion of technology throughout the entire teacher education curriculum is most effective (Duran, 2001); b.) sustained administrative support for experimentation and vision is critical (Mehlinger & Powers. 2001); c.) risk takers and change agents among the faculty are needed (Strudler, 1991); d.)effectively using technology in specific courses and throughout the curriculum gives professors the opportunity to model concepts from constructivism (Jonassen, Peck, & Wilson, 1999; Sprague & Dede, 1999; Ferguson, 2001), problem-based learning (Boud & Feletti, (1991; Lieux, 1996), and collaborative and cooperative learning; e.)students need access to technology in their field settings and need to be placed with technology using cooperating teachers; f.) your students will always make you look good.

The multimedia projects created to date are as varied, complex, and creative as the students themselves. Since early childhood, elementary education, secondary education, and special education majors are all required to take the "Multimedia Design" course as part of their "Professional Semester," the topics can range from healthy teeth to Hamlet, from the ABC's to American literature, from a simple addition game to geometry theorems, or from parts of a plant to genetic crosses. As students present their various projects to the class each semester, lesson "f" is continually reinforced: "Your students will always make you look good!"

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Using Electronic Models to Increase Preservice Teachers' Ideas and Confidence for Technology Integration

Peggy A. Ertmer
Department of Curriculum and Instruction
Purdue University
United States
pertmer@purdue.edu

Judy Lewandowski
Center for Educational Research in Information Assurance and Security
Purdue University
United States
judyl@purdue.edu

Abstract: Given the difficulty involved in trying to arrange successful classroom technology experiences for preservice teachers, his study was designed to examine whether electronic models of exemplary technology-using teachers, presented via CD-ROM, could provide a viable alternative for developing ideas about, and self-efficacy for, technology integration. Sixty-nine students enrolled in a one-credit technology course completed demographic and online survey instruments before and after interacting with a CD-ROM that featured six teachers' classroom technology beliefs and practices. Results suggest that electronic models can significantly increase preservice teachers' ideas about and self-efficacy for technology integration. Furthermore, students' found the examples of teachers included on the CD-ROM to be both realistic and relevant. Implications are discussed as well as suggestions for future research.

Theoretical Framework

New teachers today, despite possessing adequate technical skills and a strong desire to use computers in their classrooms, still report not feeling well prepared to teach with technology (NCES, 2000). Clearly, the growing increase in teachers' technical skills is insufficient to guarantee the effective use of technology in the classroom. In order to translate skills into practice, teachers need specific ideas about how to use these skills to achieve meaningful learning outcomes. While today's teachers are expected to leverage the full potential of powerful conceptual technology tools to meet the changing needs of their students, they have been given few, if any, opportunities to develop their own visions for, or ideas about, meaningful technology use. As Dexter, Anderson, and Becker (1999) explained, "For teachers to implement any new instructional strategy, they must acquire new knowledge about it and then weave this together with the demands of the curriculum, classroom management, and existing instructional skills" (p. 223). Teachers need information about *how*, as well as *why*, to use technology in meaningful ways. Lack of knowledge regarding either element can significantly decrease the potential impact that these powerful resources might have on student learning.

Yet even the best ideas about technology use will go unused unless teachers believe that they are capable of implementing them in the classroom. In particular, teachers' beliefs about their *ability to use computers* in instruction may be key, given the role self-efficacy is proposed to play in determining behavior. Self-efficacy refers to personal beliefs about one's capability to learn or perform actions at designated levels (Bandura, 1997). According to Bandura, "beliefs of personal efficacy constitute the key factor of human agency" (p. 3). Thus, teachers who have high levels of efficacy for teaching with technology are more likely to participate more eagerly, expend more effort, and persist longer on technology tasks than teachers with low levels of efficacy.

Researchers in the area of self-efficacy describe four primary sources of information that can influence judgments of efficacy: personal mastery (successful task completion), vicarious experiences (observing models), social persuasion ("I know you can do this!"), and physiological indicators (emotional arousal, relaxation). Next to personal mastery, vicarious experience provides the most valid information for assessing efficacy (Schunk, 2000). According to Olivier and Shapiro (1993), "vicarious experiences with the computer increase one's feelings of control and confidence" (p. 83). Given the logistical difficulties involved in providing preservice teachers with enactive experiences related to successful technology integration, teacher educators have turned to modeling as a feasible, yet powerful, method for increasing teachers' ideas about and self-efficacy for technology integration (Schrum, 1999). Not only can models provide information about *how* to enact meaningful technology use but they can increase observers' confidence for generating the same behaviors (Schunk, 2000).

Many factors have been shown to influence observers' responses to models including the prestige and competence of the models, consequences experienced by the models, perceived similarity of the models to the learners, as well as learners' own self-efficacy for performing the behaviors (Schunk, 2000). However, research has yet to establish whether models, presented electronically, can be used to achieve results similar to those achieved with live models. Will learners perceive themselves as similar to models that are presented electronically? Will they regard the models as both realistic and relevant? Given the increasing potential to present models of exemplary technology use via multimedia technologies, it is important to determine the extent to which pre- and inservice teachers can benefit from observing these types of electronic models.

Purpose of the Study

This study was designed to examine the effects of electronic models on preservice teachers' perceived ideas about, and self-efficacy for, technology integration. Specifically, exemplary technology-using teachers were presented via a CD-ROM teacher development tool, called VisionQuest (VQ). VisionQuest features the classroom practices of six k-12 teachers and is designed to support users' reflections on both the underlying beliefs and classroom strategies that enable exemplary technology use. Given the few opportunities preservice teachers have to observe exemplary technology use in actual classrooms during student teaching or observation sessions (Vannatta & Reinhart, 1999), VisionQuest was developed to provide these opportunities. Specifically, the research questions were:

- What effect does observing exemplary technology-using teachers, presented electronically, have on preservice teachers' perceptions of ideas about technology integration?
- What effect does observing exemplary technology-using teachers, presented electronically, have on preservice teachers' perceptions of self-efficacy for technology integration?
- What are students' perceptions of the use of electronic models for learning about technology integration?

Research Design

A pretest-posttest research design was used to examine increases in preservice teachers' ideas about, and self-efficacy for, technology integration following two 50-minute class sessions in which students used VisionQuest. Of the 103 students enrolled in six sections of an undergraduate educational technology course, 69 students signed a consent form and completed all three data collection measures needed for the study. Participants ranged in age from 18-34 years ($x = 20$). The majority of the students were female (65%), sophomores or juniors (71%), and majoring in Elementary Education (60%). When asked to rate current levels of computer skills, 75% of the students rated their skills at an intermediate level while 9% rated themselves as beginners; 16% rated themselves as advanced. None of the students rated themselves as novice users.

Methods

Demographic information was collected during the first class session of the semester. During weeks 10 and 11, as part of their normal class activities, all students worked with VisionQuest, completing two different tasks.

During the tenth week, students evaluated VisionQuest as an example of professional development software. Students focused on content the following week when they used VisionQuest as a modeling tool to examine the beliefs and classroom practices of the teachers included on the CD-ROM. Students were asked to describe how the different teachers prepared their classrooms for technology use, how they used various grouping strategies to manage their rooms, how they managed classroom "chaos," and so on.

At the beginning of the tenth class session, prior to evaluating VQ, students completed an online survey designed to collect three types of information. First, information was collected regarding students' computer ownership, current use, and perceptions of skills and comfort using computers (e.g., "I enjoy working with computers." "When using computers, I can deal with most difficulties I encounter."). Eight items comprised this initial section. The second section included seven items regarding students' *ideas* for technology use (e.g., "I have ideas about how to use one computer effectively during large group instruction."). Items were presented in a Likert-style format; students were asked to rate their level of agreement (from 1-strongly disagree to 5-strongly agree) with statements related to the possession of specific ideas regarding technology use. The third section used the same seven items but with an emphasis on the possession of *confidence* rather than ideas (e.g., "I am confident I can use one computer effectively during large group instruction."). Students used the same rating scale to record their levels of confidence. Students' responses to the online surveys, prior to using VQ, comprised pretest measures of students' perceived ideas about, and self-efficacy for, technology integration.

At the end of the eleventh class session, after students had explored the ideas presented by the models on VQ, students completed the second and third parts of the online survey again. These measurements served as posttest indices of students' perceived ideas about, and self-efficacy for technology integration. In addition, four items were included to explore students' perceptions of using VQ as a modeling tool (e.g., "I can relate to the examples of teachers shown in VQ." "I can relate to the examples of technology shown in VQ.").

During both class sessions in which students interacted with VQ, one or two researchers were in attendance, making observations of students' engagement with the software. Observations provided evidence of the "holding" quality of the software and also provided useful information for the selection of interviewees. Students were purposefully selected for interviews (one or two per section) based on noted levels of interest, with an attempt to choose one highly- and one less-engaged student from each section. Interviews were scheduled at a time convenient to each participant and were audiotaped and transcribed by the interviewer. Interviews focused on identifying specific ideas (about classroom organization, assessment practices, etc.) that students gained from VisionQuest and the extent to which they thought they would use these ideas in their classrooms. We were particularly interested in knowing whether students regarded the VQ models as "real" and whether they believed that they had learned from them, just as they might learn from live models.

Results and Discussion

Students' Perceptions of Ideas and Self-Efficacy for Technology Integration

A two-tailed paired t-test ($df = 68$) indicated a significant increase in students' ratings of perceived ideas about technology integration ($t = 8.85$; $p < .0000$) from pre- to post survey. A two-tailed paired t-test ($df = 68$) also indicated a significant increase in students' ratings of perceived self-efficacy for technology integration ($t = 3.46$; $p < .000$) from pre to post survey.

Based on a critical r value ($df = 66$) of .35 ($p = .0005$), correlations among demographic characteristics and pre- and post- ideas and self-efficacy indicated no significant relationships among age, gender, or year in school (freshman, sophomore, etc.) and ratings of computer skills, ideas, or self-efficacy. Although one might expect advanced college students (e.g., juniors and seniors) to have more skills, ideas, or confidence, this was not the case here. Furthermore, there were no significant relationships between gender and any variables examined in this study.

Significant correlations were found between students' perceptions of their ideas for technology integration, before and after using VisionQuest ($r = .61$); similarly students' perceptions of self-efficacy for technology integration ($r = .50$) were significantly correlated before and after using VisionQuest. Additionally, perceptions of ideas and perceptions of confidence were significantly correlated. Students who began with greater perceptions of ideas, also tended to have higher levels of confidence ($r = .72$). This relationship was even stronger at the time of the posttest ($r = .84$). That is, the more ideas students had about technology integration, the stronger their beliefs that they can be successful integrating technology into the classroom. As ideas increased, so, too, did confidence for implementing the ideas.

Interestingly, judgments of computer competency (skills) were not highly correlated with either ideas or confidence for technology integration. This supports earlier research findings (Yildirim, 2000) that suggest that simple skills training is insufficient to prepare students to use technology in the classroom. In fact, students' perceptions of the direct usefulness of their skills may have decreased after seeing how the teachers on VisionQuest were not dependent on high skill levels, although this conjecture requires further examination. Furthermore, skill competency did not seem to translate into confidence for achieving integration either pre- or post-VQ ($r = .18$ and $.26$ respectively). Just because students know how to use word-processing, email, and the Internet, does not mean that they know how to use these skills within classroom instruction or that they are confident trying to do so.

Based on the correlations obtained, providing preservice teachers with specific integration ideas (e.g., how to organize a classroom that uses technology, how to assess student technology products) via electronic observations of technology-using teachers may be more effective than skills training for increasing their self-efficacy for technology integration. Furthermore, by increasing future teachers' self-efficacy, we increase the probability that these behaviors will be implemented in their future classrooms. According to Olivier and Shapiro (1993), "Self-efficacy has been shown to be an excellent predictor of behavior. Individuals with a low sense of self-efficacy will, more often than not, shy away from the best alternative, and, instead, choose an alternative that they believe they can handle" (p. 84). Even when practicum and student teachers possess "positive dispositions towards computer use," they often lack confidence in their ability to teach successfully with computers (Albion, 1999). This lack of confidence for teaching with computers has been shown to influence the levels of computer use by student and beginning teachers.

Students Perceptions' of Learning from Electronic Models

Interviews with 10 students, as well as data obtained through four post-survey items and two software evaluation questions, were used to answer our research question regarding students' perceptions of using electronic models to learn about technology integration. Interviewees were representative of the students enrolled in the class; interviewees included both male and female students who ranged in age from 18-34 years and in skill levels from beginner to advanced.

Two questions on the software evaluation form asked students to rate the relevance of the activities and models observed on VQ. On a scale from 1 (strongly disagree) to 5 (strongly agree), students agreed to strongly agreed that "activities regarding the use of technology were realistic" (mean = 4.46) and that "the video cases of teacher interviews and class activities were relevant" (mean = 4.31). Four similar questions included on the post survey averaged a 3.96 rating indicating that students' perceived the VQ models to be both realistic and relevant.

Although students had suggestions for improving the software (particularly in terms of navigation, which was unfinished at the time), interview comments were overwhelmingly positive. Students viewed the models as realistic, indicating that they felt as though they were in the classrooms with the teachers. Students described the "life-like" quality of the videos and how they felt that the teachers were talking directly to them (S: I felt like they were talking to me as a teacher and not as a student). As an example, one student stated:

> I liked it. I liked how I got involved when it showed you (the clips) and you felt like you were right there in the classroom with the students watching them. It's like you're in a movie theater almost because they have such good (videos)... and it shows the students and it shows the teachers – and you feel like you're right there in it.

Based on these results it appears as though students both enjoyed and benefited from observing the electronic models provided on VisionQuest. Interview comments suggest that preservice teachers perceived that the use of electronic models was a positive approach that provided "life-like" learning experiences.

Educational Implications

Data from this study support our hypotheses that electronic models can be used to increase preservice teachers' ideas about and self-efficacy for technology integration. Even though students used VisionQuest for a relatively short period of time over the course of two class sessions (approximately 90 minutes total) and were unable to explore the entire content of the CD-ROM, students showed significant increases in both their perceived ideas about and self-efficacy for technology integration. Interview and software evaluation comments indicated that students found the models to be both realistic and relevant. Students described a number of specific ideas that they gained from the models and furthermore, described their intent to apply these ideas within their future classrooms.

Students' pre- and post- ratings of their ideas and confidence were not significantly correlated with their judgments of skill levels, suggesting that computer skill competency does not translate directly into ideas or confidence for classroom technology use. However, there were significant correlations between students' perceived ideas and confidence, especially at the time of the posttest suggesting that as students see new ways to use technology and develop new ideas about technology integration, they develop higher levels of confidence about their ability to use technology in a variety of ways.

The results of this study suggest that preservice teachers can benefit from observing teacher models presented via multimedia case examples, such as those featured on VisionQuest. Whether delivered via the Web or CD-ROM, multimedia models are becoming more readily available for use by teacher educators. These types of examples can be incorporated into an educational environment for self-paced exploration, as a small group reflection tool, or as an instructor-led activity. From an instructor's perspective, electronic models can positively impact the authentic nature of a course and simultaneously increase the confidence and integration beliefs of students. This type of modeling can help preservice teachers develop a vision for what technology integration looks like in real classroom as well as strategies for implementing those visions.

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How and when do students become "invested" in online collaboration?

Richard Ferdig, University of Florida, US
Heather A. Davis, University of Florida, US

Teacher candidates often express concern with the conventional pedagogy of their methods classes, complaining of a need to see challenging, reform-oriented teaching in action (Ferdig, Hughes, Packard, & Pearson, 1998; Hughes, Packard, & Pearson, 2000). They describe instruction that is limited to articles, books and lectures about methods of teaching reading and writing (Ferdig et al., 1998). Most universities have responded to this call, supplementing students' in-class experiences with classroom observations and internships. However, even when provided with these opportunities to 'watch' pedagogy in action, pre-service teachers often fail to see (or are failed to be provided with) teaching models that align with the focus of university pre-service preparation programs (Kinzer & Risko, 1998).

Educational researchers have responded to this problem by introducing web-based learning environments that attempt to supplement preservice teacher education through technologies such as web-based learning environments (Ferdig, Roehler, & Pearson, 2001). Research in this area provides evidence that this form of instruction and electronic medium can be successful. In one study, Ferdig, Roehler, and Pearson (2001) found evidence that students who participated in the electronic forum were more likely to demonstrate a deeper understanding of pedagogical diversity as well as a more complete approach to the teaching and learning of literacy. In a different study, students who posted more frequently to an electronic discussion forum (and thus participated most in the assigned classroom activities) reported both increased interest in the course and mastery of the material (as evidenced by their self-evaluations and class journals) (Davis & Ferdig, 2001). In both cases, students had the opportunity to become meta-analytic and meta-cognitive about their participation and journey towards becoming fully enculturated into the community of practice known as teaching.

Unfortunately, in both cases, researchers reported data suggesting these claims were substantiated only when students became "invested" in the technology. In other words, gains and successes were measured only when students fully participated in the electronic activity. Neither case reported the process in which students became invested, nor did they describe the characteristics or context under which students became emotional, intellectually, and behaviorally involved in the activity. In both cases, authors called for future research to examine and define exact contexts in which students would become invested in both the classroom integration and the new technology.

The purpose of this paper is to discuss, from a psychological perspective, ways in which several preservice teachers became invested in electronic innovation. We describe how supplemental discussion forums were used in preservice education courses to further students': a) skills and abilities in working with diverse populations of students; b) knowledge and adoption of psychological and developmental theory; and c) ability to integrate cutting-edge technology innovations into their instructional design. Most importantly, we describe characteristics of electronic learning contexts in which students are most likely to become invested emotional, intellectually, and behaviorally.

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Video, database, and web-based learning environments as tools for preservice education: The case of the Reading Classroom Explorer

Richard Ferdig, University of Florida, US
Richard Ferdig, University of Florida, US
Laura Roehler, Michigan State University, US

Teacher candidates often express concern with the conventional pedagogy of their methods classes, complaining of a need to see challenging, reform-oriented teaching in action (Ferdig, Hughes, Packard, & Pearson, 1998; Hughes, Packard, & Pearson, 2000). They describe instruction that is limited to articles, books and lectures about methods of teaching reading and writing (Ferdig et al., 1998). Most universities have responded to this call, supplementing students' in-class experiences with classroom observations and internships. However, even when provided with these opportunities to 'watch' pedagogy in action, pre-service teachers often fail to see (or are failed to be provided with) teaching models that align with the focus of university pre-service preparation programs (Kinzer & Risko, 1998).

In response to these concerns, we developed the Reading Classroom Explorer (RCE). Originally a CD-ROM product for the Macintosh, the current iteration of RCE is a web-based learning environment for pre-service teachers studying literacy instruction. The goal of RCE is to provide multiple opportunities for teacher candidates to develop rich understandings about teaching and learning in classrooms where diversity of pedagogical approaches and diversity of student populations are evident (Ferdig, Roehler, & Pearson, 2001). An RCE user logging into the system is provided with an opportunity to search over 300 movie clips using four different search mechanisms.

First, they may decide to search by school or "case." RCE contains movies from ten major elementary school 'cases' from throughout the United States (i.e. Hawaii, San Antonio, Harlem, and Lansing). Students may choose to watch the entire video from a case (~45-60 minutes), or they can select specific components within that full case. A second option is to select movie clips by choosing a Theme. Much like a table of contents, the themes are broad categories divided by "Teacher", "Student", "Curriculum", and "Context." Examples of themes include "Assessment", "Planning", and "Management Strategies." Users might want to search more specifically, and thus they would chose the third option of searching by Keyword. If the themes are like a table of contents, then the keywords are the index for that book. Keywords are much more specifically designated, and include words like "book clubs" and "decoding." A fourth and final way to search is to use a free-form text search, referencing text that is either in the transcripts or the general description of a clip.

Once a movie clip is selected and the title is clicked, the user is sent to a webpage that contains the video and any related information for the clip. Using Real Player, a user only has to wait 3-4 seconds for the video to begin playing—one of the major benefits of a web-based system. The transcript, related keywords and themes, links to artifacts that may appear in the clip (e.g., pictures of students' work shown in the clip), and any other related information also appear on the page. In order to stimulate further thought on the video, questions—and a notepad to save responses into—are provided for each individual clip.

One of the problems with a CD-ROM based product is that interaction between students is limited to those students working together, or a "share-time" provided by the teacher after using the tool. Since RCE has moved to the web, we are now able to provide students with scaffolding through social interaction. For instance, if a user wishes to see what others thought about the movie clip, he or she merely has to click on a button and anonymous responses (provided the user has granted permission) pop-up in a new window. Or, if a user has a specific question, they can go to the "RCE Discussion Forum", where messages are hierarchically saved in either a "General Room" or a room designated specifically for that students' class (provided they are part of a class). At any point in time, a student has access to all of their notes, which is important if a student decides to write and/or submit a paper online. RCE provides the opportunity for students to write papers that include links to specific movie clips discussed in their paper, and then electronically publish that paper to their teacher, their classmates, or RCE users as a whole.

Up until now, we have basically described the user side. RCE also has a "teacher" side. The teacher can log-in at any time to read student papers and to answer questions from their students. They can also go to their own discussion forum to discuss ideas (i.e. collaboration) with other RCE instructors. Finally, RCE instructors can create, save, and search saved lesson plans regarding implementing RCE into the curriculum.

In recent studies, data has been collected that suggests RCE is beneficial to instruction in a number of ways. For instance, evidence suggests that students using RCE, and specifically the discussion forum in RCE, are more likely to demonstrate a deeper understanding of teaching and learning (Ferdig, Roehler, & Pearson, 2001). They are also able to relate what they have learned to experiences outside of the RCE learning environment (their internship, other classes, etc.). Research is currently being conducted that explores issues of diversity, as well as dispositions and skills related to literacy instruction before and after the use of the Reading Classroom Explorer.

The purpose of this interactive session is to present audience members with a new web-based learning environment for preservice education. Audience members, specifically those who teach preservice methods classes, will be invited to use the web-based learning environment in their own classroom. More importantly, they will also be invited to join the RCE research team in exploring innovative ways to teach preservice teachers about pedagogical and student diversity. Novice and expert technology users are invited to attend, as minimal technology expertise is required. Specific objectives of this presentation include:

1. exploring an innovative web-based learning approach to preservice education
2. discussing new integrations for teacher education that highlight pedagogical and student diversity
3. discussing research techniques and possibilities for innovative learning technologies

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Distributed Learners – Motivated Classrooms
Building Class Knowledge

Joanne Fevergeon, Teacher
Ellensburg High School: Ellensburg, Washington
jfevergeon@wonders.eburg.wednet.edu

Anuja Dharkar, Curriculum Specialist
Macromedia: San Francisco, California
adharkar@macromedia.com

Abstract: Using technology requires wide expertise. Teachers need expertise for everything from troubleshooting everyday hardware and software problems to helping students keep up with the latest technology. This need for expertise can place a large strain on the teacher as the sole provider of information. One method that can be modeled in teacher education programs and in the classroom to alleviate this strain and model professional work practices is to distribute some of the knowledge and responsibility among students. In professional work teams one person is rarely the expert on all topics, so the team shares information to accomplish team goals. Similarly, students can become experts in some areas and share their expertise with their class. Small student groups can be formed where each group has two main roles. In the first role, the group helps with general tech support for the classroom. If a question comes up in the classroom about using the scanner, a student group would use class reference materials to find a solution before approaching the teacher. Students gradually learn how to handle more basic tech support issues on their own. The second role of the group is to bring new knowledge into the classroom. Each week a student group researches technology innovations relevant to class work or background information on a class technology topic. They present this research to the class to share their new knowledge. In this model students are in charge of seeking knowledge and helping to build collective classroom knowledge. This yields empowerment for the student, ownership over their learning, and a model for bringing in new information to the classroom.

With the advent of technology standards and a greater need for students to be prepared for a technologically complex world, teachers are required to gain greater technological expertise. Coupled with the need for technology expertise is the need to be prepared for new forms of changing and advancing technologies. Technology integration results in a classroom that requires constant upkeep and updating of that technological knowledge. Although professional development workshops exist to help teachers "catch-up" with new technology and technology implementation methods, how can teachers learn about new technologies while being able to support present technology in the classroom? This dual problem can be addressed by modeling class management methods in teacher education classes that can be transferred to student classrooms. Distributing the learning process for understanding implemented technology and for incorporating new technology can help teachers survive the changing environment that results from technology integration while helping them stay updated on current technology.

Tech Support Teams

One method to help support present technology use in the classroom without deep expertise would be to engage the help of students in technical support. For example, students can volunteer or be placed in small teams in charge of technical support for the class. These teams are asked to use the Internet, help manuals, and software support books for find answers to basic software issues before approaching the instructor in the class. This management method helps students learn details about the software while alleviating the need for the instructor to be a software expert. This method will also help students learn different pathways for help support systems. In professional work environments, there is rarely one person who knows how to solve all the technical problems and therefore solving these problems requires team members to seek out answers. Students learn the various ways that professionals use to seek out answers. Although students may not always solve the technical problem, they will learn to use the resources available before approaching the instructor. If the students are unable to uncover the answer, the instructor can address questions that cannot be answered from this pathway. Students become more self sufficient in organizing methods to help themselves and others. Teacher education or professional development workshops that model finding help support and building the help support pathway, will help teachers learn to deal better with technology problems that arise in the classroom, without losing time and attention with students. This action also prepares the teacher to become more of a facilitator in the classroom rather then the pinnacle of knowledge for students. Teacher become better able to adapt to new versions of existing technology, since they are prepared to answer questions or help students understand how to answer new questions without spending large amounts of time becoming experts in that technology.

New Technology Research Teams

Technology is dynamic and new forms of technology emerge daily. When using technology in the classroom, instructors need to be prepared and keep their students apprised of any new developments in this field. How can instructors keep up with the newest technologies as well as how these technologies impact the future of the field? One method is to have an ongoing seminar series where small groups of students are designated "research teams." These teams are responsible for introducing new technology topics to the class. Students not only model professional practice, but also become proactive about their learning. Similar to professionals who must always stay apprised of the most current technologies and trends, students will contribute to the class ability to be aware of the most current technologies and trends. The class builds its own knowledge and sets up a model for keeping up with technology. The instructor re-asserts the role of the facilitator instead the sole provider of knowledge.

Conclusion

Distributing tasks among students helps the instructor manage technology issues in the classroom. Students are responsible for learning pathways that seek help, while supporting and improving collective knowledge by bringing new information into the classroom. Modeling this methodology helps future teachers empower students to become proactive in their education while utilizing professional practice, which gives more validity to their work and supports the idea of an instructor as a facilitator. The main benefits for teachers are the following:

- Teachers can concentrate on the content of the project or unit
- Processes of thinking, and problem solving are emphasized
- Students have ownership of both content and process
- Learning is natural and student-centered

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Systematic Observation of Student Teaching Episodes

Warren Gamas, Minot State University, US
Kevin Prusak, Minot State University, US

Introduction

Our question was simple. What can we do to best prepare preservice teachers for the rigor of their first year of teaching. We believe that good teaching behaviors are quantifiable, transferable, and masterable. Good teaching behaviors can be observed and measured, they can be learned by observation and practice, and they can, with practice, become a natural part of a person's teaching presence. Our response was to focus on developing a Pedagogy Lab; a high-tech facility for video viewing, editing, and recording designed for student use in documenting their own teaching episodes. This short paper reports on the system implemented within the Pedagogy Lab including the hardware selected, student process developed, and lessons learned in the course of the first year of the Pedagogy Lab.

The Pedagogy Lab

The Pedagogy Lab is a technology lab designed to facilitate student learning in identifying, learning, practicing, and mastering specific teaching behaviors. To do this, we have created a facility to that allows students to observe and document teaching behaviors using real world examples as well as requiring students to record, edit, and assess examples of their own teaching episodes.

Key Features of Pedagogy Lab

Key features for our Pedagogy Lab include digital video viewing station, digital video editing stations, and digital video authoring stations. Each of these stations fits within one or more of the activities that are in our good teaching cycle.

Viewing Stations

The digital video viewing station allows students to focus on viewing example or their own videos of teaching and quickly documenting specific teacher behaviors. This includes a custom computer program designed to assist students in systematically recording, coding and reporting observed teacher behaviors.

Editing Stations

The digital editing stations use Apple's iMovie for the clipping, titling and output to quicktime for students as they identify and document specific teaching behaviors from their own teaching opportunities. Our custom computer program for recording, coding and reporting observed teaching behaviors will allow students to improve their self assessment of their teacher behaviors.

Authoring Station

The authoring station utilizes Apple's iDVD, students will create final products that document their skills in the teaching environment. DVD output allows students to create feature rich long videos of their teaching performance.

Process

1) Classroom instruction on systematic observation focuses on teaching students to identify specific teaching behaviors.
2) Students review and practice their systematic observation skills by observing non-specific lessons which students will code using the systematic observation computer program within the pedagogy lab.
3) Students record and review their own teaching episodes within the Pedagogy lab utilizing the systematic observation system to identify their own abilities and deficiencies.
4) Make and implement a plan for improvements, further teaching and lab time to assess improvements on specific behaviors.
5) Students may create final products that contain exemplar episodes of their own teaching.

Presentation Outline

If accepted, we will share the development of our systematic observation system, example video episodes, and lessons learned in the first year of our implementation schedule. We will also bring a complete student presentation documenting one student's journey from classroom instruction to completed final product.

A Web-based Solution for Integrating Technology into Teacher Education Courses

Marsha A. Gladhart
College of Education
Wichita State University
Wichita, KS USA
marsha.gladhart@wichita.edu

Abstract. The purpose of this study was to research, develop, and validate a product to assist faculty in meeting accreditation standards for integrating technology into teacher education programs. The design used in this study included three phases of research and development. Phase one used an online survey to determine if teacher educators perceived a need for assistance in meeting technology standards. A prototype of a Website interface to relational databases of information on technology tools and standards was then designed to meet those needs. Phase two involved evaluation and modification of the prototype using focus groups and feedback through an online questionnaire. The third phase involved a field test by teacher educators from two institutions preparing for NCATE review.

Introduction

Even though computer technology and Internet access have become more available in public PreK-12 schools throughout the United States (NCES 2000), teachers have not been prepared to integrate the technology into instruction (Resnick 1999; Trotter 1999; NCES 1999). As a result, teacher education programs have been challenged to better prepare teachers to integrate technology to meet content standards (CEO Forum, 1999). Unfortunately, teacher educators are not always prepared to provide effective models of technology integration (Glennan & Melmed 1996; NCATE 1997; Queitzsch 1997). They lack models and experience with technology, receive few rewards and incentives to integrate technology into their own classes, and do not have adequate professional development and support to develop their own skills (Green 2000).

In addition to increased public pressure to better train teacher candidates to integrate technology, teacher educators are also faced with increasing numbers of standards to be met, both in their content areas and in broader areas of education. NCATE has recently revised accreditation standards to include outcomes-based criteria (Wise 2000). The NCATE standards are broad in scope and are supported by more specific standards developed by professional organizations such as ISTE (NCATE 2000; ISTE 2000). Both sets of standards are new to teacher educators and require new thinking in terms of course goals and objectives.

Integration of technology into instruction requires training in the technology but training alone has not resulted in integration (Barron & Goldman 1994; Cravener 1999; Gilbert 1995; Gillespie; Matthew et al. 1998; NCATE 1997; Rogers 2000; Taylor & Little 1996). Professional development in higher education has been based on the traditional workshop model (Calves 1999; Gillespie 1998; Lieberman 1995). The workshop model has not been as effective by itself as it is when combined with other professional development strategies such as one-on-one mentoring, action research, and more collaborative models (Apple Computer 1995; Darling-Hammond & McLaughlin 1995; Eiser & Salpeter 1992; Howey 1994; Johnson, Johnson & Smith 1991; Valli & Cooper 1999; Webb 1996). Effective training in technology integration involves a constructivist learning environment, situated staff development, time for reflection, team planning for implementation, and ongoing dialog (Apple Computer 1995). Collaboration (Dede 2000; Ringstaff, Yocam, & Marsh 1996), any time, anywhere support (Gilbert 1996), inspiration and excitement (Milone 1999; Rogers 2000), and variety (Milone) also contribute to the success of professional development in technology integration.

Methodology

A research and development model was used to develop the product in this study. Three phases of development included a needs assessment, the evaluation of a prototype based on the results of the needs assessment, and a field test by teacher educators who used the product to identify technology integration tools and activities for their own courses. Online questionnaires, focus groups, peer evaluation, and a field study were used to gather feedback and draw conclusions during the phases of development.

Each phase used participants from different populations. The first phase surveyed members of the ISTE NETS*T writing team to determine if there was a need for a product to assist teacher educators with integrating technology. Participants from 11 states responded to the survey. The second phase utilized 2 focus groups in the development of a prototype and an online survey administered to directors of PT^3 grants to evaluate the resulting product. The third phase involved 8 teacher educators from 2 Midwestern universities in a field test of the product. The participants represented both elementary and secondary fields in teacher education as well as a diversity of technology background and expertise.

Conclusions and Implications

Phase One

The results of the needs survey in phase one resulted in the most intriguing information of any of the surveys in the study. The results indicated that a majority of the participants in the needs survey believed teacher educators do need assistance in integrating technology. Respondents viewed colleagues in their teacher education program as having more skills than sufficient knowledge to integrate technology. This response may indicate that participants perceived their colleagues as knowing more about how to use technology than how to teach with it. Integrating technology is a multi-layered process. It requires a new or revised pedagogy as well as new technical skills. Teacher educators must rethink how they teach and how the content is conveyed with few models and little experience of their own. They may know how to use the technology for their own productivity without having integrated it into their instruction.

Participants also reported their colleagues were not familiar with NCATE and ISTE standards yet nearly half reported that course syllabi in their programs identified ISTE standards and over half reported indicators of technology skills and concepts were included in their programs. This discrepancy may be a result of technology being taught in computer courses rather than being integrated into curriculum and instruction courses or methods courses. When technology is taught as a separate course, the teacher educators may consider it someone else's responsibility to teach their students how to use technology in instruction. Unless teacher educators were involved in the field of technology it is possible that they would be unfamiliar with technology standards unless they had a technology leader in their midst or were preparing for an NCATE accreditation visit and were held accountable for knowing the standards.

Responses to the question on accountability may explain why programs and syllabi identify technology standards and outcomes but faculty are judged lacking in knowledge and require assistance to integrate technology. Almost three-fourths of the respondents reported that teacher educators were not held accountable for integrating technology. This lack of incentive may account for the lack of actual technology integration.

Because any time, anywhere support is so widely sought, the lack of interest in CD-ROM delivery was surprising. Even paper manuals received a higher ranking than did CD-ROM delivery, either as a manual or in an interactive format. Since paper manuals have the same static content available as CDs, the technology involved in CDs may be the factor. CDs and paper manuals need to be stored and retrieved requiring extra steps for the user while the Web is omnipresent on networked computers. It is possible that faculty are uncomfortable with the installation necessary on some CDs or that they find navigation on the Web more familiar than varying metaphors and navigation on CDs. The Web does have the advantage of being updated as technology and strategies change. However, the Internet can go down and is notoriously slow on some overworked campus networks. The reasons behind the reported preferences, especially for the high ranking of the paper manual, should be clarified by further study.

Phase Two

The positive responses to the feedback form in phase two showed that the prototype of the Web interface was workable but needed improvement. The layout of the integrated lessons was designed by members of a focus group who desired a simple one-page format but wanted to be able to connect to more information if desired. This feature was easy to accommodate with related databases. Reviewers responded favorably to the primary colors of the Web site and to the metaphor of the robot as their assistant. They judged the content to be accurate, useful, and appreciated being able to browse through the hypermedia environment of the Web.

One of the most interesting comments in the feedback at this point was the comment made by one evaluator that the product appeared to assume that the users had he necessary knowledge to use the technology and only needed to be nudged. Even though the needs survey indicated that the participants in that phase viewed their colleagues as having the necessary skills, this respondent did not think her colleagues knew enough to use the technology. Her experience may be more common than those of teacher educators involved in technology grants and initiatives. To accommodate for this need, more tutorials were added to the technology tools section.

Phase Three

The teacher educators who field-tested Integration Assistant were very positive in their responses about the ease of use and content. Most of the participants found the Web site easy to navigate but several made comments that indicated that they could not find what they were looking for even though the material was there. These comments may reflect a lack of understanding of how relational databases fit together, lack of knowledge about how to conduct a search, or need for better organization of the Web site.

Most comments in phase 3 focused on the content in the databases. Two users asked for more specific examples in their content areas. Another participant asked for more examples in the tour to help search the databases more effectively. In general, the participants were satisfied with the content and found it useful. When asked to identify the least helpful section, several of them responded that none of the sections were "least helpful" and went on to describe what they liked about the product.

Users were invited to enter an activity or technology tool in the Integration Assistant databases. Three of the participants in phase three did enter integrated lessons. The Web interface did not allow as complete an entry as did Instant Web publishing or direct access to FileMaker©. One participant asked to be allowed to enter the activities directly into the Instant Web publishing interface to the database rather than try to fit into the fields allowed in the Integration Assistant interface. Her request pointed out the wide variance in users' skill levels. Other participants in the evaluation stage did not even realize that they were working with a database. Further development of the Web interface could facilitate entry of data by novice users.

Conclusions and Recommendations

The feedback in all three phases of this study indicates that teacher educators do need assistance with integrating technology into their courses. Respondents to the needs survey reported a variety of support was available to their faculty, that faculty had technology skills, and that their programs did specify technology outcomes. In spite of the presence of such support and knowledge, faculty did not have the knowledge necessary to integrate the technology. This discrepancy raises questions related to integration and knowledge of technology. What factors have inhibited acquisition of the necessary knowledge if most of the teacher educators have the necessary skills? Do the rankings of the respondents represent an accurate perception of teacher educators' knowledge? Would the teacher educators rate themselves the same way the participants did?

The efforts of initiatives such as the U.S. Department of Education PT^3 grant program should continue to focus on integration strategies in teacher education programs to better encourage teacher educators to model technology integration. If it can be determined that teacher educators actually do have the necessary skills but do not integrate technology, then professional development in SCDEs should focus more on integration strategies and less on skill training. Furthermore, teacher education programs should establish clear measures to hold faculty accountable for meeting standards identified in course syllabi and program documents.

The preference for a Web-based mode of delivery expressed by the respondents to the needs survey should be considered as teacher education programs develop support and training for faculty to meet accreditation guidelines. The Web-based product, Integration Assistant, provided helpful content and a convenient format for the participants in the study. Feedback indicated that teacher educators wanted more information for themselves and for their students and liked the easy access through the related databases. Textbook publishers and instructional design teams should continue to explore and develop the use of databases and Web sites to share current information on rapidly changing technologies and instructional strategies. Further study on the use of interactive materials in comparison to the use of textbooks and static print materials should be conducted to determine which mode of delivery best meets the needs of teacher educators.

One of the difficulties in designing a Web interface to relational databases is how to organize the information so that it takes few clicks for the users to find the necessary information. While the designer is very familiar with the data and how it is organized, the user does not share that same frame of reference. Further study on human factors that influence the ability to find information would provide useful information for Web developers. The development process of this product raised several questions for study. Does understanding the technology make the search for content easier? How much does technical background affect the user's ability to search and find content? What key factors determine a user's ability to find the desired information? How much and what kind of assistance is helpful in a tour?

Relational databases provide easy access to information and provide an interactive interface between the user and the data. Continual updating of data adds to the timeliness of the information that cannot be reproduced in paper manuals. The technology involved in a Web interface to relational databases requires the developer have the support of a Web designer and a network administrator, have fairly sophisticated skills in developing and using FileMaker©, and have knowledge of how to write scripts for the Web interface. Providing and updating the content is time consuming because the developer must keep current with new resources and continually analyze and enter new information into the databases. Writing descriptions for users with different backgrounds and keeping up with changing technology also requires experience in instructional design as well as a background in technology support. Any further development of Integration Assistant or a similar product would be best accomplished by a team with expertise in Web development and relational databases or by a publishing company.

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Integrating Technology Experience into Student Teaching: A Model for Preservice Teachers' Technology Education

Yi Gong

College of Education, Indiana University of Pennsylvania

Indiana, PA 15701

Abstract: Effective integration of technology into curriculum and instruction has received much attention in education, and teacher education programs are expected to equip the preservice teachers with both technology literacy and teaching methods with technology. In most of the teacher training programs, the common practice is to insert technology-related courses as required courses into teacher education curricula. But it is not a practicable solution to the problem, which is the lack of effective use of technology by new teachers in school settings (Bruder, 1991).

In this study, a new model of integration of technology into preservice teacher technology education is explored. The study is conducted in an elementary class setting through a webpage building project. The participants are student teacher, classroom teacher, college technology staff, and students. Before the study, both student teacher and classroom teacher are new to the webpage design. An interview with the student teacher is conducted regarding his technology literacy, proficiency, and attitude toward technology use in teaching. During the process, the student teacher acts both as trainee and trainer. As the project proceeds, the role of the student teacher focused more, until totally, on a trainer. The webpage of the class is well designed and uploaded as a result of the cooperation of the student teacher, classroom teacher, college technology staff, and the students. An after-project interview is also conducted with the student teacher. Results show that such an on-site technology experience contributes significantly to preservice teacher's technology competence and increasing his attitude positively toward using technology in their future teaching.

Keywords: preservice teacher, teacher education, technology

Learning to See, Learning to Teach: Developing Video Case Studies From One's Own Practice

Elizabeth L. Haslam, Ph.D.
School of Education
Drexel University
United States
elizabeth.haslam@drexel.edu

Abstract: This paper describes a case study approach in a field seminar for pre-service teachers. Building on the focus of reflective practice, students develop a video segment from a videotaped teaching scenario into a case study format. In the seminar discussions, students present their own case studies to other students, cooperating teachers (who are part of the seminar) and university faculty. The goals of this authentic assessment are to (1) inquire into specific teaching practices pre-service teachers experience through individual ways of knowing; (2) use multimedia tools as partners in inquiry and meaning-making; (3) connect teaching performance, best practice standards and reflective assessment; and (4) use mediated learning in a more conscious and empowering context for continuous learning, research and reflection. The paper includes assessment criteria, examples of the student video cases and implications for pre-service education.

Introduction

During their field placements in student teaching or graduate field experience, Drexel University pre-service teachers participate in a collaborative weekly seminar, reflecting on their field journal entries and learning more about best practices based in constructivist theories (Wilson, 1996). Participants in the seminar include the pre-service teachers (student teachers and graduate field experience students), cooperating teachers who serve as clinical adjunct instructors, and university faculty. In addition, students' videotapes are studied and analyzed at the beginning and end of their placements. The videos, however, seemed loosely connected to their overall performance goals. What would happen if the students were asked to develop *their own* video cases in the context of best practice, selecting a focus that had relevance and meaning for them? Would learning to see help them learn to teach? Students were asked to select a segment from a videotaped session that had presented a teaching/learning example in the context of best practice. Next, the student was to write a case description of the background context, why they selected this focus, what the audience should look for, and what they planned to do next. They presented their video cases during the seminar meetings.

Video Case Features

The video case assignment is regarded as an authentic assessment that would "challenge students to apply new academic information and skills to a real situation for significant purpose (Johnson, 2002, p. 165). This approach develops the students' abilities and learning in several important ways. First, inquiry into one's own practice is at the heart of making sense and meaning out of one's individual experience and helps students find their own creative and unique solutions in a collaborative context. Second, students use multimedia tools, such as video, as partners in their inquiry. Through video, a holistic scenario unfolds that facilitates learning on cognitive, sensory and emotional levels (Laurel, 1993). So much of what we learn as teachers is learned through our thought, senses, and feelings *together*. Using video also allows students to "leave a pre-conceived role and to take chances while constructing and deconstructing knowledges through the use of technological partners" (Goldman-Segall, p. 65). Third, developing the video case connected and aligned performance, best practice standards and reflective assessment. Students were now making the connection among the theories and their teaching performance through reflecting on real situations in a critical stance. Fourth, by consciously selecting and developing a video case, students are empowered in their own ways of learning and knowing as reflective practitioners.

Student Cases

This past fall term, students presented their video cases in the seminar. Several cases were memorable. A physics graduate student discovered how important it was for him to design engaging hands-on experiments and then make adjustments, rather than focus first on controlling disruptive behavior. His video excerpt showed students working on a project at various stages of collaboration. Another graduate student, biology major, showed a video in which students conducted a role-play as an iodine or starch particle in diffusion. As someone who had only lectured before, he was obviously pleased that the students not only enjoyed the activity, but also understood the concepts of diffusion, particle size and weight, and cellular bonding. And finally, a former computer programmer who now teaches computer skills to high school juniors, showed how an emphasis on quality instead of speed was reflected in the students' purposeful work as they moved among their stations. Her follow up plan was to gradually lessen the amount of structure she provided and increase the amount of collaboration. When she presented her video, she was the most relaxed and engaged I had seen her all term.

Implications for Pre-service Education

Ann Berthoff stated "pedagogy always echoes epistemology; the way we teach reflects the conception we have of what knowledge is and does (1981, p. 11). For pre-service teachers, this gap between pedagogy and a critical examination of one's practice is often tacit and unexplored. It may appear insignificant, but this disconnection often leads new teachers to experience burnout or quit the profession. According to Schon (1987), the prevailing conceptions of many teacher education programs of professional knowledge may not match the actual competencies required of practitioners in the field. He emphasized that prospective teachers must untangle situations that are complex and undefined and impose a coherence of their own making. As educators, we need to give pre-service teachers the time, space and medium for them to investigate their practice intentionally, for the student "has *to see* on his own behalf and in his own way the relations between means and methods employed and results achieved" (Dewey, 1974, p. 151). Developing a video case study is a dynamic way into reflective practice.

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Practical Experiences: Teaching Preservice Teachers Using Technology

Tina Heafner, University of North Carolina at Greensboro, US

A. Objectives or Purposes

A pressing need exists for preservice teachers to become proficient in using technology. Many states have implemented technology standards that identify the skills young teachers need. However, there is no consensus on how these skills should be taught in the university setting. At a public university in North Carolina, a cohort group of interns were exposed to an education course in which instruction was delivered online. The purpose of this study was to evaluate preservice teachers' views toward using technology in this technology rich education course. The course topic was Seminar: A Focus on Exceptional Children. Elementary education majors took the course online and meet once a month to discuss topics of study and to reflect on their experiences during the semester.

B. Perspectives or Theoretical Framework

Much has been written about the infusion of technology into academic life. Schools are moving at different paces at integrating technology. Varying beliefs about the effectiveness of technology has attributed to the inconsistency in implementing a technologically based curriculum. Concern about the social consequences of technology have driven some to suggest de-emphasizing technology in education (Stoll, 1999), while others have argued that effective instruction, particularly in social studies education, must include a range of computer technology skills (Martorella, 1997). Research studies describe an intensive computing environment as a positive influence on academics (Corwin & Marcinkiewicz, 1998; Geissler & Horridge, 1998; Walters & Necessary 1996). Brown (1999) suggests that technology is an integral part of education in the 21st century.

In a statewide study of the impact of technology, Dirksen, Bauer, Coffland, and Naylor (1998) identified that the computer is an adaptable and versatile tool. They continued by stating that when used appropriately, technology can be a very effective tool. Technology as a tool does not change basic learning processes, but instead it transforms how these processes are developed.
To infuse computers in the curriculum, teachers need to be more technology -literate. Teachers' beliefs about technology are often hindered by teachers' lack of technological skills. Difficulty in locating resources and ineffective use of software can inhibit teachers' decisions to integrate technology. Teachers should not only know how to use technology, but they must also know how to effectively integrate technology in their teaching practice and to engage their students in active learning and research (Pan, 1998). Mason et al. (2000), in *Guidelines for Using Technology to Prepare Social Studies Teachers*, suggest that teachers need to learn how to successfully integrate technology to make their teaching better than it would be without it. They emphasize the need for teachers to develop technical skills not just for simply acquiring these skills, but to make them proficient at using technology.

Pan (1998) suggests that in order to infuse computers in the curriculum, teachers should know not just how to use computers themselves, but also how to engage their students in active learning with computers. It is not enough for teachers to allow students to employ technology; they must network with their students and teach them how to effectively apply technology. Trentin (1999) emphasizes along with many others that teachers need specialized technical skills to apply the most appropriate network-based teaching and learning strategies, which usually involve cooperation, sharing, organizing work and study groups, and searching the network to locate significant resources for the educational process.

C. Methodology

At the end of the semester, students enrolled in the seminar were asked to complete a survey identifying their perceptions of their technology use in the course. The survey was posted online (with a CGI script to encode responses in a text file) and an email message was sent to all students enrolled in the seminar encouraging them to follow the included link and complete the survey. After one week, a reminder email was sent. The survey consisted of 29 questions that were divided into the following categories: Collaboration and Communication, Content Knowledge, Individualized Tasks, Frequency of Use, and Ability Rating. Responses were reported using a Likert scale.

D. Results

In the area of Collaboration and Communication, students compared this online course to more traditional educational courses that rely primarily on face-to-face instruction. 56% of the students reported that they were somewhat more likely to actively participate in scheduled discussions about the course material, such as a threaded discussion posted on a discussion board. 67% of the students were somewhat more likely to ask for clarification when they did not understand assignments or content and to discuss the ideas and concepts taught in this course with the instructor. 89% of the students stated that they would tell the instructor when they had a complaint or suggestion about the course. 67% of the students reported that they worked on an assignment for this course with a group of other students three or more times during the semester. 78% remarked that they discussed with other students the comments they made on one or more of their assignments or examinations for this course three or more times during the semester. 44% of the students reported feelings of isolation from other students due to the structure of the course.

Content Knowledge was evaluated by looking at the effort required by students to complete tasks and the perceived quality of those assignments. 56% of the students stated that they spent more time studying. 56% of the students felt that they put more thought into their comments. 89% reported that the technology used in this course was appropriate for performing the tasks required. 78% of the students stated that thought the use of technology in this course, they were acquiring skills that will be useful to them as teachers. All students stated that they discussed the ideas and concepts taught in this course with other students three or more times during the semester.

Individualization of the tasks of the course is a major advantage of an online course. 89% of the students stated that taking this course online strongly valued the ability to work though the course materials at their own pace and to complete tasks at times that were convenient for them. 89% reported that they were better able to juggle their course work with work and/or home responsibilities. 89% of the students stated that using technology enabled them to earn at their own pace. All of the students agreed that a benefit of the online course was the ability to see the results of their work almost immediately.

The survey was used to identify how often students were using technology due to the nature of this course. Students were asked to approximate how much time they spent during a typical semester on various activities. 56% reported that they spent ten or more hours per week working on assignments, projects, quizzes or examinations on a computer-based, self-paced instructional program. 67% spent three to five hours per week interacting with their instructor or other students at their institution by way of email or other "time-delayed" electronic communication, such as bulletin boards or discussion lists.

Students were asked to rate their technological ability. Reponses were reported using a scale of one to five. One represented a self-efficacy rating of no knowledge or technological ability and five identification of one's ability as an expert technology user. All students rated their abilities as a four or greater. 56% reported a self-efficacy rating of expert. No students reported feeling at a disadvantage, because they did not possess adequate computer skills.

E. Implications

The use of technology in teacher education has a positive effect on preservice teachers' learning. Information technology empowers interns to learn more easily, enjoyably, and successfully due to the individualization of tasks. Appropriate experience with instructional technology promotes improved cognitive understanding, content knowledge, problem-solving skills, and basic academic skills (Mayer, et. al., 1999, Soloway, et. al., 1999).

Pedagogy affects teachers' motivations for using computers. Sadera and Hargrave (1998) identified that teachers' epistemological beliefs affect their instructional practices and their conceptions of the role of the computer in learning and teaching. Technology engenders an environment that promotes cooperation and collaboration among students; more in-depth conversations among teachers and students and among students themselves; encourages constructivist classroom instruction; a more equitable distribution of power between the teacher and his/her students; increases both written and oral communication (McGrath, 1998).

Computer experience fosters positive attitudes toward computers (Sadera & Hargrave, 1998). Galloway (1997) conducted a study of teachers to determine their use of technology and how teachers learn to use technology. The results revealed that educators learn to use computers primarily on their own and that it is unlikely that teachers will integrate computer technology into classroom instruction without the inclusion of personal and professional usage. Teachers' motivations for integrating technology into the curriculum, as identified in this article, are dependent upon teachers' experiences with technology and their technical skills. A study by Janice Mitchell and Susan Williams (1993) evaluated the effect of teacher knowledge of technology in the classroom. They categorized teachers into two groups: novice and expert. Their study revealed that experts promoted the use of technology and exhibited a greater confidence in the implementation of technology. Novice teachers did not emphasize the use of technology. The technological knowledge of students depends on the technical savvy of the teacher. Teacher technological literacy is essential in the integration of technology into the curriculum.

Teachers' self-efficacy is defined as teachers' knowledge that they can successfully integrate technology within their curriculum. Teachers' self-efficacy related to instructional computer use fosters flexibility, experimentation, and multiple approaches to using computers in instruction (Dawson, 1998). There is a positive correlation between teachers' technical savvy and teachers' self-efficacy in computer use (Sadera & Hargrave, 1998). Teachers' self-efficacy about their technical expertise will have an effect on whether or not and how they integrate technology in their curriculum Lanich and Meyer (2000). Kurkjian and Sponder (1998) identified attitudinal objectives for effectively integrating technology: teacher motivation to use technology and motivation to develop their skills. Helping teachers enhance their attitudes toward technology involves developing teachers' self-efficacy by transforming their self-perceptions as non-tekkies. If teachers have a high self-perception of their technological abilities, they will be more effective at integrating technology.

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Getting beyond the preconception of teacher as technology expert

Belinda Hill, Saint Martin's College, US

The Field Based Program at Saint Martin's College has been working with two grants that promote changing the learning environment with technology. The ST2EP grant, is a PT3 catalyst grant, that focuses on creating a learning community that includes pre-service teachers, a team of college faculty, and K-12 students. The Intel grant involves a curriculum for pre-service teachers that encourages the use of technology to include more critical thinking tasks. The grants work together, the ST2EP grant provides an opportunity for our pre-service teachers to work with K-12 students using and learning with technology, while the Intel grant provides support for creating curriculum that includes K-12 students use of technology.

In order to help our pre-service teachers understand how technology can change the way K-12 students learn they need to see and work with those students. Contact with the students, will allow us to test to see if the ideas put forward in either grant can be implemented. Will the pre-service teachers be able to see the advantages of working with K-12 students as the technology experts and themselves as guides to learning. This session will report the findings of this study.

Preparing Pre-service Teachers in Technology: How Far Should We Go?

Mark Hofer
Steve Whitaker
Center for Technology and Teacher Education
University of Virginia
United States
mhofer@virginia.edu
whitaker@virginia.edu

Abstract: This paper examines the challenge of determining how colleges of education should prepare pre-service teachers to enhance teaching and learning with technology. With so many different types of software, emerging technologies, and the constraints of the typical K-12 classroom, it is difficult to determine the best content for the "technology course" in a teacher education program. This paper will examine some of these new trends and offer a framework to assist teacher preparation programs in determining the content of the educational technology course. A discussion of how different technologies fit into the framework and how a teacher preparation program's values can help guide the answer to the question: how far should we go?

Introduction

As NCATE, ISTE, and other national organizations issue the call to teacher education programs to prepare teachers to teach with technology, a new question has arisen: how far should we go? Even as colleges of education work to integrate technology throughout the teacher preparation program, the educational technology course retains the potential to lay the foundation for technology as the students move into their methods and education foundation courses. While the typical educational technology class deals mostly with productivity tools, several new initiatives have developed in K-12 schools that are expanding the use of technology to enhance teaching and learning. These new initiatives are stretching the types of technology tools used and their application in the classroom.

While these new initiatives are exciting, they pose a challenge for colleges of education. With the wide range of options available for integrating technology, teacher preparation programs must make several choices in determining what technologies/applications should be included in the educational technology. Should the focus be on technology as a productivity tool, a medium to foster creativity, or as a catalyst for change? Further, should the emphasis of the program be on preparing teachers for the practical reality of today's classroom or expanding their horizons to prepare them for the potential of tomorrow's classroom?

Current Trends

Some students in K-12 classrooms are creating web pages, animation with Flash, digital video, and even claymation films. They are using PDA's, probes, digital microscopes, and digital imaging to enhance learning. For students in other classrooms, work with any type of technology is measured in minutes per week. OTEA reports that while the connectivity of US classrooms is increasing, student access is limited. This wide range of access and current use makes a "typical" technology program and infrastructure in a school elusive. This lack of continuity begs the question, "what should we prepare our teachers for?"

The typical "technology course" in a teacher preparation program is often focused on productivity tools. Leh (1999) reports that most courses typically require facility with word processing, databases, and spreadsheets. Many also include work with multimedia presentation software and webpage design. Other courses incorporate digital video editing and production, curriculum integration, and hardware and software maintenance and troubleshooting. With the wide range of capacity and use in K-12 schools, and the varied approaches to technology integration in teacher preparation programs, how can an instructor decide how to best prepare her students for an uncertain future?

A Framework for Discussion

In order to answer the question of how far we should go, it is fundamental to examine the different focuses of technology and schooling and the different vision and mission of teacher preparation programs. Only then can we begin to determine the content of the "technology course." Different schools and districts have different visions of the purpose of technology and learning. In the current climate, many schools have a keen focus on standards and how to use technology to increase student learning in measurable ways. Other schools see technology as a means to increase the depth of the curriculum and to provide students with an outlet for creative expression. Still others see technology as a way to transform education to be more project-based and learner driven. While all of these approaches are valuable, they have distinctly different views of technology and the learning process. In the same way, the vision and missions of the colleges of education can widely differ. Some programs may put the premium on practical preparation. The goal would be to provide them with the skills, strategies, and methods that will be immediately useful for them as teachers. Other programs may value innovative approaches to schooling within the current school framework. Still others desire to prepare teachers for the classroom of the future.

The choices one makes in these categories greatly impacts what should be taught in the technology course. The chart below offers some suggested course content within each of the criterion cells described above. For example, a teacher education program that values innovation with partner schools who see technology as a way to provide depth into the curriculum might stress the use of mindtools such as databases and spreadsheets to allow students to ask and answer inquiry-based questions.

	Standards Driven	**Depth/Creativity**	**Transforming Education**
Practical	Word Processing Skill and Drill Software	Multimedia Presentation Web Page Design	Internet Collaboration Electronic Portfolios
Innovative	WebQuests Internet Research	Concept Mapping Inquiry with Mindtools	Graphing Calculator Digital Probes
Future	Differentiated Content-Area Software	Digital Video	Flash Animation 3D Modeling

Conclusions and Recommendations

While the framework above is merely a starting point of a discussion, it is important that the content of the technology course is carefully considered. In order to make these decisions, it is important to define the values and focus of both the college of education and its partner schools. This can be accomplished by talking with university faculty (methods faculty in particular), teachers, administrators, students, and parents from local schools, and by surveying partner schools on technology capacity and current use. While these conversations can help one arrive at a focus for the technology course, it is probably best to incorporate activities that have a primary focus on a particular area of the chart, while also touching on activities in other areas.

A difficult question like this requires ongoing discussion and different perspectives. To facilitate this discussion, a discussion board has been set up in the Electronic Learning Community section of the PT3 website (http://www.pt3.org) to provide a forum to discuss these issues.

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Using Formative Evaluation in Teacher Designed Multimedia Courseware

Chun Hu
National Institute of Education
Singapore

Abstract

This paper describes an experience of pre-service teachers using formative evaluation in courseware design. In the module "Learning, Thinking and Instructional Technologies", trainee teachers learned to use PowerPoint to produce multimedia courseware. In the process, they learned basic strategies of formative evaluation and applied them to the improvement of courseware design. The trainee teachers had three weeks to finish their products. By the end of the second week, they tested their courseware on respective target learners. Subsequently, the courseware was revised to incorporate the feedback obtained. Some trainee teachers managed to do the second testing before the final submission. The experience helped the trainee teachers learn the importance of formative evaluation in instructional courseware development, one of the least-well-done parts of multimedia design.

Using the internet to link preservice teachers to the state and national standards

Elaine Hutchinson, University of Wisconsin-Stevens Point, US
Sandra Madison, University of Wisconsin-Stevens Point, US

As a portal website, IDEAS provides Wisconsin's educational professionals a starting point in their search for resources and materials that have been evaluated for quality and align with the Wisconsin Model Academic and the National Standards.

All the websites have been reviewed by a team of researchers including teachers and university personnel. A rubric was developed by the team to evaluate all resources. After resources have passed this test, they they are tested in the classroom and feedback is provided from these field studies. All the resources are linked to the Wisconsin and National Standards so that a teacher may choose a content area, a grade level and the standards he/she wishes to teach.

Elaine Hutchinson was a part of the initial researcher team in the mathematics area. This presentation will share the rubric and the development of the IDEAS website and use examples of the resources included in the mathematics area.

Children of the 21st Century have issued this demand: Give us teachers who know how to use technology in the classroom. Are we prepared to meet the challenge?

Gerrie Johnson, Southeastern Oklahoma State University, US

Objective of the Presentation:

The objective of the presentation is to inform teacher educators of the importance of preparing technology proficient teachers who are able to integrate emerging and existing technology into the pre-K through 12th grade classroom curriculum. To accomplish this task, all teacher educators must be involved. Simply taking an educational technology is not enough.

Interactive of the Audience:

Participants will have an opportunity to share their experiences and the policies of the colleges or schools of education in terms of preparing technology proficient new teachers.

Abstract:

Educational systems within our society are experiencing fundamental changes directly linked to emerging technologies and improvements in existing technologies (Matthews, 1998). According to Schank (2000) "Technology is on the verge of fundamentally reshaping the American education system" (p. 43). Colleges and schools of education have a responsibility to prepare a new generation of technologically proficient educators (Krebs, 98). This responsibility was addressed in the 1987 landmark study entitled A Nation Prepared: Teachers for the 21st Century, conducted by the Carnegie Corporation, which proposed reforming the current education system in order to provide opportunities for professional development for teachers, especially the use of technology and the promise it holds for developing new approaches to classroom instruction (Krebs, 98).

Research indicates that teachers teach the way they were taught (Goodlad, 1994). If integration of technology is to occur in education systems, the change must occur within teacher preparation programs, not on an in-service basis once teachers are out in the public schools (Dolly, 1995). The need for training teachers to integrate educational technology into the curriculum is highlighted in virtually all major reports analyzing technology-based instruction (Krebs, 98). Colleges of education must take a leadership role to guarantee that teacher education students experience a full range of the use and application of educational technology. Teacher education students should be required to apply technology to a variety of settings, not just in the context of an educational technology course. They would leave college better prepared to utilize technology in the K-12 environment if they were required to use and integrate technology in a number of course assignments (Dolly, 1995). It is in this manner that the students will realize how the use of technology can be effective for conveying appropriate content and knowledge to students in the classroom (Knupfer and Zollman (1994).

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Development of CD-ROM Course Materials: Demonstration of Toolbook Assistant

Lewis R. Johnson
Department of Specialized Education Services
University of North Carolina Greensboro
United States
Lew_Johnson@uncg.edu

Abstract: In this interactive session, a short application will be built to demonstrate the power of the multimedia authoring program Toolbook Assistant 8.1 for creating tutorials and case-based simulation instructional materials. This PC-based authoring program was selected as the authoring tool for our university's online learning initiative due to its power as an authoring tool and its ease of use. Toolbook has a drag-and-drop interface that is easy for subject matter experts to use to create high-quality e-Learning content, and comes complete with a wide selection of ready-made templates similar to PowerPoint templates to get a new author preparing instructional materials quickly. The program can make a log of user data that is saved to a disk for verification of learner performance or research.

Introduction

As teacher educators, we are faced with a daunting task: to prepare special education teachers who have the professional knowledge, skills, and dispositions to meet the challenge presented by the new accountability measures of teacher education and the challenge of working with children of increasingly complex disabilities in the classroom. The teachers of today must pass an application-oriented national licensure exam and be well trained to develop high levels of professional self-efficacy to withstand the demands of the profession, which can result in their retention in the field. Further, from a university perspective, the national report card on university teacher education programs will publish the pass rates for all programs. To meet these multiple challenges, the teacher education faculty in special education must revise its programs to meet the new licensure standards and provide instruction in a way that the pre-service teachers acquire the skills for teaching not at the knowledge level but at the performance level. In redesigning our instruction for the teacher education program, we focused on adding tutorials and case-based simulations on CD-ROM to our web-supported, and our online courses.

Including Multimedia in the Design of the Courses

Courses were designed using a textbook or a collection of readings as a core knowledge base. Course objectives and resulting content were examined for forms of knowledge (factual to strategies), and intended levels of performance, such as knowledge of higher-order learning skills such as evaluation and synthesis. There was a strong mandate to avoid focusing on knowledge acquisition in the classroom so time could be devoted to developing higher-order skills. Instructors were already using Blackboard a teaching and learning environment that could be used to organize instructional materials, provide forums for discussion and assessments. However, Blackboard-based courses lack the hypertext and media capabilities unless these materials are externally linked to the course interface.

Multimedia materials such as Functional Behavioral Assessments (Liapsin, Scott, & Nelson, 2000), a $79.00 program published by Sopris West were included in the in-class instruction. However, this program required two hours of class time to present and proved to be too expensive to require students to purchase for use outside of class. The cost-benefit of using multimedia programs in out instruction became a critical question to resolve when courses were being developed to be taught online. Once we began designing courses we realized that to match the quality of the courses in which multimedia was presented to the class and to accomplish the ambitious learning objectives needed by our students, tutorials and authentic case-based examples and simulations were needed. This choice of adding multimedia tutorials was validated by Welch and Brownell (2000) who recently developed a CD-

ROM multimedia instructional program and evaluated its use with undergraduate and graduate students. They found significant differences between pre-and posttest scores on content knowledge.

The Solution: Hypermedia Authoring

The university's technology-based courses were comprised of MS Word documents, web pages and some audio-visual PowerPoint slide presentations. These solutions were not able to match the interactivity standards established by the commercial materials. With a clear understanding of our instructional objectives and very positive experiences with commercial multimedia instructional materials, the course development team examined its course development options. It became clear that to move the course development to the next level, multimedia authoring needed to be part of the course development process. Multimedia authoring involves structuring content in a manner that is consistent with the instructional design: sequential in tutorial direct instruction model applications, and open-structured in constructivist model applications. In the tutorial applications, the metaphor of a book with chapters works well in developing a mental model of the instructional program (Lehner, 1987). Also, in the case-based authentic learning model advocated by Herrington and Oliver (1999) for teacher education there is a need to develop non-linear hypertext learning environments.

In examining the multimedia programs that are used in the classes, the tool used to develop the commercial materials was either Macromedia's Authorware or Director (Macromedia.com). Several of the multimedia programs our faculty found useful were developed as part of federal grant projects supported with hundreds of thousand of dollars in the budget. Additionally, university instructional support professionals did not have the expertise to create multimedia using these programs and certainly it was beyond the expertise the faculty. A problem with university course development is that faculty members are content experts not multimedia authors who work within limited budgets, so the search for an alternative authoring tool using product reviews (White, 1997) led the instructional technology support staff and faculty to Toolbook, a multimedia authoring tool.

Toolbook Assistant

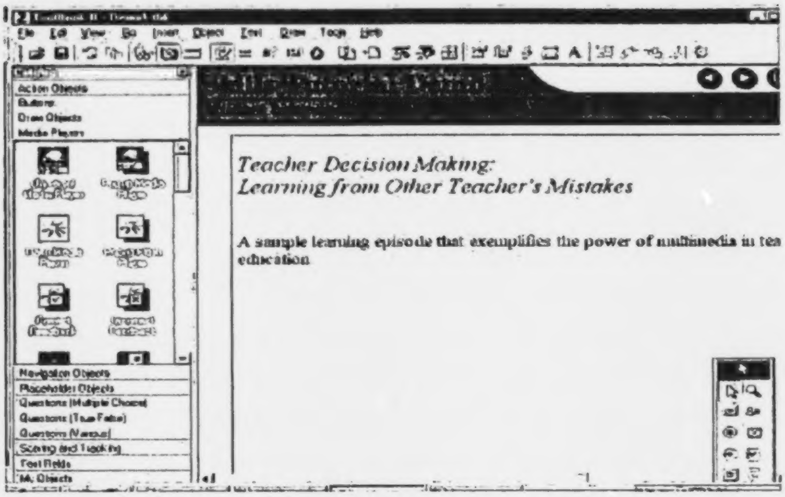
ToolBook Assistant (Click2Learn.com), a PC-based program, was selected as the authoring tool for this program redesign initiative due to its power as an authoring tool and its ease of use. Toolbook uses the metaphor of a book with chapters, table of contents, glossary and pages of content to ease the developer into the process of building multimedia instructional material. The program has a drag-and-drop interface that is easy for subject matter experts can create high-quality e-Learning content. ToolBook comes complete with a wide selection of ready-made templates similar to PowerPoint templates which facilitates a new author in preparing instructional materials quickly. The program contains a catalog of authoring objects (icons) to build your interactive content-assessment objects, media players, navigation panels, and other interactive objects, many with predefined behavior that you can customize. With its WYSIWIG page development, and the ability to toggle from author level to reader level with one click of a key, Toolbook provides immediate feedback to the developer.

From a student accountability and research perspective, Toolbook has a feature equivalent to the Authorware data tracking feature. The program can make a record or log of user data that is saved to a disk. This data tracking information can be used for verification of learner performance or as research data.

The development of multimedia incorporates the five–stage process as outlined by Jerram and Gosney (1995) which end with authoring. The technology used for authoring will in part creates a context to define the parameters of the final project, but does not control or drive the project. For example, once the authoring stage begins for a basic tutorial the faculty member:

- selects a template and a background which is similar to PowerPoint.
- creates or copies page layouts for text and media
- pastes text content into text boxes, and adds audio and video as it is needed to support the instuction
- makes hyperlinks to other pages, or pop up notes
- inserts question objects.

Many of these actions are easily accomplished by dragging preprogrammed objects from a convenient catalog onto the work space as shown in Figure 1. Immediate feedback to the student is accomplished by adding to quiz items. Context-based assistance is accomplished by using branching user paths which can lead to reteaching or additional examples can be placed into the program by answering questions in dialog boxes as the questions are created. The final product can be "packaged" for distribution as read- only files for Windows PC CD-ROM



Teacher Decision Making:
Learning from Other Teacher's Mistakes

A sample learning episode that exemplifies the power of multimedia in tea education

Figure 1: Toolbook authoring work space showing catalog of drag and drop items.

or converted to web pages for cross-platform accessibility through a process managed by an autopackaging feature. This process "collects" all of the media and support files, creates folders and places it neatly in a folder that includes an install/setup file and a reader file.

Conclusions

Toolbook Assistant offers the instructor who has both the content knowledge and interest in working with technology the opportunity to develop multimedia instructional programs for use by students online or from CD-ROM. The data tracking-log file function that makes a recording in the form of a text file on a floppy disk that can be submitted to the instructor via e-mail is especially valuable to faculty who wish to conduct research into learner performance and navigational patterns. The programs developed are easily edited and updated so a small project can be expanded and become more elaborate as formative feedback is received from students. In course evaluations from courses that have included multimedia materials as part of the instructional delivery, the student feedback has been quite positive. Therefore, if instructors wish to go beyond the use of web pages in a Blackboard-like teaching and learning environment and animated audio narrated PowerPoint presentations, consideration should be given to including multimedia authoring tools as an option for instructional material development (Mitchell, 1999).

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Meeting the Challenge of Teacher Education Through a Technology-enhanced Program of Studies

Lewis R. Johnson
Department of Specialized Education Services
University of North Carolina Greensboro
United States
Lew_Johnson@uncg.edu

Abstract: Special education is one of the most challenging specialties within teaching. It provides an excellent opportunity to test the promise of technology to enhance teacher education. As teacher educators, we are faced with a daunting task: to prepare teachers who have the professional knowledge, skills, and dispositions to meet the challenge presented by the special education classroom. To meet this challenge, the special education preparation at Arkansas State University redesigned its instructional design so that it makes full use of instructional technology options for teacher education.

Introduction

First year teachers have report that their teacher preparation courses do not sufficiently prepare them for the realities of the classroom. Moreover, recent changes in the performance-based teacher examinations have placed more emphasis on application of the knowledge and analysis of situations. As teacher educators, we must find ways to present information and encourage students to process that information prior to coming to class, so class time can be spent on actively making connections between the course content and field experience. The program of studies and courses in special education described in this case study of Arkansas State University accomplished this task and led to increased student learning, satisfaction, and sense of professional efficacy.

Program and Course Design

The work on program revision began with examining each course for content type according to Gagne's forms of knowledge and Bloom's Taxonomy. Courses that were heavily loaded in content were supplemented with text study guides, PowerPoint presentations that were accessible for review on the web before class meetings. Also, provided were tutorials designed from a direct instruction model that included many instructional supports, such as explicit help in organizing information through content maps, coaching, summaries and immediate feedback on comprehension questions. Due to the extensive knowledge base needed by students as a foundation for engaging in higher order learning, the critical need emerged to "package" content in a manner that would make it available for students to study outside of class. For topics such as Direct Instruction and collaborative consultation CD-ROM hypermedia tutorials were created that had the capability of recording on a student disk the "path" of the student through the tutorial and recording student performance on assessments. Through the use of these tutorials, especially the Direct Instruction tutorial, presentation of content and the demonstration of skills could be accomplished outside of class, so class time was used for viewing teaching clips and engaging in analysis of lesson plans and teacher behaviors.

Courses that involved application, analysis, and synthesis of information to solve problems included case-based situated learning materials. Situated learning incorporates into the learning environment: authentic contexts, authentic activities or problems, multiple perspectives, expert opinion, and opportunities for collaboration and reflection. This instructional design feature is ideally suited for preparing special education teachers, who are learning a body of knowledge and skills that must be applied in a simulated meaningful, complex context, such as a classroom. This situation reflects the context in which the information will be used in real life. These authentic contexts for learning anchored the instruction in reality which facilitated retention and application of the instruction. Langone, Malone and Clinton (1999) compared test scores of preservice teachers taught using either anchored or nonanchored instruction, a form of situated learning. The nonanchored instruction consisted of traditional lectures while the anchored instruction used video-based case studies. While no difference in test scores were noted between groups on tests administered immediately following the instruction, test scores of those receiving anchored instruction given eight weeks later were significantly higher than the nonanchored group. The authors concluded that retention of content was better for the anchored instruction group. The Teacher Problem Solving Skills (TPSS) (Fitzgerald, Semrau, Johnson, Kraus, Nichols, & Standifer, 1996) series of multimedia programs developed and used at Arkansas State University are integral components of the preservice preparation program.

Given this research, the Arkansas State University special education preparation program moved from an information dissemination model with assessments of low-level learning toward a model of instruction focused on higher-order learning and thinking. That is, it shifted from a Reductionist orientation to a Constructivist orientation as the student progressed to more advanced courses within the program (Herrington & Standen, 2000). This made course design very important. Careful consideration was given to the instructional design of courses, activities within courses, and the instructional conceptual framework. The **Instructional Events Model** (IEM) (Rosenshine & Stevens, 1986) was selected to guide our development process. IEM consists of nine elements: a) gaining the learners' attention, b) stating learning objectives, c) guiding the learners through learning activities, d) presenting information, e) coaching through learning exercises, f) facilitating interactions between learners, g) providing constructive feedback, h) assessing learners' performance, and i) promoting transfer of skills to new situations This selection was validated by research conducted by Welch and Brownell (2000) who recently developed a CD-ROM multimedia instructional program based on IEM design principles and evaluated its use with undergraduate and graduate students. They found significant differences between pre-and posttest scores on content knowledge. The following components were included in our technology-enhanced courses:

1. a comprehensive listing of specific knowledge and skill objectives to establish the expectations for the learning outcomes;
2. an instructor authored commentary for each module and each chapter which serves to alert the student to important aspects of the chapter and provide motivation;
3. multimedia presentations or tutorials of chapter content that include audio and video material to serve as introductions to the chapter before arriving in class;
4. reading study guides which help the student focus on important content;
5. case examples which serve to anchor the information in real-life situations and provide a common experience for discussion and analysis;
6. authentic activities to provide practice;
7. opportunities for in-class and online synchronous discussion using virtual class software;
8. a discussion web to provide a forum for sharing views and publicly reflecting on what is learned and experienced; and
9. on-line quizzes so the student can check his/her comprehension of the content.

Conclusion

It was the intention of this short paper to expand the notion of the technology-enhanced program and course from a web-based correspondence course to a carefully planned series of web-supported courses containing interactive CD-ROM multimedia tutorials and authentic case-based learning exercises. Consideration should be given to including technology resources beyond PowerPoint lectures and web links to improve student outcomes.

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Intergenerational Learning: A Model for Teacher Preparation

Deborah Jolly, Texas @&M University, US
Frank Clark, Texas A&M University, US

With funding from the Preparing Tomorrow's Teachers to Use Technology initiative a consortium of seven rural school districts along with Texas A&M University has designed an innovative approach for integrating technology into teacher preparation programs that allows thousands of minority, language minority, children of poverty and geographic isolation to access teachers that are better prepared to teach in their increasingly high tech classrooms. Through the use of an intergenerational mentoring program, pre-service teachers, university faculty, and K-12 teachers interact with one another to learn best practice and technology integration skills.

The need for institutions of higher learning to prepare students for a technological world is self-evident and is striking in an area that is geographically isolated such as East Texas. Here not only school districts struggle to get qualified technologically savvy teachers to fill classrooms but the university also struggles to provide the technical assistance and ongoing support to a faculty that is just now beginning to embrace technology. Finding technical support and training opportunities in the business world has proved expensive and non-existent when indeed the answer to the dilemma was immediately evident: use the existing pre-service teachers now in the College of Education to provide the assistance to faculty.

Why use a technical assistance group that ranges in age from about 18 to 24 years of age? First we know that this age group is made up of predominately the Net Generation (sometimes called Generation Y). The Net Generation, having grown up with the new technologies, enters our institutions of higher education with a much better comfort level for technology than the existing university faculty who grew up with television and radio. Consequently an "Intergenerational Digital Divide" exists. To compound the problem, a second divide exists in our state: that is, the technology infrastructure gap between public schools and higher education teacher preparation programs in Texas. Texas schools have experienced substantial technology infrastructure changes over the past few years. Colleges of Education, however, are limited in their ability to provide substantial pre-service training in Internet-based technologies so that beginning teachers may take advantage of this increased infrastructure. Rather than presenting exemplary models of technology-enhanced instruction to pre-service teachers, most Texas institutions of higher education are struggling with integrating technology into courses and content areas and in offering of on-line courses.

The design of this PT3 initiative, funded in the first round of funding in 1999, is to address the need for increased faculty proficiency in technology while recognizing the challenge and the potential of the disparity between faculty and students in technology skills. The goals of the project were to facilitate faculty development through both approaches: building capacity and providing tech support. We did this by: 1) developing proficiency of the faculty in the TAMU COE in the use of various instructional and communication technologies (building capacity); 2) developing capacity within the TAMU COE in digital media that supports the NCATE standards and the International Society for Technology in Education (ISTE) (building capacity); and 3) providing support to faculty transitioning to the new teacher training program by providing support in the area of technology support and infusion into the curriculum and coursework (providing tech support).

Program Description

The Technology Mentor Fellowship Program (TMFP) draws upon successful strategies evolving from programs funded by the Technology Literacy Challenge, specifically the Generation www y program, Gen Y Challenge Grant-Olympia, Washington) and the Profiler and Trackstar tools developed in a partnership with the current High Plains Regional Technology in Education Consortia. Training materials supplied through a partnership with Intel and Microsoft (Gates Foundation) through the Intel Teach to the Future initiative provided additional training and support.

The scope of work for the TMFP is to: 1) Provide teacher education faculty (campus based faculty, cooperating teachers, early experience supervisors) a system for technology training that:

- Provides intensive mentoring and support to faculty, and cooperating teachers in the field from pre-service teachers experienced in the process of integrating technology into instruction at the K-12 level;

- Identifies the growing knowledge base within college and school organizations, among students and faculty, and supports the sharing of both skills and knowledge through collaboration and the development of specific, skill related instructional objects;
- Provides continuous assessment of competence for college and school teacher education faculty, in the area of integration of technology into instruction;
- Provides professional development activities tailored to the particular needs identified by teacher education faculty regarding technology skills/processes for technology integration.

2) Provide teacher education faculty and pre-service teachers access to a repository of instructional objects designed to:

- Develop and use basic technology skills, skills in the instructional application of technology;
- Use technology-congruent pedagogy, such as project based learning and continuous skills assessment;
- Be searchable by their application to specific issues related to the integration of technology into instruction across grade levels, content areas, and national standards.

3) Provide opportunities to organize instructional objects into web-based courses.

Outcomes

The redesigned elementary and secondary teacher preparation programs became fully operational as field based programs during this TMFP initiative. The elementary program has 12 Professional Development Schools (PDS) and 10 Integrated Methods Schools (IMS) that support the preparation of approximately 430 teaching candidates each semester. IMS are pairs of schools that support the field-based teacher preparation programs. All methods classes are conducted on site at the schools. The department head of teacher education has worked closely with the TMFP project staff to provide the equipment and infrastructure to support technology integration throughout the teacher preparation curricula. To example, four "smart carts" have been placed at PDS/IMS schools to enable greater technology integration into the field experiences for our teaching candidates. The smart carts consist of a large heavy-duty movable cart equipped with a laptop computer with Internet card, a digital projector, a VCR, a digital camera, and a PolyComm (2-way audio-video communication system). In turn, TMFP project staff assigned a team of technology fellows (pre-service teachers) to assist the faculty in developing instructional objects for the methods classes and classroom activities in the school. This collaboration will be very significant in sustaining the goals of the TMFP initiative once the funding has been completed.

Early on in the project, logistical challenges became daunting for tracking the large number of technology fellows. Anticipating these challenges, project staff developed an Electronic Management System to track various forms of information and to aide in the data collection. The management system uses the Internet to address challenges associated with multiple levels of communications, project management and monitoring of electronic instructional object development. Profiler has been used to assess and monitor the ongoing progress of all project participants.

One key aspect of the program is the joint-creation of learning objects by faculty and their student mentor, as we believe this provides for support and builds capacity. It is clear that a large number of electronic objects have been created across a wide range of content areas for learners from kindergarten through graduate school. Of the electronic products created, three are directly associated with a n online asynchronous course that was offered during the year.

The initiative offers an extensive professional development program to enable all teacher educators to develop and assess their own changing skill levels for developing synchronous and asynchronous distributed learning systems. It also provides a vehicle for teacher education faculty to develop and demonstrate innovative learning resources, such as web-based learning environments, on-line forums, multimedia project-based learning activities for all components of their teacher preparation programs, and where appropriate, allows for the organization of related digital instructional objects into web-based courses. Findings from this study als o address issues related to intergenerational learning and cross-age teamwork,

Trainee Teachers Experiences of Using Information and Communication Technologies.

Gordon Joyes
Institute for Research into Learning and Teaching in Higher Education (IRLTHE)
Centre for Teaching Enhancement
University of Nottingham, UK
Gordon.Joyes@nottingham.ac.uk

Abstract: This article describes the ways new entrants to science teaching on a one year post graduate training course in a UK university develop the skills necessary to embed Information and Communication Technologies (ICT) into their teaching. This is set within a framework of national personal and professional standards which all trainees have to achieve. The complex process described involves an initial audit of their confidence in a wide range of ICT skills from e-mail to spreadsheets, the use of an ICT in science education portfolio to set targets and monitor achievements, the use of university based and school based tasks and the role of written reflections/assignments. In order to develop a greater understanding of the students' experience of, and attitudes towards, using ICT in the classroom; the students discourses as revealed through their written work have been analyzed and this approach is discussed.

Background:

In the UK, the notion of initial teacher *education* has been replaced by initial teacher *training* as signaled by having a Teacher Training Agency centrally involved with its administration and inspection. This work-place learning approach or apprenticeship model is reflected in the requirement that student teacher trainees now spend large amounts of their time working in schools. The school based element for a post graduate teacher on a 36 week course leading to Qualified Teacher Status (QTS) is 24 weeks. In the past few years UK Government initiatives have placed ICT at the centre of a skills focused drive within the curriculum (DfEE, 1997c). Minimum standards for ICT in schools have been set by the Government requiring: improvements in resoursing (a computer to pupil ratio of 1:7 for secondary schools; that all schools have ICT curriculum plans; that schools are internet connected with 20% via broadband). In addition individual funding has been provided for all teachers to receive ICT training in order to reach national standards by 2002. Alongside this there is the important notion that student teachers should be ICT competent in the classroom (Davis, 1992) and in 1998 the UK Government's Department for Education and Employment issued the 'Initial Teacher Training National Curriculum for ICT in Subject Teaching' (DfEE,1998). This ICT National Curriculum for student teachers is a very prescriptive document and is essentially the same as the standards required for all UK teachers by 2002. It contains 118 separate requirements and is organized into two sections. Section A is 'effective teaching and assessment methods' and section B is 'trainees knowledge and understanding of, and competence with, information and communications technology'. Thus section A is to do with classroom pedagogy or professional development and section B is to do with the student teachers' own ICT competence or personal development.

The concern over the past two years of implementation of this curriculum is that the classroom teachers and the mentors with whom the student teachers would be working for the majority of their time would in most cases only be beginning to explore effective pedagogy themselves (Bell & Biott, 1997; DfEE, 1997a ; Galanouli & McNair, 2001; Goldstein, 1997) and that an adequate level of resourcing would not as yet be in place (DfEE, 97b). Indeed often schools look to students and newly qualified teachers to invigorate the use of ICT within the subject area (Fisher, 1996). A UK Government survey (DfEE, 2001) indicates an improving teacher confidence and competence, and improvements in aspects of resourcing, but the reality is that the indicators used do not relate to the actual pedagogic impact in classrooms and provide limited descriptive statistics. What is of direct relevance to this paper is that the survey revealed that 51% of the science teachers in the 67% of schools that responded saw ICT as having little or no benefit. This finding is supported by the more general Ofsted report on ICT, which indicated that the general improvements in teacher confidence had not translated into effective pedagogic practice (Ofsted, 2000a) and that ICT was a common omission in science department planning at lower secondary level (Ofsted, 2000b).

The rest of this paper describes the ways this ICT National Curriculum has been implemented within the one year PGCE course at the University of Nottingham in the UK in ways that recognize the varied experiences and opportunities students teachers may have in school. It then explores their understanding of the use of ICT in classrooms by analyzing the ways they describe its use.

The Framework for Development

Whilst the UK Government imposes rigorous and detailed standards, the ITT providers' agenda of developing reflective, principled and critical practitioners has continued. Support for student teachers in taking ownership of their own personal and professional development has been the general principle underlying the pedagogy used by UK HE institutions. The approach used at the University of Nottingham, which follows a reflective practitioner model (Schön 1987, 1991), recognizes the varying pre-course experiences of the students, the varying range of ICT skills and the differing school cultures in which they carry out their practice. It does this through an auditing process, which involves the ongoing setting of and the monitoring of individual targets supported by the use of a student completed ICT in science education portfolio. However, in order to support the development of effective pedagogic skills, taught sessions and reflective assignments based on observed classroom practice of science teachers, as well as of their own practice, are used.

This process is embedded within a wider approach, which has at its centre a Record of Professional Development (RoPD) of which the ICT in science education portfolio fulfils one small part in supporting student teachers in monitoring their performance. This approach is taken for all the areas of personal and professional development within the wider national framework of teaching standards throughout the course. For science student teachers there are over 400 separate standards for which there must be evidence of achievement to achieve QTS status. These standards are described within the areas of Knowledge and Understanding; Planning, Teaching and Class Management; Monitoring, Assessment, Recording, Reporting, and Accountability; Other Professional Requirements; ICT; Communication (spelling, punctuation and grammar); Numeracy (mental/general arithmetic, applications of measurement, basic algebra, using statistical information).

The RoPD contains all of the targets the student teacher has set through the course within the areas above, together with evidence of their achievement. The process has as its basis SWOT [1] analysis and a SMART [2] target setting cycles which are carried out at regular intervals during the course and are supported by group and individual tutorial sessions. What on the surface may appear to be a burdensome administrative task is critical as the means of raising student, tutor and the supporting teachers in schools' awareness of the student teachers' professional development needs. This information is used in the weekly discussions of student progress with the school mentor whilst the student is in school and is a means of focusing the student on the wide range of ICT and other skills they need to develop.

The ICT Activities

The framework consists of the components or activities which are carried out in a sequential manner and these are set out in figure 1.

Evaluation of Personal and Professional Competence

The evaluation of personal competence is achieved through the on-line student teacher completed rating of confidence in personal ICT skills. This measure of their confidence in their use of the wide range of ICT applications available is clearly related to their competence to use these in the classroom. Analysis of the confidence ratings reveals that for most student teachers, competence can be associated with a limited number of applications, e.g. word processing, spreadsheets, email (Fisher, 1998). Experience of data logging or using modeling or simulation software is not widely spread amongst the science group and some mature students have had little experience of anything except word processing. Thus the prospect of having to achieve the standards for ICT which include professional (classroom) practice can be a little daunting for some.

The evaluation of the student teacher's professional competence is on the surface unproblematic. They must go through the process outlined above providing evidence for the achievement of the standards. However what is of real interest is not what they have achieved in terms of the number of ICT lessons taught or how widely read they are in this area, but how they value the role of ICT in the science classroom at the end of their training. It is this that one suspects will be a key factor in their wish to continue to develop this aspect of their teaching. The components in figure 1 provide written examples of their explorations in this area and an analysis of the discourses that these students use to describe what is happening in the classroom form the focus of an ongoing study and a discussion of the approach and some initial findings form the basis of the rest of this paper.

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[1] SWOT analysis is the process of identifying Strengths, Weaknesses, Opportunities and Threats as part of the process of setting targets

[2] SMART targets are Specific, Manageable, Achievable, Relevant and Time-related

Phase on the course	**Component**	**Description**	**Purpose : (All components raise student awareness of achievements and needs)**
Pre-school experience	1.Initial audit of personal ICT confidence	On-line student completed rating of confidence in personal ICT skills.	To provide whole course information as to student needs. To support the planning of university tutor led taught sessions. To support personal skills development.
	2.RoPD and ICT in science teaching portfolio task.	Students complete a SWOT analysis and set SMART targets at five points in the course.	To support the ongoing development of ICT skills and to provide evidence of achievement of the standards for QTS
	3.University based taught sessions	Students are introduced to the full range of ICT use in classrooms through workshops with effective classroom teachers and their university tutors.	To provide hands on experience for students of using data-logging, spreadsheets, data bases, PowerPoint, Internet, simulations etc.
1st school experience (Teaching practice in school 1)	4.Observations in school *	Written assignment of the observation and evaluation of two observed lessons that use ICT. This is followed by ongoing observation throughout the time in school.	To support reflection about effective practice in embedding ICT in the classroom.
2nd school experience (Teaching practice in school 2)	5.Teaching using ICT *	Written assignment involving the evaluation of the students experiences of teaching two lessons that incorporate the use of ICT within them.	To develop professional competence in use and evaluation of use of ICT in the science classroom.
Post – teaching practice	6.Commentary on the use of ICT in the classroom *	Written assignment involving a reflection on classroom practice and through reference to the literature on the value of ICT in teaching and learning in science teaching.	To provide an opportunity to reflect more widely on effective use of ICT .
3rd school experience in school 3	7.School Based Inquiry tasks *	Schools request students to undertake a curriculum inquiry project during the final phase of the course. Many of these have an ICT focus.	To provide an opportunity for further development of classroom skills in this area. The projects involve curriculum development, teaching and evaluation as well as a process of communication of the project within school and more widely through a student led conference
Post – school experiences	8.Final audit of personal ICT confidence	On-line student completed rating of confidence in personal ICT skills.	To provide evidence of achievement for students and to support the completion of the final RoPD - the statutory Career Entry Profile.
	9. Final completion of the ICT in science teaching portfolio *	(Written assignment) This contains a description of the UK National ICT trainee teacher standards and the students indicate which they have achieved providing evidence from a range of sources including the tasks above.	To provide evidence of achievement of personal and professional ICT skills for students and to support the completion of the Career Entry Profile which forms the basis of professional development within the first year of teaching

Figure 1: The ICT components (All tasks are monitored and feedback is provided. Those components marked with an asterisk are formally assessed.)

Analysis of Student Teacher Discourse about ICT in the Science Classroom

The approach taken initially has been to focus on a sample of nine student teachers and analyze their written assignments that relate to their own classroom practice, components 5 & 6 (see figure 1), in order to understand the ways they perceive the value of ICT. Component 5, 'Teaching using ICT', is a student evaluation of their experiences of teaching two lessons that incorporate the use of ICT within them, whereas component 6, 'Commentary on the use of ICT in the classroom', is broader and involves a reflection on science classroom practice with reference to relevant literature. The researcher was their university tutor and thus had extensive professional knowledge of each of them and also of the schools in which they were based and this supported the analysis in validating what the students had written. In fact the researcher had observed all of the student teachers in the sample using ICT in the classroom. Discursive psychologists (Wetherall, 2001) claim that people use language to create the objects of which they speak, to position themselves and others, and to make some ideas seem more natural and right and others unthinkable. In this light what student teachers express about their classroom practice in the language they choose reveals their constructed perspective.

Results Overview

The analysis revealed the issues raised by students and these provided an operational perspective, i.e. they were describing their actual practice in school rather than theorizing about it. However the 'Commentary on the use of ICT in the classroom' did reveal the ways theory was viewed in relation to their classroom practice. The analysis revealed a set of paradigms for use of ICT in the science classroom and these are set out in figure 2.

Focus	The rationale for the use of ICT
Curriculum (Knowledge and understanding)	***The instructional paradigm*** (Drill & practice, tutorial). Reference was made to the ways pupils were motivated to repeat on-line quizzes in order to improve their performance. ***The revelatory paradigm*** (Simulations). ***The conjectural paradigm*** (Modeling).Reference was made to the use of spreadsheets and the ways pupils could make predictions and test these out easily. ***The emancipatory paradigm*** (Labor saving/allowing time for higher order thinking). The use of data logging was referred to in that automatic graph plotting allowed more time for interpretation. **The modernist paradigm** (modern, authentic, contemporary). This refers to the ways the Internet (and the use of hand-held data loggers) were viewed as being 'modern'. This carried with it the implication that Internet resources were more up to date than text books and potentially more authentic and real. An attractive notion of science and of scientists could be presented, rather than the traditional 'old fashioned' image. (Driver et al., 1996)
Curriculum (Process skills)	**The experiential paradigm** (Development of ICT skills including information processing and data handling skills, e.g. selecting & summarizing information). This was expressed as providing opportunities for pupils to gain hands on experience of using new learning technologies and developing new skills with minimal teacher intervention.
Pupil (Generic skills)	**The empowerment paradigm** (Giving ownership of the resource and learning to the pupil). This was expressed as a desire to provide pupils with opportunities to own the resources they selected, to give them a sense of discovery and of bringing something new into the classroom as well as raising pupils' self-esteem. **The professional paradigm** (Allowing pupils to work like professionals, drafting and then producing high quality/professional looking output). This covered the use of presentation packages, such as word processing, paint, spreadsheet and PowerPoint etc. Student teachers' valued the fact that pupils were able to work in professional ways producing professional looking outcomes, by drafting and redrafting, using spell checks etc. raising self-esteem.
Teacher (Classroom management and organization)	**The pragmatic paradigm** (Choice of use based on practical planning needs). For example, the need for a variety of teaching and learning approaches, the lack of equipment available to teach a topic, the need to make a boring topic interesting, the need to increase the variety of resources available etc. **The impersonal paradigm** (Sensitive topics can be accessed 'privately' by pupils) Coverage of sex education through an Internet site, that provided a range of resources, an animation and an on-line quiz, stimulated a wide range of questions which they were keen to share (confidently) with the teacher. The impersonal nature of the resource was planned to help develop pupil confidence as there was less opportunity for teasing or for feeling embarrassed. **The motivational paradigm** (Teachers recognise that ICT can motivate pupils) The student teachers' all assumed that pupils would find the use of ICT in the classroom a motivating experience.

Those in italics were first put forward by Kemmes.and reported in Wellington (2000)

Figure 2: The rationale for use of ICT in the science classroom

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Conclusions

The analysis of the student teacher's witten reflections revealed interesting differences between their perspectives of the use of ICT in classrooms. Most focused on the set of teacher and pupil paradigms as described in figure 2. For them, ICT was perceived of as just another tool to be used within the classroom. It was most often valued in pragmatic and motivational terms rather than being selected, because it was able to deliver the curriculum in a 'better' or value added way. However, this value added perspective predominates the literature in terms of justifying the use of ICT in classrooms. Interestingly, those students who made particular reference to the curriculum focused paradigms seemed to consider the use of ICT in classrooms as something 'extra' of 'bolt on'. Their rationale for use was not described in terms of their more general values and beliefs about teaching and learning, whereas for those who made reference to the pupil focused paradigms this link was explicit. A teacher who awaits the ideal curriculum opportunity for using ICT will not be exploiting its use as widely as the teacher who is taking a more holistic teaching and learning perspective for their rationale for use. Perhaps there is a need for a shift in focus from the curriculum, particularly the knowledge and understanding perspective, to a more holistic teaching and learning perspective when considering the value of ICT in the classroom. This would encourage student teachers to view their use of ICT in the classroom in terms of their own developing models of teaching and learning. A useful tool in this process would be their reflections on their own use early on in their course in that this would reveal the wide range of paradigms set out in this paper; a powerful way of exploring with them the ways ICT fits into heir developing understanding of effective pedagogy. Perhaps if serving teachers could explore their notions of effective teaching and learning and how ICT could be used to support this, there would be fewer thinking that ICT brings little or no benefit to the science classroom.

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NEW! ISTE NETS Resources for Preparing Teachers to Use Technology

Peggy Kelly, California State University, San Marcos, US
Lajeane Thomas, Louisana Tech University, US

DESCRIPTION: Session includes samples from *NETS for Teachers: Preparing Teachers to Use Technology* integrating ISTE NETS in teacher preparation foundations, methods, student teaching, and classroom instruction.

SUMMARY: Dr. Peggy Kelly, Co-Director of the ISTE NETS for Teachers Project and Document Development Director with Lajeane Thomas, ISTE NETS Project Director will present sample learning activities from the newly released *NETS for Teachers: Preparing Teachers to Use Technology* book. The document includes standards-based lessons for preparing teachers or teacher candidates to use technology effectively to support learning in mathematics, science, social studies, and the English language arts. Additionally, activities applying technology to support communications, research, problem-solving, concept mapping and other applications cutting across subject areas will be included. The session will consist of an overview of the resources included in the document including specific examples and Web locations where the contents of the document can be located.

The purpose of the session is to reveal model lesson resources based on both the National Educational Technology Standards (NETS) for Teachers and subject area standards. The lessons will illustrate how teaching activities for each content area can be supported by technology thus addressing both the content standards and technology standards within the same learning activity sequence. The underlying goal of the session activities is to provide a framework for establishing new learning environments supported by technology and guided by the national standards of the professional societies. These new learning environments rely on integration of research-based learning theory and on technology as a catalyst for promoting these learning strategies in classroom practice.

Participants will leave with an understanding of the NETS for Teachers and how those standards can be addressed in programs for preparing teachers to use technology. They will receive examples of the learning activities, the Web address where all of the lessons and resources can be found on the Internet, and will be provided with insights regarding how the standards and resource materials can be used to prepare both preservice and inservice teachers to meet the ISTE NETS for Teachers as well as subject area standards.

Resources can be found at the following Internet locations:
http://cnets.iste.org
For further information contact: Peggy Kelly at http://www.csusm.edu or Lajeane Thomas at lthomas@latech.edu

Removing the Walls: Creating a Virtual Classroom to Link Theory and Practice in Teacher Education

Susan J. Kiger
School of Education
Indiana State University, USA
Email: eskiger@isugw.indstate.edu

Abstract: This short paper describes the outcomes of an effort to link field-based practitioners with teacher education students both virtually in the campus-based portion of a course as well as physically in the field-based portion of the course. The objective of the project was to structure an ongoing, substantive, theory/practice-based discussion.

Project Background

At Indiana State University an upper-division blocked content literacy and general teaching methods course is conducted on campus. This on-campus course also has a lengthy early field experience (EFE) carried out in public high schools as preparation for student teaching. On campus, students are introduced to various theoretical frameworks that are to "guide" their thinking and action as they plan for, render, assess, re-mediate and reflect on instruction delivered during the field experience. As always, one of the primary challenges is supporting movement beyond Lortie's (1975) "apprenticeship of observation" so that pre-service teachers reflectively address student need rather than simply reproducing the practices learned through their twelve-plus years as public school students. In response to this challenge, our efforts focus on "grounding" these pre-service teachers in relevant theoretical frameworks so that as they move into the field experience, they are better able to respond to the diverse needs of the public school students they encounter. Of course, reflection about the link between theory and success in practice (i.e., careful application of a particular learning theory for a given group of students actually does support student achievement) is critical to the ability and propensity to move beyond an "apprenticeship of observation."

Schon (1987) established the centrality of the role of reflection in such professional development. In the context of this course, Zeichner and Liston's (1987) Reflective Teaching Index provides a framework and process that challenges students to thoughtfully connect theory with practice. However, given the centrality of dialogue between pre-service teachers and practitioners as they confront the complexities of practice during the EFE, and the somewhat peripheral role of the university professor during that time, various means of enhancing, or grounding, that conversation to create the reflection required were considered.

As I considered this dilemma, the parameters for its resolution became quite clear. I needed to create a time and space for the reflective dialogue needed, and I needed a way to involve practitioners in my course so that the theoretical frameworks and language used could become common to all. In short, I needed to remove the walls between the campus-based component of the course and the field, and between the professor and the practitioners. My solution, I believed, was in cyberspace; I would create a virtual classroom.

Primarily, the software available on campus, Blackboard's CourseInfo, drove the selection of the environment for my virtual classroom. That environment would not only allow students and practitioners alike access to the required reading materials, but would also provide an electronic forum for discussion accessible only to those enrolled in the course. Because electronic forums are increasingly becoming a viable alternative for supporting reflection (Burley et al, 2001; Kerka, 1998), and this environment allowed the discussion to be fostered in close virtual proximity to relevant theory, it seemed the most appropriate solution for the grounded reflection sought.

Findings

In terms of usability, participants reported that the password-protected environment was easy to navigate and felt that, because of password protection, the electronic forum was a "safe" and private environment for open discussion. Additionally, having the discussion based on the web rather than "distributed" to participants not only prevented mailbox "clutter," it also provided an environment where a number of topical forums could be established within which a number of related threads would support conversations. Discussants reported that because discussion threads were topically sorted, particular conversations were easy to follow and participation was encouraged.

Preparing participants to enter and dialogue in cyberspace presented differing demands for pre-service and practicing teachers. Pre-service teachers had been engaged in listserv conversations for at least the year prior because of program course requirements. These individuals had been given direction and appropriate feedback concerning online professional discussions. Practitioners were also supplied with the same basic information, though in a manner consistent with their professional stature. Both groups were given direct instruction on the "mechanics" of use of the forum. In terms of transitioning to conversations among participants in cyberspace, there had been face-to-face dialogue between most of the students in the course and the practitioners, and many of the practitioners knew each other professionally. Of course, some of the pre-service teachers and practitioners had never had a face-to-face meeting, but this did not influence online conversations according to participants.

Equipment proved the most daunting challenge. Because of the demands of this course, pre-service teachers had few problems because they had been challenged to locate and keep accessible the necessary equipment. Also, because computer use is such an integral part of completing assignments for most college courses, this was not much of an obstacle. Students reported that the extensive use of the software prior to engaging in the electronic forum helped them feel comfortable with negotiating its use. Practitioners faced more challenges, however. For many, available equipment at the school was not "fast" enough to make communicating with it an efficient use of their limited time. Time limits, once home where more appropriate equipment was available, prevented practitioners from participating more. While a listserv might have addressed some of the access issues, it would not address the privacy issues and would not have provided the organization necessary to make sense of the wide range of topics over which conversations convened.

Nonetheless, substantive conversations did occur. Even with relatively little preparation for conversing, practitioners were astute in finding and addressing pre-service teachers' concerns. Apparently, they are masters of understanding the sub-text, even in cyberspace. Among others, discussion topics included management issues; interface with parents and the community; current trends in curricular approaches; recruitment of students to content areas; career education; supporting "at-risk" students; influences of student's home life on teachers' instructional strategies; homework; graduation testing; tips on effective use of particular instructional strategies within various disciplines; safety in instructional areas; establishing relationships with students; infusion of multiculturalism; infusion of technology; service learning; licensing and re-licensing; sharing of professional information; marginalization of particular disciplines; funding; assessment strategies; teaching across disciplines, etc. In terms of frequency, the "bulk" of conversations occurred during the early field experience (EFE). Post-EFE conversations were few and primarily considered issues of time management, seemingly reflective of students' projections (or concerns) for student teaching. Unfortunately, use of theoretical frameworks and language from the course, the prime reason for establishing the forum, was not supported. Practitioners did not read the course materials primarily because of time factors. However, some of the desired theory was discussed, but the language did not directly reflect that used during the campus-based portion of the course.

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Connecting Curriculum and Technology: The Integration of Theory and Practice in Civic Education

Miri Kim
Department of Curriculum and Instruction
Indiana University
United States
mirikim@indiana.edu

This presentation will report the results of a research study conducted during the 2000-2001 school year in a midwest middle and high school. One of the central arguments in civic education is how we can make social studies curriculum work well in a real context: the seamless integration of theory and practice. Web-based instruction (WBI) can help to solve this explosion of problems. In this presentation, I will demonstrate that the best approach to effective civic curriculum development is to synthesize knowledge and skills with actual practice. Guidelines for designing civic education programs using WBI will be explained. Also, detailed methodological issues regarding WBI for civic education will be mentioned. Based on the findings of the research, I will address several future research questions in the last part of the presentation.

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Design and Practice of the Technology Integrated Teacher Education Program for Parental Engagement

Miri Kim
Department of Curriculum and Instruction
Indiana University
United States
mirikim@indiana.edu

This paper is to design and implement a technology integrated social studies methods course in order for preservice teachers to have a better understanding for engaging parents into their children's education. The schools are social systems that include parent, communities, and school professional reinforcing each other's efforts to keep students in schools. Especially parents working with schools and community are vital to the improvement of schools and neighborhoods. In this paper, several obstacles in participating in their children's education are discussed. Further, it is argued that these problems are not about knowledge but about institutional settings, social structures, values, goals of the school, and life style. We need to develop a program with an effective communication tool to improve the communication between teacher and parents in a real setting. If the teacher education program does not implement this new method, our future teachers will be limited in their communication skills with all parents. In this paper, a program for preservice teachers is explained.

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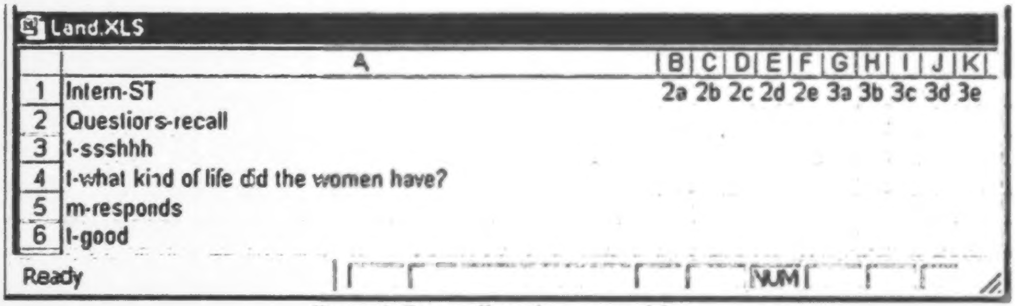
SUPPORTING THE NOVICE TEACHER

Dr. Michael Land
Dr. Bambi Bailey
Dr. Stan Harztler
Dr. Mary Ann Coe
Dr. Martha Burger
Dr. Robert Redmond
West College of Education
Midwestern State University
Wichita Falls, Texas
michael.land@mwsu.edu

Abstract: The field-based undergraduate teacher education program at Midwestern State University has been designed using TxBESS standards (PathWise, FrameWorks for Teaching). We are using Palm computers to collect data based on these standards. Data are collected in the field setting, using spreadsheets, word processing or Learner Profile software (Sunburst). The data are used during post-conferences with student teachers or interns to help in their continual development as teachers. The data will also be used as an assessment of the university's curriculum.

Our undergraduate teacher education program is based on the work of Charlotte Danielson, as presented in *Frameworks for Teaching* and her work at ETS's *PathWise*. The state of Texas has also adopted these standards for first year teacher support. We use Palm hand-held computers with spreadsheets, word processing, and Learner Profile (Sunburst). Standards that will be studied during a student teacher or intern visitation by the university supervisor are downloaded to the PDA. During the visitation, data based upon these standards is collected. The University Supervisor is free to select the type of software comfortable to her/him to collect the data.

One method used to collect and present the data is briefly described here. The data are collected in the field using a spreadsheet (Figure 1) on a Palm computer. The spreadsheet data can be shared immediately with the intern in either printed or electronic format.



	A	B	C	D	E	F	G	H	I	J	K
1	Intern-ST	2a	2b	2c	2d	2e	3a	3b	3c	3d	3e
2	Questions-recall										
3	t-ssshhh										
4	t-what kind of life did the women have?										
5	m-responds										
6	t-good										

Figure 1. Data collected in a spreadsheet.

Then the data can be easily imported into a database (Figure 2) where they can be categorized, collated by query, and prepared for export.

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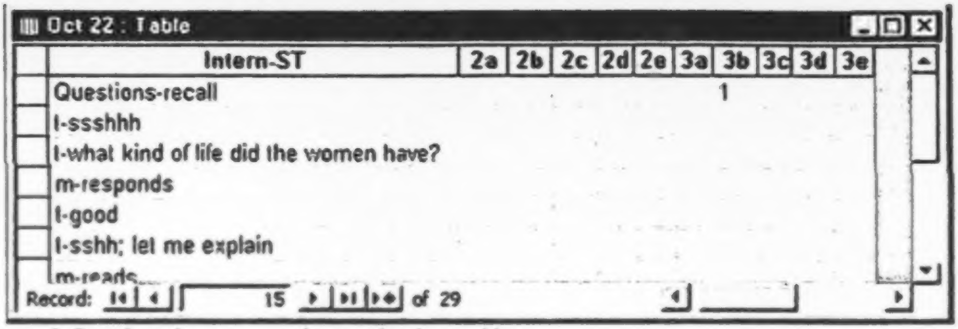

Oct 22 : Table

Intern-ST	2a	2b	2c	2d	2e	3a	3b	3c	3d	3e
Questions-recall							1			
t-ssshhh										
t-what kind of life did the women have?										
m-responds										
t-good										
t-sshh; let me explain										
m-reads...										

Record: 15 of 29

Figure 2. Data have been imported into a database table.

Finally, the category data can be placed into a word processor in a format for discussion by the observer and the intern (Table 1).

Notes of evidence by Component	*Component summary*	*Notes of Intern Reflection*
3b: Using Questioning and Discussion Techniques		
Trying to get all to participate; critiques. Asks for cities Ss have generated. These cities are primarily in the SW. Where do you suppose the English/Spanish/French are?	Most T questions elicited factual recall and did not result in discussion. Limited student participation.	

Table 1. Data collated by category.

During the paper presentation, we will share our experiences, as well as student teachers' reflections.

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Grant Writing for Preservice Teacher Educators
Using Computer Technology

Qiuyun Lin
Dept. of Professional Studies in Education
Indiana University of Pennsylvania
United States
xrdj@iup.edu

[Abstract] In this short paper, I discuss the potential of integrating technology into grant writing to enhance preservice teacher education, focusing on successful grant writing strategies and ways to integrate computers into grant writing.

Preservice educators can enhance the quality of education by obtaining grants for special projects (Bartlett II., Mupinga & Higgins, 2001). However, for many of the preservice teachers, writing a grant proposal to secure external funding is a daunting task. In this article, I discuss the successful grant writing strategies, and ways to integrate computers into grant writing.

Successful Grant Writing Strategies

Following the format. It is paramount to follow precisely the format specified by the grantor. In addition to a title page, abstract, and a table of contents, most proposal formats contain eight components: title page, abstract, introduction/problem statement, goals and objectives, methods and procedures, evaluation, personnel and budget.

Crafting Proposals. Merely including the required information in each component does not necessarily mean that funding will occur. Writing a successful proposal often requires following directions as stated below:

Tip 1: *Know your audience.* You must assess your needs and prioritize them before writing a proposal to secure funding (e.g., knowledge of funding agencies). Match your needs to those of the funding agency (Messner, 1996).

Tip 2: *Focus on the details.* Make sure that in crafting your proposal it includes the important elements of title page, abstract, statement of problem, goals and objectives, methods, evaluation, personnel, and budget. The agencies want to know what they are supposed to fund.

Tip 3: *Your proposal must be well written to receive funding attention.* No "ifs" "ands" or "buts"! Try to be as convincing as possible!

Tip 4: *You must be knowledgeable about the core tools of technology to explore your writing strengths.* Go to the word processer, or connect yourself to e-mail and the Internet (Edyburn & Weaver, 1998).

Tip 5: *Stay alert.* Your knowledge of technology can help you participate in the academic community, locate information, and enjoy receiving funding opportunities.

Integrating Technology into Grant Writing

Using computers to create documents. Today, most people use computer technology when creating documents. The computer, with common word-processing software such as Word and WordPerfect, can automatically generate a table of contents, format all headings, and check for spelling and grammar errors. Some funding agencies even require the submission of proposals online (see the Web sites for the Kellogg Foundation [www.wkkf.org] and the Ford Foundation [www.ford.org]). In such cases it is important to follow the instructions for submission, which may include font type and size and proposal length. The major advantage of using technology to create grant proposals is the availability of features such as templates (pre-formatted documents), spreadsheet calculations for budgets, and copying, cutting, pasting and saving as electronic file (Bartlett II, Mupinga & Higgins, 2001).

Using world-wide web to find potential funding sources. Preservice teachers can find potential funding sources in directories and in the Federal Register, which are carried by most libraries. These sources, however, though useful, may not offer the most current information. The most up-to-date sources and comprehensive listings of funding agencies can be obtained on the Internet. Because the Internet changes daily, it is essential to use search engines to find new funding opportunities.

Using the computer allows the grant writer to make minor changes and resubmit the proposal to other funding agencies if needed. In addition to Internet sites of potential funding agencies, sites are also available that provide grant-writing techniques and tips. Using this technology to its fullest capabilities will make the process of grant writing easier (Hult, 1992; Moursund, 1995a, 1995b; Dyrli, 1996).

Conclusion

Grant writing is a means by which preservice teachers at any stage of development come to see themselves as inquirers about curriculum, pedagogy, and educational issues (Gore & Zeichner, 1991). When teacher educators include the grant writing projects in their curriculums, they acknowledge the complexity of teaching and their commitment to prepare teachers who will continue to learn from their own research experiences.

Computer technology has certainly simplified the process of writing a grant proposal. To increase effectiveness and efficiency as researchers, preservice teacher educators are encouraged to exploit the potential technology can offer, to make full use of an integrated desktop of electronic tools to support their work.

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Technology Training for New Elementary School Teachers

Donna Lund
Department of Education
Robert Morris University
United States
lund@robert-morris.edu

Abstract: This paper is a report on the development and implementation of a new elementary education program which emphasizes technology integration in all education and methods courses. Observations of teaching and learning strategies used by the instructor and students in the first required educational technology course, interviews, and surveys administered at the beginning and end of the course show patterns of resistance as well as receptivity to new methods and tools for structuring learning environments. The results of this study can be applied to similar programs designed to enhance technology expertise for both pre-service and in-service teachers.

Introduction

In the National Center for Education Survey of 2000, only one-third of fulltime regular public school teachers reported feeling well prepared to use technology in their classrooms. Many respondents said that they had not received adequate training and needed to learn not only how to work the equipment but how to incorporate technology into their daily lessons (Jones, 2001). Since 1991, the United States has spent more than $19 billion on developing information technology infrastructure for the nation's public schools, with district-level expenditures surpassing $5 billion in 1999. In spite of the growing access to technology, the U S Department of Education calculates that "only 20% of the 2.5 million public school teachers feel comfortable using these technologies in the classroom" (Are teachers, 2001, p.83). Even schools which have adequate equipment report it being underused or not used at all, simply because "teachers do not know what to do with it" (Harmon, 2000, p.1). Slowenski (2000) reminds us that in order to achieve NCATE accreditation, teacher-training programs must demonstrate a commitment to preparing candidates who are able to use educational technology to help all students learn. Yet, not all colleges follow NCATE guidelines, and as Renwick (1999) points out, eighteen states do not even require courses in educational technology to obtain a teaching license. Teacher training institutions must adjust programs in order to meet the needs of "a new demographic group of students…techno-literates…who expect learning to be fun" and whose parents expect "customization, flexibility, and immediacy" in the learning environment (Wright, 2000, p.37). Our university, which had previously offered only secondary education, responded to the call for creative initiatives by developing an entirely new program for elementary education, with an emphasis on technology. Our experiences with the first class of students to enter the new program demonstrated how a single semester of intense technology instruction can raise the confidence level of future teachers even as it raises their awareness of how much more there is to learn about infusing new classroom technologies into daily classroom instruction.

The Program

Before writing our proposal to the state asking for accreditation of our new program in elementary education with an emphasis on technology, we surveyed over three hundred elementary school administrators to determine the exact areas of technology expertise they want teachers to have. In addition to expressing interest in hiring new teachers with skills in electronic publishing and instructional software, principals cited a need for teachers who could "trouble-shoot" and solve technical problems wherever they might arise. They also wanted new teachers to be able to assess equipments needs, make recommendations for new purchases, and install and implement new equipment. Rather than re-train existing (and possibly resistant) faculty, these administrators looked forward to hiring new teachers who could bring new knowledge and serve as technical resource persons for the rest of the faculty. In response, we developed a program that would build on the technology requirements already in place for our university's core courses, taught in classrooms which are all equipped with presentation devices (document camera, VCR recorder/players, computer projection systems). The new syllabi we wrote for all elementary education and methods courses require integration of technology into the instructors' as well as the students' planning and presenting of lessons and projects. The college provided funds for a new Education Resource Lab, which contains the following: Dell Personal and iMac computers, a color projector capable of showing images from the computer, a document camera, DVD/ VHS, an overhead projector, LCD panel, smart board, digital camera, digital video camcorder, and an Ellison Press (a cookie cutter for paper used primarily in Elementary school).

The Students

As we recruited our first class for this new elementary education program, we deliberately sought students who had been leaders in high school, who had demonstrated an interest in working with children, and who had high academic credentials--a minimum of 1000 on SAT and 3.4 GPA; or 1050 SAT and 3.2 GPA; or 1100 SAT and 3.00 GPA. To follow and monitor the progress of this select group and to gather data on the strengths and weaknesses of the program, I audited the first education course taken by our incoming class of twenty-three candidates--ELED 1000, Technology for Education. At the beginning of the term, the instructor administered a survey in order to determine the students' current level of knowledge and degree of comfort in using the technology tools that would make up the course content: e-mail, internet, video camera, digital camera, document camera, scanner, smart board, LCD panel with overhead, desktop publishing and spreadsheet software, using software to import graphics, installing software to a hard drive, putting data on a CD ROM, hooking a computer to a VCR or TV, and selecting software for children. All equipment necessary for learning these tools was made available to students in the newly established education resource center, which students could use during class time and during lab hours, under the supervision of the graduate assistant. A review of initial survey findings shows that the incoming students were most confident with common technologies such as word processing, internet searching, using e-mail, and using a still camera. In the middle range were devices such as the video camera, desktop and spreadsheet software, the scanner, the digital camera, and the slide projector. At the lowest levels of confidence were these skills: installing software to a hard drive, using a document camera, setting up a computer from scratch, and hooking a computer to a VCR or TV. The incoming survey also questioned students about their expectations of the challenges and rewards of the technology component of the new elementary education program. Only four students stated they were "not nervous" about the technology component, but all students agreed that their technology skills will be "very important" in landing a job. The majority of the incoming students described themselves as having "average knowledge of technology." Some students had a previous college computer course, CI 212, but others were taking this introductory course concurrently with ELED 1000.

Of the twenty-three students who entered the course, four dropped out of the ELED program at the end of the semester. The course may have helped students to either solidify their commitment or to realize that elementary education was not their best career option. In addition to differing levels of commitment, the students in this class demonstrated differing levels of comfort with technology. Some had extensive experience with computers and other technologies in their jobs or homes, while others were neophytes. In addition to these gradations, I had expected to find gender differences in the way the students learned how to work with the tools in the education resource lab. My own experience as well as recent reports of the reluctance of women and girls to embrace technology (AAUW, 2000, Eisenberg, 2000, Gehring, 2000) had led me to assume that the mostly female elementary education candidates in this class (19 women and 4 men) would be resistant to working with the high tech tools in the education resource lab. Yet, my own observations as well as interviews with the instructor, the lab assistant, and the students showed that success in learning to operate, manipulate, and un-plug equipment was predicated not on gender, but on the sheer amount of time and effort put into practicing and learning hands-on in the lab. Some students were taken aback by the sheer number of hours required to work through the problems and the assignments. Like tech learners of all ages, they had to accept the absolute necessity for committing large blocks of time to the learning process. Another typical barrier they faced was the technical language, the somewhat arcane acronyms (RAM, ROM), and esoteric words for inputs, outputs, cables, and ports. The students had to develop patience and endurance to forestall the pleasure of using the product until they had carefully deconstructed the time-consuming but necessary steps of the process. The instructor did not explain in class the specific details of how to start up and monitor the working of the equipment. Rather, he spent class time assigning projects, organizing teams and groups, and answering questions. It was expected that students would accomplish the goals of the course by carrying out instructions and completing projects that required them to experiment and practice with the tools in the Education Resource Center, on their own time, under the guidance of the lab assistant.

The Projects

In one class project, students were to demonstrate various software packages such as *Word*, *Power Point*, *Excel*, and Mail Merge. The student who did a presentation on *Excel* said she spent hours on the formula for figuring out grades using a spreadsheet. The problem she had initially, as she described it, was "I did not pay attention to the instructions…I did not see how I would ever use this tool." While it makes sense to train new teachers before they go into the classroom, without real-world experiences it was difficult for many of the students in this class to fully imagine how they could integrate the new tech tools into learning experiences for future classes. Another requirement of the course had the students evaluate software packages that could be used in elementary language arts, science, social studies, and math classes, following criteria such as the purpose of the software; appropriate audience or age group; the learning this software would support; and possible lessons that could be built around the program. Although they demonstrated competence in installing and running the programs, most of the students lacked the real classroom experience required for making good judgments on how best to use educational software to promote learning. One student reported remembering herself as a grade school learner and others relied on informal observations of young siblings or other children to judge appropriateness. These projects revealed to the students that knowing HOW to use a tool does not guarantee knowing WHEN to use it.

Another major class project required teams of two students to read and study the technical manual that accompanied one of the pieces of equipment in the lab and then to write a set of clear instructions for installing and operating the assigned device. A second team then took the original directions and edited, corrected, or simplified the instructions. The test of both teams' success was the ability of a third team to carry out the instructions as written. The first challenge was to actually take home and read the manual. As one student described the problem, "I read the directions but they didn't relate to anything I know." Like others in the class, he lacked a previous knowledge base into which he could to assimilate the new information. He had to translate the technical language into words he could understand for himself and then recast the information in a set of directions that his peers (not technical manual writers) could follow. The need to explain a complex process forced the students to develop their own teaching and learning strategies. Some students talked through the steps to themselves, while others found it helpful to experiment on fellow students, trying out different approaches and explanations. Students who invested the time and effort eventually learned to cope with the issue of how to demonstrate the workings of a complex mechanism. Using a combination of jargon and everyday language, students learned to describe the properties and appearance of various parts of the equipment, make analogies to more familiar examples, and break up intricate processes into smaller, simpler steps.

Interviews with students conducted in the semester following this class affirmed that the most useful exercise had been the final examination—not a paper and pencil test but an individual interview during which each student had to demonstrate complete, detailed knowledge and expertise with a piece of equipment chosen at random by the instructor (smart board; color projector; differences between a Dell and Mac; digital camera; video camera; scanner; inkjet printer; document camera; zip drive; VCR/ DVD). Some students opted for luck and/or prayer, hoping that they would be given a tool they felt comfortable with. But the most successful students were those who put in at least fifteen to twenty hours in the lab on their own time, practicing setting up and taking down each piece of equipment, and talking through the explanation in front of another student or lab instructor. Students pointed to this practice-with-a-purpose situation as the most significant element of their learning for the entire semester. Working on their own or in small groups, they talked through the steps and instructions and asked each other 'dumb" questions, echoing the ongoing preference of many practicing professionals for learning new technology skills from peers.

Findings

A comparison of students' own ratings of their levels of confidence before and after course instruction shows a general pattern of improvement in all areas, as well as some unexpected results. Since the majority of students coming into the course expressed a high level of confidence in their ability to use e-mail, surf the internet, or play games on the computer, it not surprising that these items showed the least amount of change in confidence levels from the beginning to the end of the term. Common technology tools such as the video camera, word processing and desktop publishing, which were not the subject of direct instruction in the course but were used by students to accomplish other tasks, also showed little change in the students' over-all confidence levels. One unexpected finding was the lowering of confidence in the ability to "select software for children" from a middle ranking on the first survey to a lower level of confidence at exit. This result can perhaps be explained by the students' new awareness of the many criteria that must be considered (ability of the program to meet lesson objectives, appropriateness for age and ability levels, ease of use, etc.). There were minor changes in the level of confidence in using tools that were not overtly taught in the course but probably already familiar to students, such as putting data on a floppy disk, using software to import graphics, loading software from a disk or CD ROM, using Internet search engines, spreadsheet and database software, and using a still camera. Significant changes for the better in confidence levels were shown for "installing software to a hard drive," "using a scanner," "using a document camera," "using a digital camera." and for "setting up a computer from scratch." Showing some growth but not complete mastery was "hooking a computer to a VCR or TV," still a complex task for most students.

In follow-up interviews, students expressed concern with lack of opportunities to practice using the new tools they had learned in ELED 1000. Although they reported using the Internet, videos, and power point in subsequent classes taught in regular classrooms, they did not feel compelled to return to the Education Resource Lab to carry out projects or just to practice and experiment with the equipment. The department is now reviewing the sequence of courses for elementary education majors, possibly placing ELED 1000 in the sophomore year, when students will also be taking the methods courses that require full technology integration. While the follow-up surveys and interviews showed that students were still "somewhat nervous" about using technology, their experiences in this class made them "nervous" for different reasons. Now they understood the commitment of time and persistence necessary to develop understanding and skill in using various kinds of equipment to enhance learning. On the first survey, only five students had described themselves as "above average" in technology skill, but after the fifteen weeks of course instruction, fifteen out of eighteen students now characterized themselves as "knowing more about technology than most people."

Conclusions

Despite expectations that variables such as gender differences and previous levels of knowledge and experience would affect students' progress in their first elementary education technology course, the key to learning the new technology tools appeared to be the students' own motivation to invest time in hands-on experimentation and practice. The challenge of "finding time" faced by our pre-service teachers is evidently shared by classroom teachers who consistently report a lack of released time to achieve the necessary learning as a high barrier to their implementation of technology. "Teachers who spent more time in professional development activities on technology use indicated that they felt better prepared to use technology for classroom instruction than those who spent less time in those activities" (*Teacher's Tools*, 2000, p.102). Even more than money for new equipment, we need to allocate funds to give teachers time and opportunities to gain the level of comfort necessary for them to integrate technology into their plans for classroom instruction. Teacher training institutions and the educational community at large must rise to the challenge put forth by the U.S. Department of Education in *PT3 2000*: "School boards, school administrators, parents, and students will expect all future teachers to be well-prepared, technology proficient educators…who know how to infuse technology tools into the curriculum to improve learning and achievement."

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Coding Electronic Discussion to Promote Critical Thinking: A Cross-Curricular Teacher Education Approach

Gregory R. MacKinnon, PhD
School of Education
Acadia University
Canada
gregory.mackinnon@acadiau.ca

Joanne Y. Pelletier, PhD
School of Education
Acadia University
Canada
joanne.pelletier@acadiau.ca

Margaret Brown, EdD
School of Education
Acadia University
Canada
margaret.brown@acadiau.ca

Abstract: Acadia University in Nova Scotia, Canada offers unparalleled opportunities to conduct action research on the innovative use of instructional technologies. This laptop institution (the first in Canada) supplies some 4000 students with anytime-anywhere campus access through the use of networked A20m IBM laptop computers. The School of Education, as a teacher training facility, is particularly interested in the pedagogical applications of computers to classrooms. This paper provides the framework for an institutional session on the evolving use of electronic discussion groups.

Introduction

Electronic discussion has gained a well-deserved place in the arsenal of teaching strategies for the 21st century, particularly in distance education. Since early studies (Harrington & Hathaway, 1994, 1995; Harrington & Quinn-Leering, 1994) it has become clear (Kuehn, 1994) that the asynchronous nature of the electronic discussion group (hereafter EDG) and the accessible transcripts of dialogue, make the EDG a unique phenomena that is decidedly different (Molinari, 2001) from face-to-face (FtF) discussions.
At the onset of EDG use, the obvious application was to allow for an open forum for students to exchange ideas in a relatively unstructured format. Though this model remains prevalent, educators have sought to prime this facile communication to support improved classroom instruction. This has been accomplished by supplementing FtF classroom discussions. As an example, instructors (Joyce, Nodder, & Young, 2001) have used the EDG as a means to 1) extend the classroom discussion by assigning additional topics post-class or 2) preface classroom FtF discussions with readings and preliminary EDG exchanges.

Coding Electronic Discussion Groups

The EDG offers the added benefit of a recorded transcript of discussion and recently the authors have capitalized on this feature. Though the use of analytical rubrics for assessing EDG's has been explored in distance education, in many EDG settings grades continue to be assigned based on quantity of contributions rather than quality of the discussion. A coding system (cognotes) has been developed (Aylward & MacKinnon, 1999; MacKinnon & Aylward, 2000) for use in EDG's. The cognote system, based on journal coding (Knight, 1990), encourages students to engage in more substantive electronic discussion through a grading scheme that favours higher-order discussion patterns (see Table 1). In this scheme the instructor electronically codes the students captured discussion and then returns the coded work to the student. This promotes critical thinking in that students tend to utilize higher order argumentation patterns which in turn yield a higher grade for their participation (MacKinnon, 2000). Over the duration of several EDG sessions, students have an opportunity to reflect on the quality of their contributions and in ensuing discussions improve their discussion patterns.

Specific Interaction	Grade	Coding Icon
Acknowledgement of Opinions (evidence of participation)	1	☜
Question (thoughtful query)	1	Q
Compare (similarity, analogy)	2	◉
Contrast (distinction, discriminate)	2	⦶
Evaluation (unsubstantiated opinion/judgement)	1	⚖
Idea to Example (deduction, analogy)	2	💡Ex
Example to Idea (induction, conclusion)	2	Ex💡
Clarification. Elaboration (reiterating a point, building on a point)	2	✂
Cause & Effect (inference, consequence)	2	⇄
Off-Topic/ Faulty Reasoning (entry inappropriate)	0	?!

Table 1: Coding Icons (cognotes) and Associated Grading Scheme

Action Research

The research findings to be discussed are presented in Table 2 in chronological order. The institutional session will map very closely our evolving understanding of the EDG setting and will afford opportunities for in-depth discussions on each of the projects.

Research Description Reference

1. EDG analysis in discussions around gender issues in science education (Hemming & MacKinnon, 1999)
2. "Cognotes" developed, instructor application to secondary science education student's EDG's (Aylward & MacKinnon, 1999; MacKinnon & Aylward, 2000)
3. The Dilemma of Grading EDG's (MacKinnon, 2000)
4. Peer coding of EDG's in a Middle School Education course. (MacKinnon & Bellefontaine, 2001)
5. Using the coding exercise to promote more comprehensive case study reports. (MacKinnon & Bellefontaine, 2001)
6. Introduction of coding categories to Physical Education students with no numerical assessment. (Pelletier, Brown & MacKinnon, SITTE 2002)
7. Analysis of EDG's in an Inclusive Education course parallel to the above Physical Education course in an effort to judge transfer without categorical prompting. (Pelletier, Brown & MacKinnon, SITTE 2002)

Table 2: Chronological Description of our Evolving Research Around EDG's

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Lessons Learned: The Partnering of Students with Teachers and Administrators to Achieve Successful School-wide Implementation of Learning Technologies

Sheila MacLeod Potter
Acadia Institute for Teaching and Technology
Acadia University
Canada
Sheila.Potter@acadiau.ca

Abstract: Six years ago, Acadia University became the first in Canada to adopt a campus-wide student notebook program. Concurrently, the Acadia Institute for Teaching and Technology (AITT) was created to take a leadership role in the effective use of technology in learning. Soon after, the AITT began translating its growing expertise into training programs for K-12 teachers in Nova Scotia. On campus, the AITT partners exceptional undergraduate students with faculty members in their disciplines to develop learning technologies for the classroom. The success of this experience inspired the inclusion of outstanding secondary students in our K-12 technology training.

This paper will examine the lessons learned from two new programs in which secondary students play an integral part. Sponsored by General Electric, and Clarica, the AITT is in the process of running two 2-year programs that partner teachers and administrators from across Canada and the state of Maine, with exceptional students in their schools. In developing and running these programs, it has become clear that, just as in post-secondary institutions, tremendous gains can be made to both sides of student-teacher partnerships in K-12 schools.

Introduction

The Acadia Institute for Teaching and Technology (AITT) was established six years ago, as a center for the development of learning applications to support the Acadia Advantage (AA) program, which has since put a notebook into the hands of every faculty member and undergraduate student on campus. Quickly, the AITT became recognized as a center of excellence for the effective integration of technologies into learning, and was funded provincially to train Nova Scotia's K-12 teachers, training over 950 as of fall 2001. The AITT maintains its dual teaching and development roles by employing a large number of students throughout the year. These students are chosen mainly for their people-skills and teaching ability, and are trained in basic applications before being partnered with faculty to support the development of new learning materials, or teacher-training programs. This past summer, the AITT embarked on two new training programs, each of which built on an aspect of our provincial experience. Over 3 years, the Clarica Scholars program will bring up to 60 teams to Acadia, to spend a week developing a technology solution to a learning challenge in their school. The GE Leaders program will fund 14 teams over two years. As in the Clarica program, GE teams consist of two teachers and two students, but with the addition of an administrator. The GE Leaders week is designed to facilitate the creation by each team of a school-wide technology implementation plan. To date, we have hosted twenty Clarica Scholars teams, and seven GE Leaders Teams.

Lessons Learned

Empowered by a supportive school, and with ready access to the boundless possibilities of technology, students not only rise to expectation, they exceed it.

This premise, more than anything else, has made AA a success. Each year, as the story of the program is told over and over again, visitors to Acadia find it hard to believe that students could be relied upon to the extent that they are: as software developers, instructional designers and teachers. Not until some of the student-developed applications have been demonstrated, and the students themselves have described their involvement, is everyone convinced: with guidance, student energy and ingenuity can result in products that not only meet the expectation of their faculty partners, but far exceed it.

The success of technology implementation at any level of education depends on the teacher finding uses for the technology, beyond the obvious PowerPoint delivery of lectures. At Acadia, students not only provide busy faculty with much needed development support but gaining some experience, students also consult with faculty to explore what technology can do for their teaching.

High schools all over North America currently face the same challenge: busy teachers have no time to create innovative applications for their classrooms. In our two summer programs, we met administrators who have already recognised that trying to find time for teachers to first learn the technology and then to work with it, only offers a partial solution at best. Instead, these schools rely on their teachers to be content and pedagogy experts, and to a varying extent, on their students for support and development. For example, at Jakeman All-Grade, in Newfoundland, students worked with their teachers, developing support materials for the classroom. Out of the success of this experience, has come a more ambitious project: a CD-ROM based tour of their town. In order to create this CD, students and teachers have to learn a considerable amount of technology, however, in researching and writing the content, the students are also learning local history, geography and sociology, inspired by the knowledge that their work will benefit a much wider audience.

In another example, at Bonny Eagle Middle School in West Buxton, Maine, 'student assistants' act as teaching and trouble-shooting support to computer lab users.

It is time to formalise the role of students as technical support to their peers and to their teachers.

Many teachers feel great trepidation about the unpredictability that arises from technology implementation in their classrooms. Some react by avoiding new technologies all together, while others create powerful opportunities for learning.

At a training workshop for high schools with notebook programs, the question arose: how does a teacher manage both her students' learning, as well as the challenges posed by fickle technology? In response, one teacher described how, while preparing her lessons for the following day, she had tried to incorporate a Microsoft Excel function into a class demonstration. After she had spent some time trying to figure-out the software without success, she decided to put the problem in her students' hands. The next day, she offered bonus points to the first student who could solve the problem, and within five minutes, had given the points away. She had also created a learning environment in which students and teachers are equal contributors.

Similar stories arose, particularly in our GE Leaders Program, where discussions of technology implementation issues included students, teachers and administrators. Clearly, many teachers allow technology to create a collaborative, problem-solving environment in their classrooms. However, students quickly pointed out that although some teachers may not see it, many students expend considerable time, helping themselves, each other, and even their teachers to overcome challenges posed by technology. As two students put it, "I end up spending all of my time helping other people [with the computer] and don't get to work on my own projects." and, "sometimes, I know a lot more than my teachers do."

Believing that students can be formally assigned technology-support roles at their schools, we set-out, in our GE Leaders program, to model how this might be done. We set a few of our programming experts the task of creating situations in which support technologies, such as digital projectors and notebook docking stations, would not function. Our "Student Troubleshooting" workshop, however, did not go as we imagined it would. After having spent less than an hour learning how to confront these situations, the students resolved them too easily and became bored.

As a follow-up to that week, teams (and in many cases, the student members) have agreed to find ways to recognise and reward students' contributions to technical support. When we conduct our 6-month post-survey, we look forward to hearing how each team has accomplished that goal.

Conclusion

The greatest obstacle to successful implementation of technologies into the classroom is time. Teachers are pressed to learn new technologies as well as to use them in developing solutions to teaching and learning challenges. We have seen that by partnering with students, teachers at all levels of education can not only harness the power of technology to enhance their teaching, but also create a more productive and healthier environment for learning.

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The Educational Technology Minor at the University of Wisconsin-Stevens Point

Sandra Madison, University of Wisconsin-Stevens Point, US
Elaine Hutchinson, University of Wisconsin-Stevens Point, US

Until recently, the education program at the University of Wisconsin-Stevens Point (UWSP) has not been unlike many teacher preparation programs throughout the United States. For example, a recently released report fromthe National Center for Education Statistics revealed that less than a quarter of new teachers reported feeling well prepared to use technology in their teaching. Additionally, the CEO Forum on Education and Technology concluded that many teachers do not know how to put the new gadgetry to good use. The Forum noted that many college teaching programs are 'failing to train the next wave of teachers adequately.' K. Kay, executive director, observed that "We've got to make sure we have a strategy in place in school to bring teachers up to speed to use this technology and make sure we don't graduate another teacher from a school of education who doesn't know how to use technology in the classroom" (Mendels, P. New York Times, 2/24/99).

Recognizing the need to address the issue of improved technology training for pre-service teachers, UWSP introduced the Learning Technologies minor in 1998. The minor, the first of it kind in the state of Wisconsin, is designed to prepare future teachers to integrate technology in their classrooms and to become technology leaders in their schools. The first cohort of pre-service teachers to complete the minor will student teach and begin the search for a teaching position during the 2001-2002 school year.

Concurrent with the development of the minor, the Dean of UWSP's College of Professional Studies worked closely with the Wisconsin Department of Public Instruction (DPI) to institute a Learning Technologies certification category for elementary teachers. The new certification became effective at approximately the same time as the UWSP minor passed through university governance. The DPI is currently considering a proposal to expand the certification to K-12.

The program at UWSP is noteworthy in that it offers a 24-25 credit inter-disciplinary minor in contrast to the single educational technology course offered in many teacher education curriculums. In addition, our program differs from many in that we require that our pre-service teachers begin working with students early in their education, their first experience coming as early as the freshman year. We are convinced that this early and extended field experience serves our students and ultimately their students well. Moreover, the minor contains a strong technical component, including required courses in computing fundamentals, the rudiments of computer programming, and computer hardware and network architecture. We believe that the extensive integration and field experience and the strong technical background provide graduates with the confidence, credentials, and the credibility necessary to serve as effective technology leaders in their schools and in their districts.

The authors developed the Learning Technologies minor and co-teach the minor-specific courses, the curriculums of which are guided by the Wisconsin Model Academic Standards for Information Literacy and the National Educational Technology Standards (NETS). The paper/presentation will describe the minor, the content of the minor-specific courses, provide excerpts from the field experiences, and share the insights gleaned from the experience of our students and graduates working as pre-service technology teachers in the K-12 school environment.

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Unplugged! Pioneering the e-Campus Vision

Harriett McQueen, Dean
College of Education
Oklahoma Christian University
Oklahoma City, OK 73136 USA
Harriett.mcqueen@oc.edu

Dwayne Clevelend, Professor
College of Education
Oklahoma Christian University
Oklahoma City, OK 73136 USA
Dwayne.cleveland@oc.edu

Coralee Risley, Associate Professor
College of Education
Oklahoma Christian University
Oklahoma City, OK 73136 USA
Coralee.risley@oc.edu

John Vincent, Professor
College of Education
Oklahoma Christian University
Oklahoma City, OK 73136 USA
John.vincent@oc.edu

Abstract. A technology enriched campus with anytime-anywhere access created a challenge for the Oklahoma Christian University Teacher Education program. An academic environment in which every student is issued a laptop computer creates the opportunity for teacher education candidates to be better prepared to teach p12 students to live and work in a world rich in technology. This happens only when faculty adjust their instructional strategies to model the effective use of technology in teaching their courses. The 4-member panel presentation includes: sharing the Vision of an e-campus; changes in teaching strategies; preparing pre-service teachers to assess p-12 students; and challenges yet to be addressed.

Proposals for change are generally met with excitement and anxiety. The extent to which an individual welcomes or opposes such proposals depends upon the perception of the effect of the change. The availability of and the emphasis on the use of technology in instruction suggests that old ways of classroom instruction are no longer acceptable; new learning must be acquired by the teacher if instruction is to be effective.

Sharing the Vision

Change is accomplished only when those affected have an opportunity to participate in the change. When the proposal to create a wireless campus at Oklahoma Christian in which each faculty member and each student would be issued a laptop computer was first considered, most faculty members were using desktop computers and standard programs. In order to involve all groups who would be significantly affected by the change, focus groups made up of the entire Oklahoma Christian University campus community considered the advantages of moving to a laptop environment and recommended the change.

Technology Mediated Learning. Such learning requires a change in instructional strategy with the goal of improved learning outcomes. The absence of technology in instruction is characteristic of the receptacle model of learning in which the engagement of students in learning is related to the day and time which the class meets. Engagement is moderately high early in the week and highest in the middle of the week; the engagement level drops dramatically by Friday afternoon. This fact has long been recognized by teachers; it is an aspect of instruction in which change is welcomed.

Chickering and Gamson (1987) articulated Seven Principles of Good Practice in Undergraduate Education: encourage student-faculty contact; encourage cooperation among students; encourage active learning; provide prompt feedback; emphasize time on task; communicate high expectations; respect diverse talents and ways of thinking. Although 15 years have passed and technology has become a major resource for teaching and learning in higher education, these goals still state the desired characteristics of the undergraduate experience and are aligned with the mission of Oklahoma Christian University. The value of using technology in instruction can be assessed by the extent to which it makes these Seven Principles more evident.

Technology mediated learning results in the Discovery Model of Learning. Technology-driven activities such as on-line quizzing, simulations, cyber-shows, collaborative writing, presentation preparation, pre-exam chats, and e-mail engage students in learning before the time of the class meeting. During the class meeting the students are further engaged in student presentations, problem analysis, current lectures, one-minute quizzes, discussion, in-class chat, and case studies. Following the class meeting students complete assignments using discussion board, software demonstrations, on-line guests/videos, Internet research, group web sites, notes on line, and email. By employing these options in classroom instruction, the teacher becomes the facilitator of learning and students are able to be more in charge of their own learning. Students with greater levels of capability are able to move to more challenging levels of learning.

Changes in Teaching Strategies.

The support for such change is evident in the opportunities that were provided for faculty to learn new programs. Oklahoma Christian faculty received IBM Tinkpads a year before laptops were issued to students. Classes were offered and individual instruction was provided as needed. Thus, faculty had a number of opportunities for staff development before the campus was "unplugged" last August. Continuing support is provided through a "help desk" which provides instant assistance when a technological problem occurs. Support teams work specifically for faculty members; they help faculty work through problems they may be having with new instructional strategies and help them set up new options for use in classes. Ongoing staff development for the individual instructor or for groups in available.

Preparing Teacher Education Candidates to Assess P-12 Learning. Teacher education programs accredited by the National Council for Accreditation of Teacher Education (NCATE) must be able to demonstrate how they know their candidates can make a difference in p-12 student learning. One approach which is being used at Oklahoma Christian in an elementary education literacy course addresses the need for assessment over time. This method was chosen because it seemed that it could better prepared elementary teacher candidates to assess student learning in literacy. This approach emphasizes the importance of using authentic child-authored print to practice assessment; it provides opportunity for pre-service teachers to develop an understanding of writing rubrics by using and creating their own rubrics.

The Assessment Plan. All teacher candidates were given access to a prepared writing assessment rubric and authentic elementary student writing samples which were provided by an elementary school in which students complete a literacy practicum. The technology used to distribute the work samples to students included the Digital Dropbox in Blackboard. As an out-of-class assignment, each candidate was given the task of using the prepared writing assessment rubric to asses the student writing sample and make annotations using Adobe e-Book Reader. During class meeting time, completed rubrics were projected for the entire class to review and discuss.

Following this activity, all teacher candidates prepared a writing assessment rubric based upon the Oklahoma Priority Student Skills (P.A.S.S.) The rubric prepared by each student was based on the grade level of the writing sample which the teacher candidate had been given for assessment purposes. Candidates submitted their rubrics electronically via the Digital Dropbox in Blackboard to be critiqued by the professor. The completed rubrics were then projected for the entire class to review and discuss.
Teacher candidates with writing samples from the same grade level were grouped together for the purpose of using Blackboard's Discussion Board Forum Page. The purpose of the discussion was to determine particular strengths and weaknesses noted in each grade level.

The final activity was based on an end-of-year writing sample from the same group of students whose work was the basis of the initial activity. Teacher candidates again submitted electronically the completed writing assessment rubrics for e end-of-the-year writing samples; these, too, were critiqued by the course instructor. Candidates working with writing samples from the same grade level were grouped for electronic discussion. The purpose of this discussion was to develop summaries of student strengths and weaknesses in a particular grade level. Teacher candidates then presented the rubric assessment results of their two student writing samples to the class using a projection system.

Other examples of instructional use include materials developed by teacher candidates. The preparation of graphic materials and the use of PowerPoint and Hyperstudio. for designing instruction have been accelerated. The electronic portfolios which are developed by candidates are aligned with the Oklahoma required assessment portfolio standards and serve as the candidate's professional portfolio as well.

Positive Learning Outcomes. The ability to disseminate and collect specific documents through Blackboard was invaluable. The use of class time was enhanced because students worked on projects outside of class. Electronic discussions provided an opportunity to solve problems outside of class and stimulated more focused in-class discussions. The teacher candidates projected a high degree of confidence when sharing their rubric assessment results. Class time was used for refining understanding and application instead of answering simply questions about procedures. At the conclusion of these assessment sessions, students were asked to self assess their learning which occurred through their participation in this activity. The success of the activity is indicated in the results of self evaluations. Students were asked to evaluate, using a scale of 1 to 5, the value of this activity to their preparation for classroom teaching. The resulting evaluation was 4.9

Seven Principles are Evident. Student-faculty contact is encouraged, and prompt feedback is provided because both students and faculty have computer access at any time. Instructors send course information including announcements and reminders of course assignments and provide immediate feedback on quizzes and tests. The nature of technology-driven learning activities such as the literacy activity which has been described encourages cooperation among student as well as active learning. Time on task is emphasized by accelerating learning which precedes and follows class meetings. As students use technology work together to reach consensus and develop presentations for class meetings, cooperation is heightened. This contact will result in a greater respect for diverse talents and ways of thinking.

Challenges Yet to be Addressed

Pioneering leads to discovery. The e-campus concept has created many new opportunities, but unanticipated challenging issues have surfaced as well. Ongoing collaboration focuses on these issues. What the faculty in Teacher Education have learned may benefit others who may be considering such a change.

Without a doubt, students on an e-campus are more engaged in learning. But practical issues accompany this engagement. For example, students have had to learn how to make the most out of the life of the battery, when and where documents can be printed, and University expectations in using electronic communication. In a laboratory setting, when a computer-related problem was encountered, a tutor was on site to assist or students simply moved to another computer. Now it is their responsibility to contact support personnel and be "talked through" the problem. When students enter the University as freshmen, some have graduated from high schools in which technology was evident in classrooms while others enter from high schools where there is very little technology. Adjusting to university life is a challenge to many; the student whose background in technology is weak can easily become discouraged in an e-campus environment.

Faculty have dealt with unanticipated issues when students use laptops for notetaking and exams. The remedies to problems are there, but faculty must be alert that some students will unwisely choose to play games, to download movies and music and to e-mail friends rather than focusing on the task. Philosophical problems regarding the extent of computer use have been discussed. The University's technology team believed that computers would be used heavily during class as well as outside the class and that this would be an invaluable tool for teachers. The faculty viewpoint was that greater access to computers would enable students to research and prepare information for classes and class projects. Some faculty did not envision the use of computers in the classroom but felt compelled since students were paying increased tuition to cover the cost of the technology.

Several factors are unique to teacher education. If teacher candidates are to remain enthusiastic about teaching, they must be placed in technologically advance p-12 schools for field experiences and student teaching. They need to be able to practice technology-driven instructional strategies which have been developed during their coursework in the e-campus environment. Students who enter classrooms with this level of preparation can often enhance the efforts of classroom teachers who may themselves be struggling with technology. The teacher education faculty must be involved in the p-12 classrooms working with teachers in order to remain current on p-12 technology issues. The university can and may be expected to "repay" schools for providing field experiences for candidates by offering technology-related staff development for their teachers.

Indeed the e-campus environment has been a learning experience for students and for faculty as well. The positive aspects are evident; the negative aspects can be overcome.

Through the Looking Glass: Preservice Teachers Vision for Technology Use in Classrooms of the Future

Presented by
Trinka Messenheimer, Bill Morrison, Alicia Bevill, & Tara Jeffs
Bowling Green State University, Bowling Green, Ohio

Introduction

The 1995 Office of Technology Assessment (OTA) report, Teachers & Technology: Making the Connection, addressed that "technology is not central to the [typical] teacher preparation experience" and that "most technology instruction is teaching about technology ... not teaching with technology across the curriculum" (p.165).

Teacher education preparation programs are constantly striving to produce "up-to-date" teachers that are knowledgeable in state of the art teaching practices, classroom management techniques, and technology integration. Yet, what technological tools and skills must be integrated into teacher preparation programs in connecting the classrooms of today with preparing learners for the societal technological needs of tomorrow?

Innovative teacher education programs must go beyond a commitment to technology and best practices in teaching. Beck and Wynn (1998) emphasize that a shift must occur to implement technology applications from supplementary to central in university coursework learning activities. We must begin with a closer look at our learners and match university curriculum opportunities with actual learners needs.

Presentation Objective:

This presentation shares an investigation of undergraduate education students' visions and perceptions of their use of technology and its importance in teaching. Presenters will provide examples of student vision statements of technology use in classrooms of the future and how these visions compare to perceptions of technology skill proficiencies they have acquired in their undergraduate teacher preparation programs. Powerful insight is gained on the need to align curriculum goals with technological competencies in teacher preparation programs to better prepare teacher for tomorrow's classrooms.

Project PICT

Data collected during the first year of Project PICT (PT3 grant) provided preservice perceptions and visions. "The overall goal of Project PICT is to enable preservice teachers to fully utilize modern technology for improved learning and achievement in their future classrooms." Collaborative efforts among university faculty (education, and arts & science) and the k-12 are providing the tools and training to restructuring and infusing technology that is meaningful and in the k-12 teacher preparation process.

Method

Participants

Over 450 undergraduate students in the College of Education and Human Development at Bowling Green State University enrolled their senior year of their programs completed a pre- post questionnaire that provided insight to the students perceived proficiencies in 1) the use of technology, 2) technology that students observed faculty in using during their courses and 3) technology that students used within their coursework.

Design and Procedure

A pre / post questionnaire was administered to the students during the first two weeks of the semester, prior to begin class assignments or interaction with technology, and again at the end of the semester, to measure the impact of technology during taking their course. The questionnaire was designed to measure perceived proficiency in the use of technology, various types of technology that students saw their professors use within the class, and various types of technology that they had used within their class.

Findings

Common threads and themes were among the visions of preservice educators. Below is an overall snapshot of how preservice educators envision the use and importance of technology in their classrooms in the future:

> The goal of using technology, as an instructional tool is to give students an opportunity to have access to a wealth of information beyond what we cover in the classroom to enhance learning and offer different approaches to learning. A technology rich instructional approach would be implementing different types of technology into the classroom across the curriculum. This could be done through various assignments both in and out of the classroom utilizing a variety of up-to-date equipment and programs as teachers will be knowledgeable about equipment and model its

uses. The use of technology in the classroom should be introduced by kindergarten continuing through high school and college with age appropriate hands on activities.

Preservice teachers describe how technology will be used within the classroom in which they will be teaching:

> In a technology rich classroom, I envision both the teachers and students having access to and using computers along with other technology to gather information and as uses to reinforce and support their ideas. Classrooms should be equipped with three to five computers and ideally a laptop on every desk, as access needs to be available for all students on a regular basis. Students need to be given time to learn about and use technology. Technology that is important and necessary for a technology rich classroom would involve computers, word processing, Internet, email, spreadsheet, drawing and graphics, television, electronic references, presentation software, digital cameras, video and multimedia.

Interesting enough, this same instrument (pre/post questionnaire) provided supporting evidence of preservice teachers perceiving their own use of technology as minimal.

Lessons from the Looking Glass

Given an opportunity to reflect and look at self-competencies in using and integrating technology in the classroom preservice teachers shared that they believed that they had minimum basic computer skills, yet their vision and importance indicate high emphasis. This seems such an injustice for preservice teachers, almost in completion of their teacher preparation program, stepping into their final student teaching experience to have such a low perception of their own technological ability.

Perhaps after identifying such discrepancies, it is now time for teacher education preparation programs to stare into the looking glass and systematically begin to fill the gap between curriculum, visions, and actual preservice teachers' technological skills that can and should be obtain during their teacher education programs. In order to create innovative and technology rich classrooms of the future we must first prepare innovative and technology proficient teachers.

In this session, participants will:

- Explore preservice teacher perceptions, competencies and their implications for teacher preparation programs.
- Exchange through an open discussion, other technology tips, strategies, and innovative curriculum restructuring that enables the use of technology throughout teacher education preparation

Participant Outcomes:

Through the implementation of technology, participants will be able to generate ideas and projects that meet their specific needs of their programs and provide the learners within these programs with choices and activities that will enhance the infusion of technology into teacher education.

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Creating a Learning Community: Faculty/Student/Librarian collaboration at Washburn and Kansas Universities

Anne Millard-Daugherty, Washburn University, US
Jan Guise, Washburn University, US

This paper reports on a pilot project implemented during the Fall 2001 semester at a small liberal arts university (6500 students). Approximately 30 Educational Technology students have 3 weeks to develop an annotated resource list as part of a class assignment and a further 6 weeks to develop the resource list into a unit of work suitable for use in their classrooms. The students, all education majors, vary in specialization from pre-K through High School and include every subject area. They were given a "one-shot" library instruction session at the beginning of the project and then were paired up with one of five instruction librarians. The students will meet with their librarian twice in a one-on-one research consultation, and then submit their list of resources to their librarian for grading. The students were also paired with a student from the western civilization program at the University of Kansas. The collaboration between the Washburn University (WU) and Kansas University (KU) students was to be carried out totally through email. Data will be gathered from pretests and posttests administered to the students and the librarians and anecdotal reports will be solicited from all participants. The project will be repeated in the Winter 2002 semester, and results compared with Fall 2001 data. Among the goals of this project are: improving students' information literacy skills; promoting the librarian as a valuable resource; librarians learning about the needs and research habits of today's students; creating mutually beneficial faculty/librarian/student partnerships. This report will present findings, learning experiences, and suggestions for future projects.

A Study of Developing Reflective Practices for Preservice Teachers through a Web-based Electronic Teaching Portfolio and Video-on-demand Assessment Program

Hitoshi Miyata
Center for Educational Research and Practice
Faculty of Education, Shiga University
Japan
miyata@sue.shiga-u.ac.jp

Abstract: Web-based electronic teaching portfolios and videoclipped teaching episodes using by Video-On-Demand(VOD) System can serve as devices for reflective inquiry and self-assessment by preservice teachers during the student teaching semester. Carefully structured procedures in a web-based electronic teaching portfolio and VOD Assessment Program can assist preservice teachers in developing the pedagogical knowledge and skills necessary to effectively plan, implement, evaluate, and manage instruction. Adequate orientation and training in the program will enable preservice teachers to engage in the reflective processes of observing, analyzing, and evaluating their teaching performance. Carefully designed procedures can result in the videoclipped teaching episodes being utilized as effective tools for the improvement of instruction rather than simply a souvenir or memento from the student teaching semester. This paper presents the web-based electronic teaching portfolio and VOD Assessment Program employed in the Center for Educational Research and Practice of Shiga University in Japan. The Program has been a valuable tool for helping education majors make the transition from student to teacher.

Introduction

The importance of developing in new teachers the ability to reflect on their practice of teaching has been well-established (Posner, 1989; O'Donoghue, 1996). Several studies (Freiberg, Waxman & Houston, 1987; Freiberg & Waxman, 1988) indicate that reflecting upon teaching during student teaching can enhance the repertoire of pedagogical knowledge. Koorland, Tuckman, Wallat, Long, Thomson & Silverman (1985) state that self-assessment may be the key to creating better student teachers. Teacher education programs need to encourage preservice teachers to initiate self-assessment that will develop the type of reflection necessary for a prospective teacher to continually evaluate and modify instruction within the classroom. Most preservice teachers rely on cooperating teachers and university supervisors for constructive feedback on their teaching. Observations and evaluations conducted by cooperating teachers and university supervisors are the most common sources of data during the student teaching experience. Unfortunately, due to the limited number of observations and conference sessions generally conducted, depending solely on outside sources for feedback on instruction may inhibit professional growth. Student teaching is the capstone event of the education program and it is extremely important for preservice teachers to receive as much feedback as possible during this experience. The data provided preservice teachers should be drawn from a variety of sources to complement the feedback provided by college supervisors and cooperating teachers (Freiberg & Jerome, 1988). Encouraging preservice teachers to effectively assess their own teaching will help them overcome weaknesses and maintain strengths. Preservice teachers are capable of analyzing their own teaching, want to improve their teaching skills, and would be willing to evaluate their own instruction if they had the resources (Oliva, 1988). Preservice teachers will be in a position to critique their own classroom instruction if they are provided appropriate background and experience. In order for preservice teachers to effectively assess their own teaching, accurate data must be gathered. This data can be acquired through journals, logs, portfolios, audiotapes, and videotapes. Research supports the use of videotaped teaching episodes to foster self-assessment and enhance teaching performance (Sparks-Langer & Colton, 1991; Struyk, 1991). Simply videotaping preservice teachers and having them analyze their teaching without a systematic set of procedures or background and training in the process will be ineffective. Carefully structured procedures need to be established that can assist preservice teachers in developing the pedagogical knowledge and skills necessary to effectively plan, implement, evaluate, and manage instruction.

A Web-based Electronic Teaching Portfolio and Video-on-demand Assessment Program at Shiga University

The following information summarizes the process established at Shiga University to utilize a web-based electronic teaching portfolio and video-on-demand assessment program in order to encourage reflection and self-assessment by preservice teachers. It has been developed to enable preservice teachers to engage in the reflective processes of observing, analyzing, and evaluating their teaching performance.

Course-Embedded Instruction on Reflection, Self-Assessment, and Videoclipping

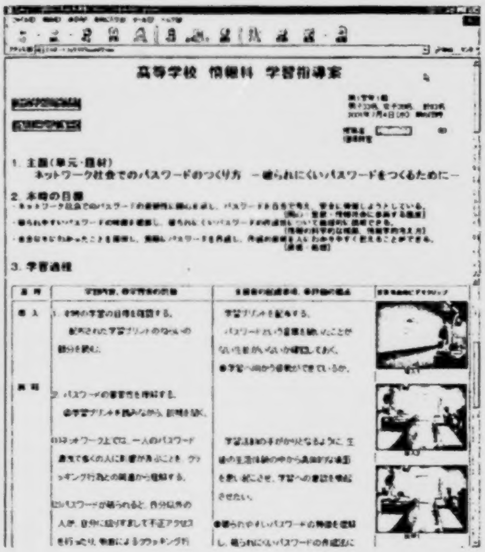
The research supports methods course-embedded instruction for self-assessment. A study by Jensen, Shepston, Connor, and Kilmer (1994) indicated that preservice teachers could benefit from more instructional experience with videotaping, self-assessment, and reflection in general. The more familiar students are with assessment measures and the more exposure they have to both self-assessment and assessment by supervising teachers, the more competent they will become (Thomson, 1992). The use of videotaped teaching episodes as an instructional tool in teacher education methods classes prior to student teaching enables preservice teachers to be more self-confident and effective teachers (Thomson, 1992). Although elements of effective instruction are reviewed and discussed in all education classes at Shiga University, a more intense study of effective teaching and appraisal systems is undertaken in methods classes. Carefully developed inventories that are based on behaviors associated with effective instruction are examined. This information is linked with assessment activities conducted in the methods classes. Former students have granted the Education Department permission to use their videoclips on the web in education classes for instructional purposes. Methods class students view and analyze videoclipped teaching episodes to compare with known principles of effective instruction. They are taught to assess procedures and consider alternatives, identify and offer changes for nonproductive routines, and think about ways to improve on the lesson. Once students have become familiar with assessment terminology, the next logical step should be the implementation of the terminology in real class situations that are videotaped for self-assessment (Thomson, 1992). Education methods classes are sequenced and clustered in order to block time for team teaching and field-based experiences. Coordinated with methods classes (currently Language, Arts, Social Studies, Mathematics, and Science) are field experiences that provide students with an opportunity to relate principles and theories learned in class with actual practice in schools and allow students to present lessons to students in elementary classrooms. During this field-based assignment, students (assigned in pairs) are videoclipped at least once for each subject area and are required to complete reflection questionnaires for each episode. Methods class instructors view the videoclip on the web with the students and guide them in methods of self-assessment. Although this process is time consuming for the instructor and students, early feedback on teaching skills during methods classes results in better preparation and success for student teaching (Rogers & Tucker, 1993). Students believe this instruction prepared them to effectively monitor their practices and make adjustments to them during the professional semester.

Student Teaching Semester

Preservice teachers participate in a eight-week, full-time student teaching semester in the Shiga University attached school district. They are generally assigned to one cooperating teacher who has completed workshops or classes in supervision provided by Shiga University. A full time college supervisor is also assigned for the entire experience. The first week of the professional semester are spent on campus for orientation activities. As a part of orientation, guidelines associated with effective instruction and self-assessment techniques that were examined and applied in methods classes are reviewed to encourage preservice teachers to make critical decisions regarding their instructional effectiveness. Preservice teachers also review the procedures and expectations of the Video-on-demand Assessment Program.

Videoclipping Procedures

Attached school districts that accept Shiga University preservice teachers support the videotaping of instruction. The districts' only requirement is for permission slips to be sent home to parents/guardians prior to the taping. Students that did not return permission slips are kept out of camera view. Availability of cameras is not an issue since the Education Department has three cameras, most schools have at least one, and many students have their own cameras. The cooperating teacher, another student teacher in the building, or the college supervisor, can conduct videotaping. Preservice teachers are required to videotape a minimum of three lessons over the eight-week period. The first videoclip is to be completed by week two, the second by week four, and the final by week six. This timing and number of videoclipping allow for early interventions and opportunities to assess growth and determine areas that need improvement. Preservice teachers are advised to videoclip a lesson that will give them an opportunity to analyze and reflect on the effects of their teaching, see [Figure 1]. The length of time for the videoclipping varies with the type of activity and grade level but normally runs from thirty to forty minutes.


高等学校 情報科 学習指導案

1. 主題(単元・題材)

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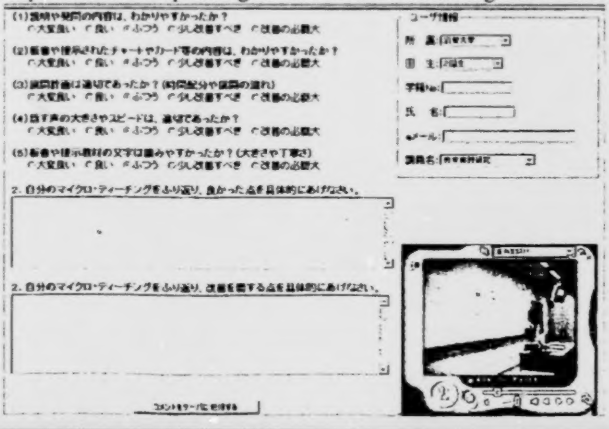
2. 本時の目標

3. 学習過程

Figure 1: A Web-based Electronic Teaching Portfolio with Videoclips.

Reflection Instrument

Preservice teachers complete the same reflection instrument used in methods classes. This instrument incorporates generally agreed upon language derived from the effective teaching literature that clearly describe observable teacher behaviors. The reflection instrument focuses on three major areas of instruction: (1) Classroom Environment; (2) Communication Skills; and, (3) Teaching Procedures. The instrument contains specific items to be rated and open-ended questions that enable the individual to analyze and reflect on their practice, assess the effects of their teaching, and improve and refine their instruction. Preservice teachers rate specific behaviors as either Proficient (Effectively demonstrated the skill well above the required level), Satisfactory (Demonstrated a steady performance and effectively met the standard requirements), or Improvement Needed (Demonstrated some competencies but improvement required). An example of an item would be: "Activated students' prior knowledge and linked this to new information." Open-ended questions for each area (Classroom Environment, Communication Skills, and Teaching Procedures) include, "What do you perceive as the most positive aspects of your teaching procedures?" and, "In the area of classroom environment you are not satisfied with, briefly describe strategies you will consider for improvement." Two additional open-ended questions focus on growth and considerations for additional improvement: "In what specific areas of instructional skills or classroom techniques assessed in previous videoclipped teaching episodes or observations have you shown improvement? Briefly describe how you accomplished this." And, "What specific areas of instructional skills or classroom techniques will you focus on for the next videoclipped teaching episode or observation?" Preservice teachers are directed to view the videoclip at least three times to focus separately on each area when completing the instrument. The completed instrument is reviewed in conferences held with the college supervisor or cooperating teacher and serves as a guide for areas to focus on in the next videoclip or observation, see [Figure 2].


(1)説明や発問の内容は、わかりやすかったか？
○大変良い ○良い ●ふつう ○少し改善すべき ○改善の必要大

(2)板書や提示されたチャートやカード等の内容は、わかりやすかったか？
○大変良い ○良い ●ふつう ○少し改善すべき ○改善の必要大

(3)発問計画は適切であったか？(時間配分や発問の流れ)
○大変良い ○良い ●ふつう ○少し改善すべき ○改善の必要大

(4)話す声の大きさやスピードは、適切であったか？
○大変良い ○良い ●ふつう ○少し改善すべき ○改善の必要大

(5)板書や提示教材の文字は読みやすかったか？(大きさや丁寧さ)
○大変良い ○良い ●ふつう ○少し改善すべき ○改善の必要大

2. 自分のマイクロ・ティーチングをふり返り、良かった点を具体的にあげなさい。

2. 自分のマイクロ・ティーチングをふり返り、改善を要する点を具体的にあげなさい。

VOD(Video on Demand) Conferences

Preservice teachers have indicated that optimum learning from the videoclip occurred when the student and college supervisor viewed the videoclip together and discussed

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the assessment in the context of the lesson being watched. This dialogue between the student and supervisor provided a smoother transition between methods classes and student teaching, resulting in better understanding of the evaluation process and a more positive attitude toward the student teaching experience (Thomson, 1992). Moore (1988) found it imperative that the videotaped lesson is cooperatively analyzed by the preservice teacher and college supervisor. The main purpose of the preservice teacher/ college supervisor VOD conference is to promote the preservice teacher's ability to reflect upon his or her own teaching and guide them in considering their own methods for improving instruction. This conference gives preservice teachers time with the supervisor to verbally analyze their own practice and effects on students, generate alternative strategies to use, and commit to self-examination and self-improvement. A college supervisor/ preservice teacher conference always follows the first and second videoclipped teaching episode. The progress and ability of the preservice teacher determine a conference for the final videoclip. Most of the cooperating teachers that have been assigned Shiga University student teachers have completed a five credit, tuition-free graduate course, Supervision of Preservice Teachers. In this course they become familiar with the Video-on-demand Assessment program and are encouraged to view the videoclips with the preservice teachers, see [Figure 2]. Through video-on-demand conferences with the college supervisor and cooperating teacher, preservice teachers receive guidance and direction for reflecting on his or her practice. This is also a time for everyone to consider areas to be focused on in the next videoclipping or observation.

Figure 2: VOD Conference with Web-based Open-ended Questions.

Conclusion

It is clearly evident the time required by all individuals involved in this process is extensive. However, preservice teachers and college faculty consider the experience worth the time (Blake, Foster & Hurley, 1996; Holodick, Scappaticci, & Drazdowski, 1999). Although the primary purpose of videoclipping preservice teachers is for the improvement of instruction, the practice is also encouraged by some organizations. Not only the National Board for Professional Teaching Standards in USA (1997) but also some Prefectural Board of Education in Japan requires candidates to submit a portfolio as part of the application process for the certification. It is suggested that candidates include in the portfolio four or five classroom-based exercises (may include videoclip of classroom interaction or discussion) and written analysis of the teaching reflected in the videoclip. If colleges of teacher education are going to prepare highly effective teachers who are capable of evaluating their teaching in the light of student learning, the time must be taken to provide education majors with the necessary training and experience in this process. Shiga University places a high priority on developing a preservice teacher's ability to become a reflective practitioner. Time is committed to learning, experimentation, critical analysis, and practice of skills necessary to effectively reflect. The videoclipped teaching episodes are utilized as effective tools for the improvement of instruction rather than simply a souvenir or memento from the student teaching semester. The Web-based Electronic Teaching Portfolio and Video-on-demand Assessment Program in Shiga University has been a valuable vehicle for helping education majors acquire the knowledge and skills required for professional development and a successful transition from student to teacher.

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Electronic Reflection in Teacher Education

Laurie Mullen, Ball State University Teachers College, US

Purpose

This session explores how reflection is shaped by the context in which it occurs. The author will share data from two years of prototyping a reflective, standards-based electronic portfolio with preservice teacher education students. Findings indicate that students' inability to reflect beyond a technical (Cruikshank, 1985) or descriptive level may be, at least in part, due to 1) lack of experience in writing in electronic hypermedia environments and 2) the tensions between the inherent messiness of reflection in learning to teach contrasted with the highly glossy "finished" look of electronic publishing. The research question guiding this inquiry was, "In what ways does the process of reflection change in a hypermedia environment"?

The session will include findings from this research as well as sample student work.

Background and need for study

Due do concomitant national and international teacher education initiatives, namely performance based assessment and educational technologies for teaching and learning, the implementation of electronic or digital portfolios as a major means of assessment is growing. The recent Preparing Tomorrow's Teachers for Technology (PT3) grant competitions sponsored by the Department of Education have resulted in a nationwide technology focus in teacher preparation institutions. Many PT3 institutions are exploring electronic portfolios as a major grant initiative.

By June 2002, my university is mandated to have in place a performance-based Unit Assessment Plan (UAS) approved by the state. Our institution has identified student electronic portfolios as one performance assessment instrument for demonstration of multiple competencies. In recent years, a number of portfolio types have been used on our campus by faculty from a variety of disciplines. The medium of these portfolios has included paper, PowerPoint, and the World Wide Web. The specific purpose of the portfolios has varied according to the needs of the discipline and the preferences of the faculty member teaching the course.

The electronic portfolio has emerged as a tool to assess students' competencies in technology and other areas. We believe that engaging in the electronic portfolio process will help students to develop technology -related knowledge and skills. The overall goal for the electronic portfolio process is to meet the learning and competency objectives of the program through a student-centered reflective process that ultimately benefits all stakeholders. Given the longitudinal nature of the student portfolio, reflection will become more rich and complex as students continue in the program providing quality information that can be used to examine growth and progress over time. Primary in each stage are students' reflective self-evaluations of their progress and readiness to move on. Building with their first education course, candidates will offer an evolving portrait of their growth as prospective teachers, supported by hyperlinked artifacts that demonstrate and exemplify this development.

Portfolios as Alternative Assessment

Reform efforts beginning in the 1980's advocated for alternative assessment in teacher education.. The introduction of portfolios, and other forms of performance-based assessments, reflects an increasing dissatisfaction with traditional assessment methods, which do not attend to process and authenticity. Portfolios emerged as a popular tool and are supported by principles such as providing a new perspective on learning, developmental in nature, and involve self-evaluation or reflection. Thus, portfolios in initial teacher education align with constructivist learning theory

Reflection

Dewey (1933), is acknowledged as a key originator in the twentieth century of the concept of reflection. He considered it to be a special form of problem solving, thinking to resolve an issue which involved active chaining, a careful ordering of ideas linking each with its predecessors. Within the process, consideration is to be given to any form of knowledge or belief involved and the grounds for its support, (Adler, 1991; Calderhead, 1989).

Instructor Orientation

As author and instructor of the course context described here, I feel it is important to share my perspective on the process of learning to teach. The following description appears in the course syllabus and offers a glimpse of my personal philosophy of teaching and learning.

> Learning to teach is developmental, procedural, dynamic, political, and problematical. Knowledge is viewed not as static and permanent in nature, but emergent, contextual, situated, and socially constructed. Therefore, novice teachers need opportunities to construct their knowledge by interacting with new ideas in school settings with structured coaching and appropriate interventions.

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Learning to teach is not a process of learning discrete techniques separate from the context of schooling. It must also include reflective capacities of observation, critical analysis and decision making around their identities in interactions with students and colleagues with whom you work.

Method

This study was situated in the secondary education program where teaching majors split much of their time in content-specific methods courses in a particular college and time in Teachers College for field-based coursework. Twelve graduate students enrolled in a methods course which included two field-based experiences. The purpose of the course is to provide curricular and instructional theory and practice in secondary schools and in the experiences of older adolescent learners in the United States. The students represented a variety of subject-area subjects and had no prior field-based experiences. Students had little or no experience in web authoring, publishing or electronic communication.

Students were asked to reflect on each of the ten standards guiding our university's teacher education program three different times during the semester. I asked them to reflect on and write about their current understandings of the teaching standard and to include an artifact that they felt demonstrated their competency in that particular standard.

I had hoped that students would reflect openly and honestly while incorporating hypertext and hypermedia in the process. An additional requirement was a portfolio presentation where each student would discuss portions of their portfolio with an audience of peers serving as critical friends.

This study uses three major data sources. First, each student's electronic portfolio was analyzed in relation to the research question. A second source of data was the required public presentation of the student's portfolio. The presentation was videotaped. The third source of data was informal discussions and other course generated materials. Some of these artifacts include course papers, e-mail, and journal entries.

Data were collected and analyzed according to qualitative research guidelines for grounded theory research and constant comparative analysis (Glaser & Strauss,), emphasizing, particularly their incremental approach to data gathering and analysis. A key to this approach is the idea of theoretical sampling, described as "the process of data collection whereby the analyst jointly collects, codes, and analyzes the data and decides what data to collect next and where to find them, in order to develop the theory as it emerges (p. 45). Analysis and data collection occur in a pulsating fashion – data collection, followed by analysis and theory development, more data collection, and then more analysis until research is (artificially) completed. Inductive analysis is shaped from the data rather than from preconceived theoretical frameworks. The development of themes resulted from constructive analysis, a process of abstraction whereby units of analysis are derived from the "stream of behavior." (Lincoln & Guba, 1985).

Preliminary Findings

In this section, I synthesize some of the findings from the analysis and experience for promoting reflection in electronic portfolio environments into two areas for further discussion.

1. Reflection is not necessarily in the written work.

The quality and depth of reflection which occurred in the oral portfolio presentation was far greater than the students' written text. The ability to reflect orally in presentation format and in interactions with myself and peers holds great promise for capturing rich reflection. If portfolio requirements ask for only the written reflection and do not provide the opportunity for students to talk reflectively, we change the learning process dramatically.

2. Reflection as two-dimensional

The majority of the written reflections were superficial and shallow. It was clear that the students did not want or feel comfortable reflecting on highly personal or ambiguous issues in a web-based format. One student shared that the *gloss* of a web page forced her to write in a way that appeared as "finished" and "clean". In addition, the reflections are mainly text-based as students made limited use of hypertextual language and almost no use of other digital media. Students reported a lack of experience across their curriculum with writing in electronic hypertextual environments.

Significance

Increasing numbers of universities moving to electronic and digital portfolios will require university educators to provide assistance in the process of deep reflection in this new medium of communication. The potential danger lies in the representation of knowledge as superficial and glossy at a time when the concept of knowledge as constructed and dynamic in nature persists. In an attempt to infuse technologies into the teaching and learning process for preservice students, we may inadvertently move our students "backwards" in terms of knowledge growth. It may be necessary to revisit the literature on portfolios in order to "remember" their original purpose as an alternative assessment method capable of capturing long term process and alternative representations of knowledge.

Data from this study suggests that researchers in this area may need to explore new methods of collecting reflection as it appears in new hypertextual and hypermedia forms. The way in which we ask preservice students to verbalize abstract, complex, possibly ethereal, and certainly fragile understandings of the learning to teach process affects *what* they tell us. If language creates a particular view of reality and of the self as well as serving as a repository of human interests, we need to investigate how language and meaning are mediated by digital environments.

Van Manen (1990) raises the issue of the epistemology of language and text when he states:

> We must not forget that human actions and experiences are precisely that: actions and experiences. To reduce the whole word to text and to treat all experience textually is to be forgetful of the metaphoric origin of one's methodology (p. 39).

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Weber State University Teacher Education portfolio guidelines: An adaptable model

Vicki Napper, Weber State University, US
Al Alberts, Weber State University, US

The Teacher Education Program at Weber State University is a typical teacher education program in that we teach classes to prepare our prospective candidates for licensure. We require our students to assemble a working portfolio during their student experience that reflects our "strands" of our curriculum. We then require them to create a presentation portfolio for their senior synthesis class. However, we are a non-traditional program because we are assembling guidelines for production of a portfolio that our students can continue to develop when they leave our program. The portfolio will also help them meet a variety of national standards such as the Interstate New Teacher Assessment and Support Consortium (INTASC), National Board for Professional Teaching Standards (NBPTS), and the basic International Society for Technology Education (ISTE) technology requirements.

Our program is based on a model of teachers who reflect, engage, and collaborate (TREC). Underlying this model we have developed a core of classes that include five strands woven throughout the curriculum from the earliest classes to the end of our program. Those strands are: classroom management, exceptionalities, multicultural education, developmentally appropriate practices, and technology. Each strand is addressed within each level of courses offered but may not necessarily be emphasized equally. The strands provide a cohesive blend of content upon which to create a balanced curriculum for our elementary and secondary education students.

However, as our program moves toward our NCATE 2000 review in 2005, we have become increasingly aware of a need for a systematic method for creation of portfolios by our students. We believe that portfolio creation most accurately reflects the changes in the NCATE 2000 accreditation process requiring us to produce evidence of student dispositions.

After surveying our existing guidelines for portfolio production, we found them to be overly simple: create a working portfolio and then create a presentation portfolio before you exit the program. In the past, it has been the individual responsibility of each faculty member to require students to add artifacts to their working portfolios as they progress through our class levels. If faculty have not required this action by the students, then many times no artifacts are added from those courses. What we also found at the senior synthesis level is that our students did not have adequate working portfolios and were using their student teaching experience as the primary source of artifacts for their professional portfolio. This was clearly unacceptable.

After reviewing our TREC model and strands as well as a variety of standards, we began to develop an adaptable model around the ten basic INTASC standards for teacher education program graduates. We felt these standards were reflective of the changes in how licensure is being granted in our state. We also reviewed the ISTE basic technology standards and the broad core concepts for NBPTS and found that may of these standards overlap and would therefore be relatively easy for our students to meet on multiple levels.

We are in the process of developing an adaptable model that meets many of these standards. Our presentation consists of a discussion of the basic INTASC matrix and how those standards overlap into the other standards and how to integrate multiple standards within one working portfolio. Although all standards may not equally apply to all students, we believe that many of our students will benefit from an understanding of how these standards and core concepts overlap as they move forward in their professional development. Further information on this process may be obtained by contacting Dr. Vicki Napper at Weber State University in Ogden, Utah (vnapper@weber.edu).

A Field-Based Initiative for Integrating Technology in the Content Areas: Using a Team Approach to Preparing Preservice Teachers Use Technology

Aileen S. Nonis
College of Education
The University of Tennessee
United States
anonis@utk.edu

Blanche O'Bannon
College of Education
The University of Tennessee
United States
bobannon@utk.edu

Abstract: Project ImPACT is a technology integration initiative at The University of Tennessee's College of Education that provides opportunities for preservice teachers to learn to teach with modern technologies. This paper describes a component of Project ImPACT for implementing a field-based team approach to technology integration. Collaboration and teaming is a key component of this model. One major initiative in this project involves the creation of teams consisting of university faculty, clinical faculty and preservice teachers to explore and develop best practices in the use of technology. We will describe our method for providing content-related teacher training and support in the use of instructional technology.

Introduction

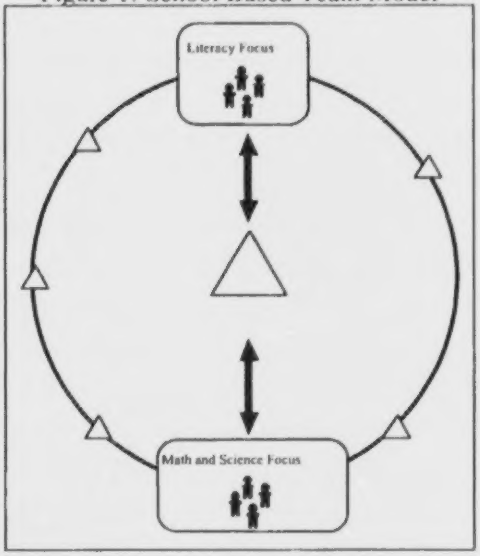
Typical models of technology preparation in teacher education programs focus on providing preservice teachers with necessary skills through a separate computer course as part of the teacher education licensure requirements. While preservice teachers are gaining important skills and concepts, they may seldom see meaningful uses of technology modeled in their methods classes or field placements. To be effective, technology integration needs to occur at multiple points in a teacher preparation program. The team model is an approach that *simultaneously* involves all of the major stakeholders in a teacher preparation experience in training activities, support sessions, and team meetings. We have found that collaborative efforts often create support structures among teams, allowing them to experiment with new skills and share ideas for further adaptation.

The Learning Team Model

Development teams at partner school sites consisted of preservice teachers, K-7 faculty, and university faculty. Five school sites (three elementary schools and two middle schools) participated in the first year of the project. Preservice teachers placed at these sites were completing their fifth-year internships, and each school maintained close contact with a faculty liaison who was responsible for the group of interns at each site.

Teaming created a dynamic alliance in which each team member played a role in creating the foundation for technology infusion. In order to identify content areas for inclusion under Project ImPACT, we looked at national trends and local contexts. Based on local needs, administrators and teachers targeted specific areas for improvement. As a result, Project ImPACT participants chose to explore the potential benefits of technology to support literacy (reading and writing), mathematics, science, and special education. Out of the five sites, four schools chose to focus on using technology to support literacy, and one school (a middle school), chose to explore technology applications in math and science. While the grant initially included Special Education as a third strand, it was decided that special education adaptations ought to be integrated within the existing strands rather than treated as a stand-alone area for the purpose of this grant. Figure 1 illustrates the modified teaming model.

Figure 1: School-Based Team Model



As content areas were identified, team training was organized into 15-hour Learning Strands and aligned with state and national technology standards and the curriculum needs of each school. Each technology Learning Strand focused on strategies and ideas for using technology to support the curriculum. These five 3-hour sessions were scheduled over a five-week period with ongoing weekly support sessions provided by project staff. Once key topics were identified, project staff created a Facilitator's Manual that provided an outline of critical topics, descriptions of curricular applications at various grade levels, and special education adaptations for each topic being discussed. Learning Strand facilitators were assigned to each site and a follow-up support night session for each week was scheduled and staffed by Instructional Technology graduate students. The follow-up support nights were optional sessions that teams could attend if they needed additional help, or if they simply needed open lab time to work on projects.

Lessons Learned

Looking back on the progress we have made thus far, it is clear that the teaming model is having a positive impact on preparing all participants to use technology to support teaching and learning. Multiple sources of evidence are being collected throughout the different phases of the grant and will be discussed in future publications. For the purpose of this paper, we would like to reflect on what we have learned from implementing the teaming model at participating school sites.

Learning Strand Facilitators. Four facilitators were hired to conduct the 15-hour sessions (due to proximity, two school sites were combined). In addition to technical expertise, each facilitator had K-12 teaching experiences. This combination proved to be very beneficial for both troubleshooting when technical difficulties arose, and for helping participants brainstorm relevant curriculum applications. Because facilitators were well versed in educational applications of various technologies, they were able to tailor instruction to better meet the needs of individual sites. As a result, although each facilitator was given a "training manual" with suggested topics and activities, each one felt comfortable with polling their group, getting feedback, and using this feedback to plan upcoming sessions. While there was overlap in technology applications, each of the sites ended up implementing training in different ways. Their teaching experiences allowed them to shift the focus of the weekly sessions from skills acquisition to one that included a focus on curricular applications.

Processing Time. Participants were involved in very intense Learning Strand sessions. While the three-hour extended block of time was needed to focus on a tool in more depth, the weekly sessions made it difficult for participants to process new information. In the future, Learning Strand sessions should be spread further apart, with ample time built in for participants to engage in applying their new knowledge. Although participants' schedules were very hectic, mini-assignments for them to complete and share at the next meeting would allow them to practice what they were learning.

Support Nights. Participants' usage of "support night" opportunities was sporadic. Some sites took advantage of these sessions to drop in and work on individual projects, while attendance at other sites remained low. Alternate support mechanisms developed as the project matured, and ranged from simple emails for help, to setting up individual times for project staff to go out to a school to help troubleshoot. At this point, we are asking each team to meet and decide on a support plan that best meets their needs and their schedules. By placing responsibility with the teams, support structures will be customized to each site.

Web Site Resource. As part of the project, we provided participants with access to a web site that included supplementary materials and resources links. We found that this area was accessed infrequently, even though it contained printable handouts, training guides, and links that were organized by content areas. To increase participants' awareness of the site's resources, a facilitator at one of the sites began introducing a "Site of the Week" at the beginning of each meeting, and allowed participants time to explore the selected links. After introducing this activity, survey responses indicated that access increased. If we want teachers to take advantage of a web-based resource, we have to continue to find ways to advertise its content and make direct connections for teachers. One way we plan to do this will be to upload a searchable database of sample projects and lesson plans created by each of the project participants. We provided each team with a standard lesson plan template for consistency and we will be collecting sample projects that are tied into our state curriculum standards as well as the national technology standards.

Conclusion

The field component of this project directly supports project team efforts to develop creative teaching strategies connecting technology across the curriculum. During field placements, clinical faculty, university faculty, and preservice teachers worked together to explore technology possibilities and to develop, share, and/or implement technology-rich lessons. We believe that this approach will help preservice teachers develop an in-depth understanding of how technology can be used as a tool in teaching and learning. This project has reinforced our belief in the need to restructure coursework and experiences to include uses of technology that are developmentally appropriate, integrated across subject areas, and that actively engage learners.

Online Learning, Online Mentors, and Preservice Technology Education: A Study

Priscilla Norton, PhD
pnorton@gmu.edu

Anastasia Kitsantis, PhD
akitsanti@gmu.edu

Monique Lynch, Doctoral Candidate
mlynch3@gmu.edu

Graduate School of Education
George Mason University
Fairfax, VA USA 22030

Abstract: What happens when secondary education teacher candidates are afforded the opportunity to learn about the role of telecommunications to support teaching and learning using online learning modules coupled with online mentoring? For this pilot study designed to assess the feasibility of combining online learning and online mentoring, five online learning modules were designed. Each module included readings and interpretive activities, tool-based tutorials, and the design of lesson plans. Teacher candidates were paired with online mentors who were veteran teachers in the candidate's content specialization. Each online activity resulted in a product emailed to the online mentor. Online mentors responded to products, asked follow up questions, and discussed technology-using practices. This paper presents results related to the central question: What is the impact of online instructional modules coupled with online mentoring? Particular attention is given to the teacher candidate/online mentor interaction and shifts in teacher candidates' stages of concern.

Some preservice teacher preparation programs require separate courses that examine the role of technology to support learning, while others attempt to integrate considerations about technology and learning throughout preservice programs. Neither solution has been completely satisfactory with a number of concerns continuing to plague preservice technology education. One, opportunities for observing best practices in schools are limited as practicing teachers wrestle with using technology themselves or have limited access (Norton & Sprague, 1999). Two, faculty whose expertise centers on foundations or disciplinary teaching methods or learning and development also wrestle with the role of technology to support learning. They find it challenging to use technology to support their own teaching or to teach about technology to support the learning of K-12 students. Three, too often, teaching preservice teachers becomes the responsibility of instructional technology faculty, all too often resulting in technology education being divorced from the ongoing flow of preservice education.

Few today would challenge the increasing use of technology education's place in the preparation program of future teachers. Thus, professional development programs and courses are being developed and offered in a variety of ways, utilizing technology to differing degrees. Some simply use technology to improve presentations, while others use technology to offer courses entirely online. The U.S. Department of Education's National Center for Educational Statistics (NCES) reported that distance education programs increased by 72 percent from 1994-95 to 1997-98 (*Quality On the Line: Benchmarks for Success in Internet-Based Distance Education*, 2000). More and more professional development opportunities for K-12 teachers are becoming available online. While there is a great deal of research in the large category of distance education, the field of online learning is still developing its literature base (Dabbagh, 2001). Within that field of research, there are few studies that have specifically looked at online learning for K-12 preservice teachers.

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Preservice teacher candidates are generally adult learners accustomed to being responsible for most aspects of their lives. Much has been written about how to best approach the task of educating adults effectively. Principles of effective adult education include the idea that adult education can and should be viewed as a collaborative activity. Mentoring relationships are an ideal way to facilitate collaboration. Although mentoring in general has a broad literature base, online mentoring is a relatively new area of research (Rogan, 1997). The few studies that have been conducted have concluded that online mentoring is an effective instructional approach, mutually beneficial to learners and mentors (Rogan, 1997; Riel & Fulton, 2001). Communication technology such as email provides an excellent way for collaborative learning to take place as novice, preservice teachers enter the community of teachers. Norton and Sprague (1997) reported that online collaboration in lesson planning has a significant and powerful impact on preservice teachers. They concluded that "collaborating with practicing teachers enthusiastic about educational technology . . . has the potential to break the cycle of replicating one's own educational experience in one's practice (p. 160)."

Given the potential of online learning and mentoring and in response to a request from the Secondary Education Program, a pilot online learning module was designed to assist eight preservice teachers to learn about the use of telecommunications to support teaching and learning for middle/high school students. In order to assess the effectiveness of this instructional strategy, the following central question was posed: What is the impact of online instructional modules coupled with online mentoring on preservice candidates' attitudes and understanding about using technology to support teaching and learning? To answer this question, three research questions were addressed: (1) Were teacher candidates successful in completing the modules? (2) Did teacher candidates report changes in their sense of technology competence, their ideas about teaching with technology, and the role of collegial relations in the process of becoming technology-using teachers? and (3) After completing the instructional modules, did teacher candidates' stages of concern related to technology as an educational innovation change?

Methodology

Subjects of this study were eight teacher candidates enrolled in the secondary education program at George Mason University. All eight subjects were pursuing a second career and currently employed in other jobs. One person was employed as a teacher on a provisional license. The subjects were enrolled in a 4-credit educational psychology course for which one credit requirement was met by completing the online modules. All were simultaneously participating in observations of classroom teaching in their content areas. Candidates ranged in age from 25 to 38. Seven were female, and one was male. The content areas represented were biology (1), English/language arts (3), and social studies/history (4).

Preservice candidates completed five online instructional modules, coupled with online mentoring. The modules consisted of a variety of activities designed to help preservice candidates understand how telecommunications can be effectively used for teaching and learning. For example, in one activity, candidates were guided through the creation of a WebQuest appropriate for their content area. All assignments and instructional material were available to the teacher candidates as web pages with the exception of one reading assignment provided in print. Completed assignments were emailed to the assigned online mentor - a practicing teacher in the candidate's content area. Online discussions about the assignments resulted in candidates having a better understanding of how the product could be used for teaching and learning, and sometimes revisions were made based on these discussions. Candidates were given ten weeks to complete the five online modules. At the end of that time, online mentors rated the candidates' performance.

Researcher-constructed surveys were administered before and after candidates completed the online modules. One of the researchers attended the face-to-face class meeting to distribute and collect the surveys at the beginning of week one and the end of week ten. Surveys included questions about basic demographic information; ratings of their sense of technology competency, the importance of collegiality in using technology for teaching and learning, and their desire and ability to use technology for teaching and learning; and ratings of their performance and interactions with online mentors (collected in the post-survey only). Additionally, the researchers used the Stages of Concern Questionnaire (Hall & George, 1979) to collect data about the changes in candidates' stages of concern about technology as an educational innovation.

Results

The first research question asked: Were teacher candidates successful in completing the modules? In order to answer this question, mentors' responses to the teacher candidate rating form were tallied using 4 for excellent, 3 for good, 2 for moderate, and 1 for poor. These values were used to compute means for each item on the rating form. Results of the analysis are presented in Table 1. As Table 1 shows, online mentors rated teacher candidates' performance as falling in the good to excellent range on all rating items. Clearly, online mentors believed that teacher candidates performed well in the course, mastering concepts and assignments. In addition to the mentors' ratings, students were asked to rate their performance on the varied activities included in the online instructional modules. Summing all teacher candidate ratings and computing a mean resulted in a rating of 72.5 that corresponded with a "fairly satisfied" rating. It is important to note that one teacher candidate's self-rating was very low (in the "not satisfied" range). This teacher candidate's online mentor also rated this candidate's performance low. The low rating by both the teacher candidate and the online mentor skewed the means.

Rating Items	Mean Rating
Level of Technological Success	3.75
Understanding of Telecommunications	3.75
Quality of Products/Assignments	3.63
Quality of Interactions with Mentor	3.44

Table 1. Means for Mentor Ratings of Teacher Candidates' Performance

The second research question asked: Did teacher candidates report changes in their sense of technology competence, their ideas about teaching with technology, and the role of collegial relations in the process of becoming technology-using teachers? In order to answer this question, teacher candidates' responses to pre- and post-surveys were collected, and means were computed for each item. Results are presented in Table 2. Means presented in Table 2 for technology competency reflect a rating scale of 1 for poor/rarely used, 2 for moderate, 3 for good, and 4 for excellent. Means for the usefulness of working with technology-using colleagues reflect a rating scale of 1 for not useful, 2 for somewhat useful, 3 for important, and 4 for very important. The final two items' means in Table 2 reflect a rating scale of 1 for rarely/never, 2 for sometimes, 3 for often, and 4 for very often. Examination of the means in Table 2 reveal a shift from good toward excellent in candidates' sense of technology competency, little or no change in their sense of collegiality or their desire to use technology to support teaching, and a decline in their sense of their ability to use technology to support teaching and learning.

	Pre-Course Mean Rating	Post-Course Mean Rating
Technology competency	3.0	3.56
Usefulness of working with technology-using colleagues	3.38	3.19
Desire to use technology in teaching	3.19	3.06
Ability to use technology in teaching	3.13	2.88

Table 2. Means for Teacher Candidates' Ratings Concerning Technology and Teaching

The third research question asked: After completing the instructional modules, did teacher candidates' stages of concern about technology as an educational innovation change? In order to answer this question, teacher candidates' responses to the thirty-five items on the pre and post Stages of Concern Questionnaire (SoCQ) were grouped by relevant stage, totaled and converted to percentile scores using guidelines in the SoCQ manual. Percentile scores for each stage were averaged for the group and graphed. Results for the group are presented in Table 3 and Figure 1.

	Pre-Survey	Post-Survey
Stage 0: Awareness	58.63	49.38
Stage 1: Informational	74.00	69.25
Stage 2: Personal	79.50	78.63
Stage 3: Management	56.88	58.62
Stage 4: Consequence	57.25	44.75
Stage 5: Collaboration	52.50	66.00
Stage 6: Refocusing	62.62	71.25

Table 3. Mean Percentile Score for Teacher Candidate's Stages of Concern

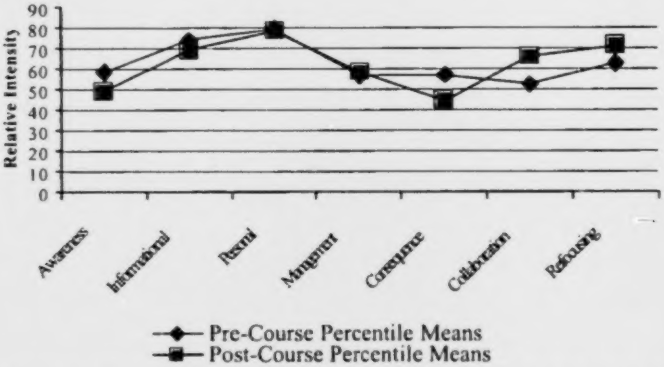

Figure 1. Mean Percentile Score for Teacher Candidate's Stages of Concern

Since this was a pilot study lasting only 10 weeks, it is not possible to draw definitive or statistical conclusions. Nevertheless, it is possible to identify some preliminary trends. Prior to beginning the online modules, the highest concerns expressed by participants were personal concerns followed by information needs. In addition, expressed concerns about consequences for students, collaboration with peers, and refocusing were lower. This profile illustrates normal, interested nonusers who are somewhat aware of and concerned about the role of classroom computers integrated with teaching and learning. This would be an expected profile. Post survey scores indicate a trend toward fewer concerns in awareness, information, and consequences for students (although these remain as the highest reported concerns) as well as demonstrating trends toward increasing concerns relevant to collaborating with others and refocusing. This remains an expected profile for normal, interested nonusers with subtle shifts toward the profile of the beginning user.

In addition to the survey results, preservice candidates were provided the opportunity to share their impressions with the researchers after completing the post surveys. Two categories of feedback emerged. First, preservice candidates expressed deep appreciation for the work of the mentors. All eight candidates felt their interactions with their mentor led to insights into the ways in which the concepts and activities embedded in the online modules might bridge to classroom practice. They felt that the insights and support of the mentors helped them transition their beginning ideas and impressions into ideas for practice. Second, preservice candidates felt that associating the online modules with a foundation course was premature and that the modules would have been more meaningful had they been associated with methods classes. Candidates' knowledge about curricular and instructional issues as well as their inexperience with lesson planning in general handicapped their ability to create robust connections with practice.

Discussion

Once again, it is important to note that this was a pilot study, limited to five learning modules completed during a ten-week period. Nevertheless, trends suggest some insights for technology education. (1)

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Preservice candidates were able to successfully learn when online modules and expert mentoring were combined. Mentors rated candidates' success, understanding, quality of products and interactions with mentor in the good to excellent range, students reported being "fairly satisfied" with their performance, and positively impacted candidates' awareness and informational concerns; (2) Participating in the online modules and mentoring activities improved candidates' sense of technology competency but had little impact on their desire to use technology in their teaching; (3) Participating in the online modules and mentoring activities decreased candidates' confidence in their ability to use technology in their teaching, suggesting that candidates' began to understand the complexities of teaching with technology and that technology's role in education is more than teaching mastery of software applications; (4) Participating in the online modules and mentoring activities had a positive impact on candidates' sense of the importance of the role of collaborating with colleagues to improve their practice; (5) Linking preservice candidates with expert mentors who can serve as models of technology-using practice is a powerful strategy for assisting candidates' entrance to practice and the process of becoming technology-using educators. This strategy, linking preservice candidates with expert teacher mentors, appears to offer opportunities for collaborative support systems whose power for promoting technology-using practice may well exceed course work or field experience opportunities; and (6) It is important to recognize the role of the modules in structuring and centering the candidate/mentor relationship. Giving structure and guidance to the mentoring relationship appears to have central importance. Casual or unstructured conversations, while useful, are less productive than conversations that are guided by a clear framework and specific contents put forward by the online modules. This not only supports candidates in structuring informed questions and interactions but also assists the mentor's ability to articulate and share expertise.

Perhaps the most important lesson emerging from this pilot study is what appears, at first, to be the major criticism provided by candidates. Candidates' expressed concerns with linking these modules with a foundations course as opposed to a methods courses and their decreased sense of their ability and confidence to use technology to support teaching and learning suggest that it is possible to design learning experiences for preservice candidates that clearly articulate technology's power to support teaching and learning. Additionally, this instructional design seemed to communicate to candidates that what matters for educational practice is not technology competence but competence with broader issues of curriculum and instruction. If activities focus on teaching and learning with technology and are linked with assistance and support of an expert technology-using mentor, trends identified in this study point to the power of online learning coupled with mentoring to assist preservice candidates' to understand the power of technology for student learning. Clearly, this is an avenue for further research.

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A Classroom Discipline Problem Solving Environment for Preservice Teachers

Sangchul Oh
University of Missouri-Columbia
United States
So672@missouri.edu

Abstract: Most Preservice teachers don't have much experience dealing with classroom management problems such as student misbehavior. Though they learn classroom management principles, they don't even know how those principles are related to multiple learning perspectives. Therefore, as a learning support tool, for preservice teachers at universities, a classroom management course web site was developed. A basic assumption of the site is that preservice teachers can more effectively solve classroom management problems if they are exposed to multiple learning perspectives and engage in real world problem solving activities. The classroom management course web site has problem context, problem representation, and problem manipulation space for preservice teachers to engage in authentic classroom management problems. Also, multiple perspectives on problem solving process are presented in two different points of view-learning theorists and field experts.

Introduction

Lots of different approaches have been used to solve classroom management problems (Levin & Nolan, 2000). Those approaches assume that the use of certain classroom management techniques can be successful enough to resolve classroom discipline problems if it were well applied. However, some researchers suspect the effectiveness of the classroom management techniques. Research on the effects of teacher education has been done to examine how those techniques affect teacher's classroom management performance. Evertson's (1989) study showed that one teacher education program has been successful in decreasing classroom discipline problems. The teachers who had been trained demonstrated greater use of classroom management skills, and their students made less misbehavior. However, though teacher education programs include learning activities in the area of developing course materials, planning classroom activities, and developing classroom rules and procedures, those do not provide real life classroom discipline problems so that learners may manipulate and simulate the problems. Thus, multiple approaches need to be connected to authentic real world problem situation and several different perspectives in educational field.

The purpose of this study is to examine how preservice teachers solve classroom discipline problems. To explore the answer, two questions were addressed: "Who do preservice teachers confer with when they need to solve classroom management problems?" and "What are the effects of scaffolding when preservice teachers solve classroom disciplines?"

Design Issues

The Classroom Management Web site has four features of problem solving process-problem representation, problem manipulation, problem justification, and problem reflection. To guide students' cognitive development, questioning strategies were selected. Ge (2001) argued that formulating and answering questions enabled students to identify the main ideas and the ways the ideas related to each other and to the students' prior knowledge and experiences. Jonassen (1999) argued that an effective method for representing problem is "narrative." Gick (1986) claimed that learners extract the given information and attempt to understand the problem or try to connect it to their existing knowledge base so that an integrated representation can be build. Problem manipulation space enables learners to manipulate, simulate and experiment their problems. By seeing the results of their experiments, they can test their own hypotheses about the problems (Jonassen, 1997). Learners should develop arguments to support their decisions. Learners can be asked to reflect on what they have done, what assumptions they made, and what strategies they used (Jonassen, 1999). By reminding them of their initial conditions of the problem and helping them to reflect on their solutions, reflective prompts can help students to integrate knowledge and serve to guide the inquiry process.

Method

This study examined three participants' problem solving process. A pilot test was conducted to test web site for classroom discipline problems which had been developed for preservice teachers. Preservice teachers' decision making processes were examined by analyzing their log files. In addition, preservice teachers were asked to solve various case problems. They could get access to multiple problem solving advice. All problem solving processes were recorded and analyzed using qualitative description

During the test, the participants were asked to solve a classroom discipline problem. While doing the task, they answered to three question prompts: What do you think the problem is?, What would you do in this situation?, and Why would you choose this course of action? Besides, the "think aloud" technique was used to capture what the participants were thinking while working with the task. In order to examine the participants' problem solving processes, whole problem solving processes were videotaped. This videotaping provided a record of the process while the testing was being conducted.

Results and Conclusions

The findings from this study point to two conclusions. First, authentic learning environment which is supported by multiple perspectives from "Field experts" and "Learning theorists" will naturally invoke students' higher order thinking. While participants used the classroom discipline web site, they tended to get advice as much as they could. Rather than responding to three question prompts, they conferred with several on line experts before making decisions. It showed that participants wanted to confer with the persons who have lots of real world experience in school. Second, question prompts can be an important strategy for helping students' problem solving process. Question prompts guided preservice teachers' learning activities. However, despite three different question prompts which encouraged students to engage in a real problem solving processes, they were not effective enough to enhance students' problem solving skills. It was supported by the results of students' inconsistency in their solutions. Therefore, the finding suggests that scaffolding strategies used in online learning environments should be dynamic, adaptive, and immediate to students' learning activities.

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Integrating Technology to Enhance Performance Assessment

Lori Olafson
University of Nevada, Las Vegas
Department of Curriculum & Instruction
lolafson@ccmail.nevada.edu

Linda F. Quinn
University of Nevada, Las Vegas
Department of Curriculum & Instruction
lquinn@ccmail.nevada.edu

The International Society for Technology in Education (ISTE) has recently developed standards related to the integration of technology into teacher education programs. These standards state that teacher candidates should demonstrate a sound understanding of technology operations and concepts as well as the ability to plan and design effective learning environments and experiences supported by technology (ISTE, 2000). Additionally, the new National Council for Accreditation of Teacher Education (NCATE) 2000 Standards call for standards-based performance assessment of teacher education candidates that verifies their knowledge of the content of their fields. These assessments must give candidates an opportunity to demonstrate professional and pedagogical knowledge, skills, and dispositions. According to Eisner (1999) performance assessment is a practice "that requires students to create evidence through performance that will enable assessors to make valid judgements about 'what they know and can do' in situations that matter" (p. 2).

As teacher educators at a large, urban university in the Southwest, we were faced with the daunting task of incorporating ISTE and NCATE standards into our practice. We chose to focus our energies on revising an undergraduate course. The course, Strategies for Effective Elementary Classroom Teaching, is an introduction to instructional techniques and management strategies for the elementary classroom. To fulfill our obligation to meet national standards, we sought to revise the course simultaneously in two ways: 1) to integrate technology into our teaching and our students' teaching and learning, and, 2) to develop performance assessments that provide teacher candidates opportunities to demonstrate their knowledge, skills and dispositions in realistic settings. Field experiences for teacher candidates are regarded as central to the development of knowledge and skill (NCATE 2000) and we believed that partnering with a professional development school would allow candidates to develop and utilize their knowledge of both effective teaching strategies and technology skills. Because hands-on, student centered approaches to learning are an essential condition for creating learning environments conducive to effectively using technology for teaching and learning (ISTE, 2000), we developed performance assessment tasks that involved student and/or instructor use of technology. These performance assessments, we hoped, would allow us to accomplish our goals for authentic candidate learning tasks and the integration of technology.

We embarked on a program of research in order to evaluate and document the integration of technology, supported by our institution's PT3 grant. Additionally, we were supported by our College of Education with permission to team teach this course. It must be noted that both instructors are elementary education generalists, and that neither researcher was proficient in the technologies we hoped to integrate. However, according to Carlson and Gooden (1999) it is critical for teacher educators to model technology use in order to prepare teacher candidates to integrate technology into their instruction. In a previous paper (Olafson & Quinn, 2001), we report complete findings from this qualitative study, including the impact of technology integration on the learning environment. In this paper, however, we focus on describing three performance tasks (and the ways we assessed these tasks) in which we integrated technology.

Data Sources/Methods

Participants included 65 pre-service teachers in three sections of the Strategies for Effective Elementary Classroom Teaching course. At the beginning of each term, after reading the Consent to Participate form, students were given the option of transferring to another section of the course. Over all semesters, four students chose to withdraw from our sections.

We approached the study through participant -observation; that is, classroom observations, in-depth interviewing, and document collection were conducted. Data collection was extensive and ongoing throughout the semester. On the first day of class, students were asked to complete a technology survey so we could gauge their current understanding and use of technology. Students completed this survey again at the end of the semester. They also completed The Epistemic Beliefs Inventory (Schraw, Bendixen & Dunkle, in press) so that we could gain an understanding of their beliefs about learning. Additionally, a graduate assistant took detailed field notes during each class session. We collected artifacts produced by the pre-service teachers (e.g. statement of philosophy, in-class assignments, responses to reading) and their technology products (the Video Case Project and their Team Teaching Project). We videotaped their presentations of the technology products. At mid-term and at the end of the term students completed written reflections that were intended to evaluate the course. And, finally, at the end of the term, one-on-one interviews were conducted.

We considered all the forms of data that we collected as texts to be interpreted. Our approach to uncovering or isolating themes from the data was the selective reading approach advocated by van Manen (1990). After reading and viewing the texts several times, we asked ourselves what statement(s) or phrase(s) seem particularly essential or revealing about the phenomenon being described? These statements were then highlighted and used for further analysis (Bogdan & Biklen, 1998; van Manen, 1990).

Context/Performance Tasks

Our pre-service teachers were organized into teaching teams and assigned to a classroom and a teacher at a Professional Development School. Teams were expected to become familiar with the teacher, the students and the curriculum currently being taught in the classroom to which they were assigned. These teams were given three performance tasks requiring them to demonstrate their knowledge, skills, and dispositions toward the use of technology in developing an understanding of effective teaching. Each performance task was designed explicitly to foster a connection between authentic elementary classrooms and our university classroom. In addition to participation in classrooms, real time viewing of a variety of classrooms provided candidates with depictions of typical complexity and spontaneity (Edens, 2001).

Performance Task One: Video Case

Each team worked together using digital cameras to photograph teaching in elementary classrooms. Teams scheduled a time when they photographed a lesson taught by their assigned teacher. In order to demonstrate their understanding of dimensions of effective teaching, teaching teams selected images from their collection of photographs and created PowerPoint presentations showing evidence of students being grouped for instruction.

In the second and third semesters of the current project, we revised the video case project to a "Storyboard" assignment. Candidates again used digital cameras to photograph a lesson taught by their assigned teacher. Instead of capturing images of grouping for instruction, in this assignment candidates selected photographs that showed the beginning, middle and ending of a lesson. Using PowerPoint, candidates constructed storyboards by importing these photographs and including a written description of the progression of events. Descriptions included the following components: lesson context and content, purpose, motivation, teaching and student behaviors, assessment, student outcomes, and reflections.

Candidates were assessed using a point system that included an evaluation of the content of their storyboard (the written descriptions for each picture) and an evaluation of their presentation design. We believed that technology should enhance content knowledge and that presentations needed to reflect the integration of technical skills and content knowledge. Therefore, assessment criteria for presentation design included graphical design, screen design layout, logical sequencing of information, selection of pictures that conveyed meaning, and clear and appropriate subject knowledge.

Performance Task Two: I-Movie

For their second project, teaching teams scheduled times for the team to teach and videotape two lessons, one with a direct instruction approach, and one with an indirect instruction approach. In the third semester we revised this assignment because we found that candidates had more difficulty with adopting an indirect approach. We decided that it would be more helpful to students if we devoted additional time for planning and implementing lessons that were student focused rather than teacher directed. In all three semesters, teams were expected to create multimedia presentations of the teaching experience using I-Movie. The final presentations included their lesson plans, edited video clips of their videotaped teaching, and a commentary and reflection on practice.

Candidates were assessed using a scoring rubric that focused on two main dimensions of their technology products: the lesson and their technical skills. Using three levels of performance (not evident, evident at an acceptable level, evident at an exemplary level) candidates were expected to demonstrate in their presentation that objectives had been met for planning an instructional event, implementing instruction, developing relationships with students, gathering evidence of student learning, and reflecting on the lesson taught. For the second dimension assessed, technical skills, candidates needed to demonstrate competent use of imaging devices and editing software, and presentation software skills. For example, both design principles and presentation content were assessed: assessment criteria included appropriate amounts of video, stills, and audio enhancements, and clear and correct subject knowledge evident throughout the production.

Performance Task Three: Post-RAVO Reflections

RAVO is a Remote Audio/Video Observation system designed for recorded and real time observation of elementary classrooms in a professional development school. Observations between the university classroom and the elementary classrooms are made possible through two cameras (located in the ceiling) and four wide-range microphones in each of 12 elementary classrooms. The cameras and microphones can be remotely controlled from the university classroom. A full screen (7' by 7') in the university classroom makes it possible for teacher candidates to view student and teacher behavior. Broadcast-quality images can be enhanced through a zoom feature that provides minute details of student interactions and work. For example, it is possible to read individual student's journal entries from the university classroom. Throughout the semester, teams completed three written reflections regarding their observations of particular teaching strategies. Structured observations were completed for the following topics: instructional strategies, classroom management, and questioning strategies. For each observation, candidates were provided with focus questions prior to their viewing experience.

Written reflections were assessed on a credit/non-credit basis, based on candidates' abilities to address the focus questions. The focus questions (e.g "What are the modes of instruction that you observed? Cite support from the textbook") were intended to elicit from the candidates connections between the text and lectures and their real-time observations of life in elementary school classrooms. We hoped, as Edens (2001) found, that technology would provide powerful new collaborative learning tools and assist with the transition from campus classroom to a field setting.

Findings

Designing assessment tasks that incorporated technology resulted in three main findings. First, we found that students became proficient in the use of imagingdevices editing software, and presentation software. Based on the results of the technology survey, students perceived that their video production and presentation skills improved dramatically over the course of the semester. One student exclaimed, "The use of technology in this course was amazing. We started with a lesson on paper and finished with an I-movie!"

Secondly, we found that teacher candidates began to see that the integration of technology could be beneficial for students at any level. They were able to articulate how they might begin to use similar technologies in their future classrooms. In the second semester, many of the teaching teams attempted to integrate Inspiration software into their lessons. In other words, candidates demonstrated both an understanding of technology operations and an awareness of designing learning experiences supported by technology. It seems that our candidates met Gillingham and Topper's (1999) definition for technology literacy for new teachers: "having the skill and dispositions to use technology in flexible and adaptive ways for the purposes of classroom instruction and professional development" (p. 305).

Our third finding was that integrating technology enhances pre-service teachers' understandings of effective teaching strategies. We were consistently impressed by their rich discourse about specific strategies and their awareness of the ways in which novice and expert teachers implement strategies. The experience of observing and reflecting on their digitized images and remote observations increased candidate learning of content. The remainder of this section focuses on evidence of candidate learning.

Performance Task One: Video Case/Storyboard

Both the Video Case project and the Storyboard assignment required multiple viewings of digital images from an actual elementary classroom. Repeatedly watching teacher and student behavior allowed teams to engage in critical reflection, and provided them with opportunities to reflect on classroom experiences in an environment outside the classroom setting yet in a context where the "discourse of teachers" is shaped by the experiential realities of the classroom (Profriedt, 1995, p. 33). In particular, candidates reflected on observed teaching strategies. For example, one student commented on the impact of completing the Video Case project: "I really love the video case project because I feel that I have a physical example of the teaching modes, classroom management techniques, and grouping techniques we have read about and discussed."

In order to complete the Storyboard assignment, candidates needed to be selective in choosing three images that best represented the content and strategies utilized by the teacher. At the same time, candidates demonstrated their understanding of the progression of events when implementing a lesson. One of the teaching teams, for example, titled their three slides in a manner that indicated understanding of the development of a third grade lesson on prepositions:

1. Getting Started: Pullingout the pieces for the preposition Halloween book
2. Busy at Work: On, under, above beside. Where do the monsters belong?
3. The Finished Product: Working together to create the Halloween book

In their written description, these candidates noted that students were motivated to complete the activity because they were constructing a student-made class book that was connected to a Halloween theme. They noticed that teaching strategy is connected to student behavior: "the teacher's modeling and guided questioning led to students' participation in the demonstration and their eager involvement."

Performance Task Two: I-movie

Candidates' I-movies and their presentations of their products to the class demonstrated growth in knowledge, skills and dispositions in three areas: student learning, content knowledge, and collaboration. In their presentations, candidates recognized the role of prior knowledge and the importance of connecting content to students' lives. The following excerpt from a presentation highlights this growing recognition:

> We structured our lesson to familiarize the second graders with weather terminology. Instead of just standing at the front of the room and going over the vocabulary with them, we decided to bring in an element from their lives outside of school. We constructed a 6 X 4 television set and Mitch dressed as a meteorologist and gave a weather forecast. In the forecast, he used the weather words and explained their meanings. This was a great way to introduce the vocabulary.

Each team was also expected to provide evidence of student learning. That is, teams were expected to demonstrate that their teaching had an impact on K-5 learners. The following examples show that candidates developed an awareness of assessing student learning:

> We found that using centers provided an atmosphere conducive to enrichment, exploration, motivation, and creative discovery. We assessed students' participation in each center and their completion of activities.
>
> We did our lesson on classification and how to use rocks to explore classification. Students sorted rocks by observable qualities. Students were able to organize collected data visually, and we assessed their understanding by observing they way they sorted rocks.

Candidates also demonstrated their ability to connect content knowledge of general teaching strategies to the lived reality of the classroom. One of the teaching teams gave a homework assignment, and explained that "Our text states on page 275 that homework can have many positive contributions to a child's learning when it is thoughtfully planned to extend classroom learning."

And, finally, candidates demonstrated behaviors that are characteristic of developing teachers. Candidates were expected to develop collaborative and collegial relationships with their peers and with experienced classroom teachers. As Phelps (2000) notes, "the need for creating collegial communities is critical" (p. 47). In order to complete their technology products, candidates needed to work collaboratively. For the majority of teaching teams this was a positive experience. "Getting to collaborate with my group" was frequently mentioned in the interviews as one of the benefits of technology integration

Performance Task Three: Post RAVO Reflections

In this third set of performances, we again found that candidates were able to make connections between their content learning in the textbook and elementary classrooms. In order to successfully complete the post-RAVO reflections, candidates had to recognize teaching strategies as they were occurring in the lived reality of the classroom. The following example shows how a teaching team identified the instructional mode utilized by the teacher during a fifth grade math lesson:

> The math lesson was clear example of expository or direct instruction. On page 228, our text states that transmitting knowledge from those who know it to those who don't know is expository instruction. An example of this is when the teacher provided rules for graphing.

Another teaching team realized the interconnectedness of instructional strategy and classroom management, noting that there were fewer disturbances when students were engaged in learning: "the students were self-directed in the learning centers. We saw that students who are actively involved behave much better and seem to truly enjoy learning."

As teaching teams developed their observational skills, they became more insightful and were able to produce interpretations that were supported by evidence. In the next example, a team identifies types of questions asked by the teacher and provides a summary that shows their observation of a questioning pattern: "We noticed that the teacher worked in a pattern, beginning with comprehension questions, then restating and clarifying, and then asking reflective questions."

Each performance task required candidates to use technology in various ways to demonstrate newly acquired teaching skills. These performances satisfied the dual purpose of learning about teaching strategies and learning about technology. An inherent goal in the tasks was to help candidates understand that technology must enhance student learning. Like Hartley (2001) we believe that new technologies do not have any inherent value. Only through their use do they become valuable.

Discussion

We agree with Morey, Bezuk, and Chiero (1997) who believe that "Technology can also be a valuable resource for improving teacher education" (p. 21). In particular, the use of technology can ground the program in real-life situations (Kenny, Andrews, Vignola, Schilz, & Covert, 1999). "Unfortunately, the majority of teachers are not trained in their preservice programs to effectively integrate computers and other technologies into their classroom teaching" (Perry & Talley, 2001, p. 26). Our candidates observed and participated in real-life situations that required the use of technology. And furthermore, perhaps this participation was made possible only through the use of technology.

In the realm of technology, the learning curve is steeper for some than for others. Teachers caught in the maelstrom of classroom life may be hard pressed to learn and use current technology in educational settings in order to incorporate them. According to Sprague, Kopfman, and de Levante Dorsey (1998), "Classroom teachers sometimes feel ill-prepared to integrate technology into the curriculum" (p.24). In addition to integrating technology into the curriculum, teachers are expected to be technology instructors in the classroom. ISTE (2000) states that "Our educational system must produce technology-capable kids:"

kids who will be able to use technology in an "increasingly complex and information-rich society"(p. 2). Obviously teachers, as implementers of the education system will be expected to help produce these 'technology capable "kids." By no means is this an easy task.

Given all that is currently known about classroom teachers integrating technology into instruction, the role of technology in pre-service teacher education is critical. In teacher education settings where candidates have the time to experiment, explore and practice technical skills in an environment that is low-risk and focused on pedagogy, the gaps between theory, practice and technology can be narrowed. Because of the support received from our institution's PT3 Grant, we were able to create conditions necessary for the integration of technology in pedagogically appropriate ways. Teacher education candidates developed an understanding of the interplay between teaching and technology, and faculty experienced, first hand, ways technology can facilitate powerful learning. Through completion of performance tasks requiring the use of technology, candidates and faculty recognized the potential of technology for changing assumptions and current educational practices and perspectives.

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Technology as a Practical Tool for Real World Teaching

Jeffrey Parker, North Carolina A&T State University, US

Discussions concerning distance education and web enhanced teaching strategies for colleges and universities continue to be directed towards ways in which technology can be used within a conventional university or public school structure. Optimistic points of view argue that using technology encourages, if not actually requires faculty members to think outside the box. In theory, this call for innovative and more flexible teaching strategies seems promising. Unfortunately nobody seems to agree on how this transformation might be implemented or how to transform theory into practical applications. From the perspective of faculty members, "thinking outside the box" seems nothing more then a plea to find new and innovative ways to accommodate vast technology expenditures by utilizing course delivery systems. In public school environments, thinking outside the box generally means figure it out, or, just do it.

For distance education programs to be successful they must be grounded within the context of actual needs and reachable objectives. Courses need to be structured in ways that will give ownership to the professors or public school teachers who design and teach them. Course development must offer a solution for something other than technology integration for its own sake or for the sake of earning required certification credits. These issues are crucial in the design and delivery of online courses in teacher education programs. In this paper I will offer a model developed by The Technology Outreach Project that we have put into practice at North Carolina A&T State University. In addition to providing technology instruction for pre-service teachers, this model combines pre-service teachers with in-service teachers who are seeking required technology certification credits.

Every spring semester I teach English 460 – Technology and the Teaching of English. This course is designed to instruct English Education majors in the second semester of their junior year in effective and appropriate strategies for using technology to enhance their teaching. These students are given instruction in the use of Blackboard as a tool for developing and enhancing the quality and the delivery of their curriculum materials. After approximately three weeks of technology instruction, pre-service teachers in Engl. 460 are paired with our list of in-service teachers seeking required technology or certification credits. All pre-service and in-service teachers are enrolled on our 460 Blackboard site. The first task for pre-service teachers is to instruct in-service teachers in the use of Blackboard by utilizing the virtual classroom and other available telecommunication resources.

After both groups feel comfortable in the Blackboard environment, in-service teachers are asked to critic, refine, and offer advise after viewing curriculum programs posted on Blackboard by our pre-service teachers. In-service teachers are given a set of guidelines for this activity. Once portions of the curriculum have been identified as appropriately designed for electronic classroom delivery, the in-service teachers provide instruction in the use of Blackboard for students in their classroom who will actually use the curriculum materials developed by pre-service teachers. In addition to Blackboard, we also utilize other software programs such as PowerPoint, and for writing components we utilize Storyspace. This model serves the needs of three audiences: pre-service teachers, in-service teachers, and actual students in the in-service teachers public school classroom.

The benefits of using this model include more then just learning technology skills for pre-service and in-service teachers. We are also increasing the technology skills of actual students in a public school environment. Pre-service teachers gain experience by being mentored and guided by in-service teachers. We believe that what makes this a viable model is that in addition to learning needed skills and gaining experience, in-service teachers view their participation in our program as an efficient and practical means for earning technology credits and re-certification. Rather then attending a class or workshop for a few days to enhance their technology skills, teachers are actually integrating their learning experiences into their own classroom, as they are learning technology skills. In short, we have provided a real world, semester long program with actual hands on experience. Mentoring is a key component of this model. Pre-service teachers are available to instruct and assist in-service teachers in learning to utilize Blackboard and a wide range of other programs. Each pre-service teacher is required to maintain a minimum of six online office hours per week. Pre-service teachers are also required to make a minimum of three visits per semester to the in-service teacher's computer lab where they will act as lab facilitators and will be evaluated at the end of the semester by their in-service mentors.

Our experience has clearly indicated that simply telling teachers or university faculty to use technology is simply not going to work. Arguing for the existence of the "information age" is not an agent for basic changes in curriculum or in instructional methodoly. What does work is not only pointing out to pre-service teachers the value of hands on experience that includes first hand interactions with students in a computer lab, but actually giving them the opportunity to do so. In-service teachers are already overburdened with a wide range of responsibilities to the extent that they frequently view acquiring technology skills as just another time consuming task. Even more problematic is that traditional technology seminars are physically removed in both space and time from their students, classrooms and from the curriculum they actually teach. Often, teachers forget new technology skills by the time they return to their classroom.

Clearly, pre-service and in service teachers enrolled in our model find that not only are they able to integrate new skills as they are learning them, but that they are functioning in an environment that actively encourages contemporary teaching behaviors and practices such as co-investigating and team learning activities. In service teachers are learning, pre-service teachers are learning, and students enrolled in the classroom are learning. I would like to conclude by pointing out that all of the technologies used in our program have been around for quite some time. The development strategy utilized by The Technology Outreach Project was based on a cultural model that took into account time management and needs assessment. Our objective was to integrate the needs of three separate groups of learners by implementing technology as a tool to accomplish specific goals. We were not interested in using technology as an enhancement or simply for the sake of learning to use technology in the isolated, and frequently sterile environment typical of many computer workshops and short courses.

WebQuest Collaboration for Special Needs Awareness

Loye Romereim-Holmes
College of Education and Counseling
South Dakota State University
United States
Loye_Romereim-Holmes@sdstate.edu

Denise M. Peterson
College of Education and Counseling
South Dakota State University
United States
Denise_Peterson@sdstate.edu

Abstract: This poster session focuses on a collaborative project for students in preservice education that combines technology integration and special needs awareness. Students designed a WebQuest in the technology integration course and students from the Special Needs course became the non-expert reviews. The non-expert review process was used to evaluate the WebQuests on their design for students with disabilities. Based on the evaluation, the planning for the next semester's projects began to take into account the Universal Design Learning Principles.

Introduction

Today, teacher education programs have numerous responsibilities to provide teachers with a comprehensive preparation that includes content, methods, classroom management, special needs and technology. In our teacher education program technology (2 credit hours) and special needs (1 credit hour) are both offered as required courses but with minimal credit hours attached to them. Thus both courses have difficulty covering all comprehensive relevant content that is necessary.

Two instructors, one teaching the technology course and the other teaching the special needs course, have been working together in the area of Universal Design Principles of Learning. A plan was developed to incorporate the WebQuest Process into both courses with collaborative components. This paper describes the collaboration efforts between students in both classes.

WebQuest

A WebQuest is "an inquiry-oriented activity in which most or all of the information used by learners is drawn from the Web" (Dodge, 2001). WebQuests consist of a task that engages students in authentic problem solving using prescribed processes and requiring some final product in which the web resources can be synthesized. The WebQuest process is used in the technology course as one of the means to fulfill many of the International Society for Technology Education Standards Professional Performance Profile indicators. The technology course has used this format in the spring 2001 semester and found that students really enjoyed the process and could demonstrate ISTE proficiencies. The only proficiencies not easily met were the exposure to Universal Design for Learning principles and assistive technology and along with the opportunity to peer teach their lesson.

Universal Design for Learning Principles

Universal Design for Learning Principles is the design of instructional materials and activities that allows the learning goals to be achievable by individuals with wide differences in their abilities to see, hear, speak, move, read, write, understand English, organize, engage and remember (Orkwis & McLane, 1998). The principles for universal design include multiple representations of content, multiple means of expression and control, and multiple means of engagement (CAST, Universal Design for Learning). Universal design implies the use of technology in curriculum materials as the content is in digital format. Technology allows teachers the ability to meet the universal design principles by providing various mediums to compensate for the differences in student's skills and abilities.

The Collaborative Process

The idea of working together to provide exposure to both technology integration and special needs was an intriguing one but could we pull it off? In the technology course, the overriding consideration was that students needed the opportunity to gain an understanding of technology integration as it applies to a classroom. According to the International Society for Technology in Education (ISTE) Standards for Professional Performance Profile indicators (2000), students needed to be more aware of the various learner needs as they integrate technology into curriculum. Students also needed to have an opportunity to evaluate curriculum materials in order to explore the various methods they could use to provide materials to all students in the format they needed.

The other consideration in this project was the collaborative aspect. Many teachers work closely with other professionals regarding students with special needs and this requires a collaborative relationship to best meet the needs of these students. In doing this project, students would get a better understanding of how this collaboration could occur.

The needs of the classes were also discussed. The technology course was looking for "expert" evaluators for the WebQuest projects and the opportunity to introduce some of the universal design of learning principles into the curriculum. The special needs course really needed practice in identifying materials that could be adapted and determine strategies of how materials could be used effectively.

Coordinating the project was not easy. Because of the program structure, both courses contain students who have varied backgrounds and responsibilities. There are students from a secondary education program, students with a K-12 emphasis and early childhood students in both courses. There was a concern that the material they would evaluate may not be at their particular grade level.

The special needs students were introduced to assistive technologies. Students were then introduced to WebQuests by examining Bernie Dodge's WebQuest Site. Based on the exposure to the WebQuests and the rubric the instructors developed, students were asked to examine a specific WebQuest being build by the technology course. Students were looking for multiple items.

Conclusions

The outcomes of the project are anticipated to be a better quality WebQuests due to the feedback opportunities. The students should also have an understanding of how technology integration can enhance opportunities for students with diverse learning needs. The evaluation process is also important for the students in seeing how constructive feedback through collaboration can provide both parties with a product that can be used for multiple purposes.

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Guiding Principles for Technology and Teacher Education

Susan M. Powers, Ed.D.
School of Education
Indiana State University, USA
powers@indstate.edu

Howard D. Mehlinger, Ph.D.
Indiana University, USA
mehlinge@indiana.edu

Abstract: How does a teacher education program begin the process of integrating technology? This paper provides a framework for technology integration that incorporates guiding principles, technology standards, and the developmental stages of teacher education. Additionally, the paper discusses that technology integration must be more systemic than just teacher preparation and must involve educational administration and special education. For technology integration to be successful, it needs to be implemented in an environment of strong leadership and where a technology vision and infrastructure are in place.

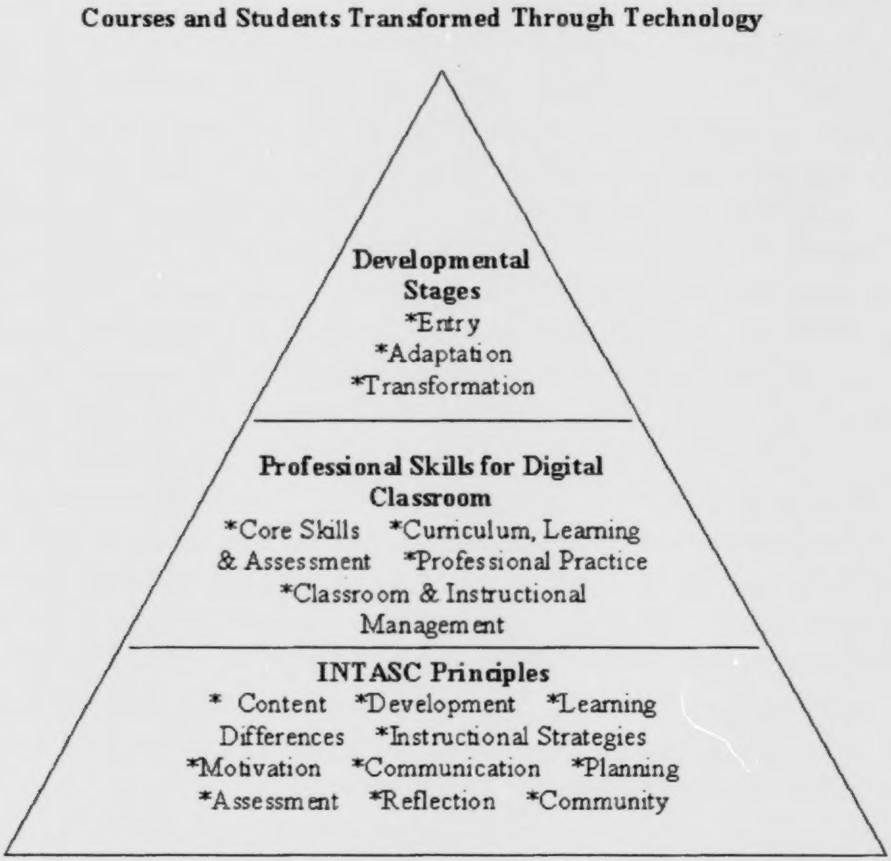
Introduction

While school systems and other organizations are working hard to meet the training needs of those teachers already in service, teacher education institutions must guarantee schools that all newly employed teachers will be able to use technology well. Unfortunately, the reality is that there is a deficit in the teacher education community to be able to ensure that technology competency of graduates (NCATE 1997; RTEC Consortia 1998; Moursand & Bielefeldt 1998). Schools and departments of education (SCDE) need a guide to determine what their own technology integrated programs can look like.

A Framework for Teacher Education

There are numerous ways that an SCDE can bring technology into its teacher education program. Some programs elect to use a stand-alone course to introduce technology skills and applications. Other programs may elect to put technology components and instruction into a variety of courses. A few programs are able to use a university-wide technology competence requirement for skills, and then focus on educational application in later courses. The variations can seem endless and there is good reason for it. In other aspects of teacher education, an SCDE seeks to establish a focus of specialty. Some programs feature a strong liberal arts education with a fifth year for teacher education. Others may extol their excellent field experience. It is these variations that may programs unique, interesting to students, and provide outlets for their faculty. The systematic integration of technology into teacher preparation therefore needs to take these differences and points of excellence into account and complement them. There is not a "one size fits all" approach that can be used with technology integration; however a guiding framework can be used to make technology an enhancement to the program.

A graphical representation of this framework is shown in Figure 1. The framework is provided as a model that can be used and modified to suit a program's need. First, there needs to be a base upon which all other elements are built and integrated. For many SCDEs this might be a knowledge base, or a set of guiding principles, or perhaps a set of standards that a state has adopted. This example uses the INTASC Principles (Interstate New Teacher Assessment and Support Consortium). These ten basic principles have been adopted for teacher preparation by numerous states and have served as a catalyst for the development of state-specific teaching standards. The principles are a thread that weaves throughout the teacher preparation program and cover areas such as content knowledge, child development, learning differences, instructional strategies, motivation, communication, planning, assessment, reflection, and community. These are foundational elements that are present to varying degrees throughout teaching programs.


Courses and Students Transformed Through Technology

Developmental Stages
*Entry
*Adaptation
*Transformation
Professional Skills for Digital Classroom
*Core Skills *Curriculum, Learning & Assessment *Professional Practice
*Classroom & Instructional Management
INTASC Principles
* Content *Development *Learning Differences *Instructional Strategies
*Motivation *Communication *Planning
*Assessment *Reflection *Community

Figure 1: Framework for Teacher Education

The next level of the framework builds upon this foundation by introducing a set of technology expectations or standards. These standards could be nationally recognized such as the Professional Skills for the Digital Age Classroom (Milken Exchange on Education Technology, 1999) or the ISTE National Educational Technology Standards for Teachers (2000). Alternatively, a SCDE might have formally adopted its own set of technology standards. Whichever path a SCDE elects to take, these standards need to be joined in with the foundational elements – this becomes one of the essential pieces to integration.

Finally, a SCDE places on the top of the framework the stages of the teacher education program and the unique nuances of that program. For instance, there is a beginning stage to teacher education, when a student is first exploring the field. Just as the elements in regard to the INTASC principles are covered in different depths and with different types of experiences, so to should technology. As a student moves to more advanced courses, the expectations of technology application should also become more advanced and reflect more of the advanced principles and standards. With technology, a student will move from the observation of technology-rich classrooms or learn the basics of application skills to using the technology in the field for assessment and differential learning strategies. This presentation will provide a more detailed look at the framework and the types of integrated activities that support the framework.

The Case for Special Education

Technology for special education is worth separate mention because of the different technologies available and the different training and opportunities provided. Recent philosophical changes in the field of special education, coupled with legislative amendments have lead to widespread inclusive education. Although paraeducators, or special education teachers are often available to help the classroom teacher, s/he must be ready to use the available assistive technologies to help students achieve learning goals. The Council for Exceptional Children has developed a set of core technology competencies that beginning special educators that lay a foundation for a technology curricula (2000). Furthermore, the ISTE National Educational Technology Standards for Teachers (2000) also suggest that prior to a student teaching experience that all candidates be able to identify and use assistive technologies.

Preparing Educational Administrators

SCDEs prepare teacher to go out and teach in schools. However, they are not alone in the schools with the students; their work is guided and often managed by the administrators present in the school and the school system. Technology will impact the role of school administrators as much as teachers, if perhaps in a different way. Administrators need to be aware of the technologies that teachers can use to impact teaching and learning and be prepared to facilitate that work. Administrators also need to be able to use technology to document and report out the teaching and learning that occurs within each class, building, and corporation. Technology has the power to influence and impact the daily work life of an educational administrator, and in order to ensure that the administrator has the capacity to use that available power, SCDEs that prepare educational administrators must be prepared to integrate technology into their programs as well and to help their students understand the role technology plays in the 21st century classroom.

A Systems Approach

What should be clear from all of the above information is that technology is not mutually exclusive to segments of teacher education or the SCDE as a whole. In order to integrate technology into the mission and very core of an SCDE, a systematic approach must be considered. However, the system includes more than the programs. An SCDE must first have a vision for how technology will manifest itself in the programs and the desired outcomes. There must also be strong leadership within the SCDE to build the necessary vision, provide the leadership to guide the curriculum development, guide faculty and student competence with and use of technology, reach out to alumni and community, and to build the necessary SCDE infrastructure. And as strong as that leadership might be within the SCDE, it alone will not be enough. There must be campus-wide leadership that recognizes and acknowledges that the successful preparation of a good educator is the task of more than just the education program because a campus-wide infrastructure for technology must also be in place and the necessary support must be provided to the SCDE.

Conclusion

The integration of technology should not and cannot become the purview of a few individuals. To create a SCDE that successfully employs technology, all members of the unit must be involved. The systemic effort extends beyond the program to all those who teach and work with the program. Not only the instruction, but also planning and evaluation must be systematized by the SCDE. It is also not a process that will happen overnight or show immediate widespread results. Technology integration is an evolving process, and the vision and infrastructure will take time to grow. The evolution will continue as the technology changes and user sophistication increases. This evolution will provide yet another opportunity for a SCDE to develop and find its distinctive niche in the preparation of educators.

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Understanding Teachers' Purposes for Using the Internet with Their Students

David Pratt, PT3, University of California, Santa Barbara, US

Purpose

The purpose of this paper is to better understand the different purposes teachers have for using the Internet with their students. It utilizes Bandura's theory of self-efficacy as a framework to conduct a study with experienced teachers.

Consideration of the purposes teachers have for Internet use with students is important when considering the potential of the current investment of money related to the increase in school-related technologies. According to one report, $5.4 billion was spent on computers and related infrastructure in 1999 (Ballard, 2000). The federal government estimates another $5-10 billion per year as the cost for maintaining and improving those infrastructures.

More importantly, we need to realize the potential this technology can have in helping train students to become prepared for the Knowledge Age. At the end of the 20th century, computer technologies, particularly the Internet, revolutionized the American household and workplace. It has only been ten years since the U.S. spending for Industrial Age capital goods was exceeded for the first time by the spending for Information Technology (Trilling & Hood, 1999). According to some educational researchers, this marked the first year in a historic shift from the Industrial Age to the Knowledge Age (Stewart, 1997). This turning point to a new age requires a renewed examination into education and its purposes for society.

The present study focuses on answering the following research questions: 1) What kind of educational purposes do teachers have for using the Internet with their students? 2) What is the nature of the association, if any, between teachers' confidence for using the Internet with students (Internet Teaching Efficacy) and the purposes for Internet use with their students?

Theoretical Framework

Self-efficacy theory is helpful to use as frame to better understand both the quality and quantity of teachers' integration of Internet use with their students. Bandura (1997) understood self-efficacy as an individual's judgment of one's ability to complete future actions. He contended through his theory that humans are active participants in producing behavior and that they exercise control over their own destinies. In his description of social cognitive theory, he suggested that the full understanding of human behavior required an integrated causal perspective in which social influences operate through self-processes that produce actions.

Personal Teaching Efficacy is a specific form of self-efficacy. The construct of Personal Teaching Efficacy, a specific belief about one's ability to teach, has been used by researchers to describe the mediating effects one's beliefs can have between knowledge or skill and one's actions. A teacher with high efficacy, for example, would persist in the face of obstacles and rebound from temporary setbacks.

Bandura's theory of self-efficacy, therefore, provides the framework in which we can examine the role beliefs have in a teachers' selection or creation of Internet activities they may use with their students. A scale assessing teachers' beliefs about using the Internet in the classroom has been recently developed and follows Bandura's claim that self-efficacy is task-specific. Understanding this belief about using the Internet with students is an important factor that has been overlooked in previous studies related to Internet use.

The role of purposes. The purposes a teacher has for engaging students in an Internet activity can vary widely. One research report on the effectiveness of technology in schools reported "goals of instruction" as one of four factors contributing to the effectiveness of use (Software and Information Industry Association, 1999). According to Copeland et al, (1994), beliefs about educational purposes is a central way to understand how teachers interpret and understand classroom events and has been linked to a part of a larger system of beliefs and perceptions generally referred to as a teacher's "practical theory".

Methods

Participants

A purposeful sample was chosen so that information-rich cases could be examined. Patton (1990) describes the type of sample obtained for the present study as "criterion sampling". Each of the participants will provide information-rich data since all will have been predetermined to have the following characteristics: 1) participate as master teachers in partnership with a large university, 2) use the Internet with students for educational purposes at least several times a year, and 3) teach in grades 4-8.

Data Sources or Evidence

An initial survey was given to 120 K-12 cooperating teachers. Teachers were given a choice to take the survey in either paper or electronic (online) form. The purpose of the survey was to collect data about each teacher's technology ability, amount of Internet use with students, and level of efficacy for using the Internet with students. Twenty-five teachers were found to meet the criteria listed above and became participants in the study.

A semi-structured interview guide was used to elicit information for three general categories: background information, context of use, and purposes for using the Internet with students.

An established coding procedure developed by Copeland & Caston (1994, 1998) was used to categorize purpose statements as "broad" or "narrow". An example of a narrow purpose would include concern with students' cognitive thought typified by simple recall. A broad purpose would be considered a response related to such a concern as the development of a student's ability to proceed in a learning task independently. These tend to mainly be related to pupil-oriented responses. Teacher-oriented purposes are considered a separate category of responses not sub-categorized as narrow or broad. However, over ninety percent of responses discovered by the authors mentioned above were associated with the pupil-oriented category (Copeland & D'emidio-Caston, 1998). The focus of the present study is primarily on understanding the differences displayed among the ratio of broad purpose statements with total number of purpose statements among teachers.

The second interview will utilize what Patton (1990) describes as "illustrative extremes" to access information regarding beliefs about confidence and purpose for teachers' use of the Internet with students. Illustrative examples of Internet use with students will be created based on levels of purpose for use. One example will have an extremely narrow, while the other would contain an extremely broad purpose.

Results and Conclusions

Preliminary results of survey and interview analyses indicate that a relationship exists between teacher's purposes for using the Internet and their Internet Teaching Efficacy. Specifically it was found that teachers who have higher Internet Teaching Efficacy include broader purposes for using the Internet with students. Specifically, the majority of teachers who had higher Internet Teaching Efficacy included in their description of the lesson the notion of information literacy, while those that had lower Internet Teaching Efficacy did not. This finding of mentioning information literacy, or including as a purpose the students ability to locate, select and choose sites for relevance and accuracy, was categorized as a broader purpose using Copeland et. al's categorization scheme. This could be a fundamental shift in the way that higher Internet Efficacy Teachers view learning in general or learning through the use of technology such as the Web.

The present study includes a specific sample of teachers in partnership with UCSB as cooperating teachers and included a relatively small number of participants. Therefore results should not be generalized to a broad population. It does, however, provide an interesting window into the uses and motivations behind using technology and suggests that further studies should be conducted.

Educational or Scientific Importance of the Study

Teacher education issues. Besides adding to the existing research base on efficacy and technology use of teachers, it may be helpful to know what type of preparation is necessary for teachers under current contextual conditions. For example, it may be important to determine whether one should specifically consider addressing efficacy in the preparation of teachers. If the purpose for using technology by teachers differs not just on skill but by efficacy, then one would assume that along with proficiency workshops, support for specifically increasing one's computer or Internet efficacy would be necessary.

Program implications. Teacher education programs may need to consider that providing a strong knowledge base of content and pedagogy may not be sufficient to help teachers grow and succeed as professionals. Many researchers suggest that teacher education programs should be revised to incorporate this notion of explicitly acknowledging the beliefs teachers bring with them to a program (Ashton & Webb, 1986; Hollingsworth, 1989; Ross, 1995). Although not aiming explicitly at developing a teacher education program intervention, the results of this study may help to develop an understanding of the role teachers' beliefs have in the purposes teachers have in using the Internet with students. It is hoped that this new knowledge will help programs appreciate the need for a focus on providing not just skill but opportunities to enhance one's efficacy.

The cost and potential. Considering the cost of having Internet compatible computers suggests the nature of its purpose should be greater than that of drill and practice. Besides the cost involved with such a resource, many agree that teachers should employ methods to increase the use of technology as a tool to support higher order thinking skills with their students. Several studies specifically state the importance of higher level thinking as a necessity for survival in a rapidly changing world (Lee & Dinkins, 1998; Paul et. al., 1990). This study supports the notion of including higher level or broad purposes among the existing low/ narrow purposes of teachers: although like other, it does not state to what degree they should be employed. However, in order to reap some of the benefits of the great expenditure related to technology, this paper argues that more teachers must use technology for higher purposes, so that technology can be transformed from the token and peripheral aspect of the classroom it is today.

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Web Resources for Student Teachers

David Pratt, PT3, University of California, Santa Barbara, US
Heidi Stevenson-Bagnall, University of California, Santa Barbara, US

Examining the best, easy to use, and free resources for student teachers to integrate into their teaching

This interactive session allows participants to experience the best the web has to offer for student teachers. Most of the time will be spent on reviewing interactive activities for students, resources for teachers such as lesson plan and photo galleries, and powerful online applications that can be used immediately. All of these resources are located on an independent, easy to use web portal. The focus will be on how these resources can be implemented in methods, technology, and other teacher education program courses to help facilitate the use of technology in the student teachers' placements.

Students belonging to an education program may be generally aware of the wealth of information that is available to them via the Internet. Many of them interact with the Internet daily in order to meet certain needs or gain access to specific information. Unfortunately, many student teachers are not incorporating that use of the web in their coursework or placements. One possible reason for this is that they may not be cognizant of the multitude of free activities and applications designed specifically for teachers and their students.

During this session, participants will be able to interact with web resources in order to: access student activities such as WebQuests, gain access to thousands of lesson plans, create a website, utilize a rubric generator to create a rubric, and design their own personalized web quests, quizzes, and games. Discussions will focus on how to best integrate these on two levels. First, university instructors need to model appropriate use of these resources and begin to demonstrate their effectiveness in their own courses. Second, we will share how student teachers have used the resources in their school site placements to help meet the technology standards required before receiving the California Teaching Credential.

Participants do not need to have any prior knowledge or experience with technology to be a part of this session. The main web site used for this presentation can be found at:
http://www.freesites4teachers.com

Technology, science and preservice teachers: Creating a culture of technology-savvy elementary teachers

Rose Pringle, Kara Dawson & Skip Marshall
University of Florida
United States
rpringle@coe.ufl.edu

Abstract: The purpose of this study was to explore how preservice teachers incorporated technology into a microteaching activity that was a component of their science education and educational technology course. The preservice teachers displayed various levels of technology use ranging from additive and nonessential to being an integral aspect of the lesson. Four use of technology emerged; as knowledge source, data organizer, information presenter, and facilitator. In our presentation we will discuss microteaching as a tool in teacher education and share the preservice teachers' efforts to integrate computers and other related technologies in the teaching of science.

Introduction

There is no doubt that technology has strongly influenced the course of history and the nature of human society. Schooling has also been influenced by this increasing wave of new technologies. As a result, both science and technology educators have articulated the importance of understanding such technological advances and their relevance to teaching and learning in general and science in particular. In an article discussing the implications of science and technology interaction on scientific literacy, Cajas (2001) commends the science education community in taking a strong step toward including technology studies as part of science education by selecting and clarifying specific technological concepts and processes relevant for scientific literacy. The National Science Education Standard (NRC, 1996) recommends that technology in the classroom should provide opportunities for students to investigate science content beyond superficial levels, establish connections between the natural and designed worlds and provide students with opportunities to develop decision-making abilities. This is supported by the recommendations of the National Council for Accreditation of Teacher Education (NCATE) and the National Educational Technology standards (NETS) that seek to define standards for integrating curriculum, technology and technology support. NCATE stipulates students at the preservice and graduate levels in teacher education are prepared as 21st century teachers. They should be able to design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners.

As the debate surrounding technology and its role in teaching and learning intensifies, and as technology becomes more pervasive in society and more available in schools, the focus is on teacher educators to prepare preservice teachers with the capabilities to effectively integrate technology into their teaching. Many possibilities exist for the integration of educational technology into the curriculum and most content-specific governing bodies include statements related to effective technology integration (Churma,1999).

With the goal of creating a group of technologically savvy elementary teachers, both the science educators and educational technologists collaborated intensively during the 2001 spring semester. The purpose of this study was to explore how preservice teachers incorporated technology into a microteaching activity that was a component of their science education and educational technology course. In our presentation we will discuss the microteaching as a tool in teacher education and share the preservice teachers' efforts during their teaching activities as they integrate computers and other related technologies in the teaching of science.

The Program

In the seventh semester of the teacher education program, students are enrolled a science education, mathematics education and educational technology course. This semester is referred to as the

Math, Science, Technology (MST) block and focuses on individual pedagogy and content of the three subjects while emphasizing their integration as an important component of teaching and learning in elementary classrooms. Throughout the semester, efforts are devoted to developing teaching and learning activities aimed at achieving integration across the three subject areas in the inclusive elementary classroom. This is accomplished through collaborative planning among instructors and the administration of common assignments.

One common assignment is the microteaching activity. Students develop and teach a thirty-minute lesson that integrates math, science and technology. The lesson is developed for a grade level of their choice and is correlated to the state's curriculum standards. Students submit the written lesson plan to the instructors on the day of the teaching and make the necessary arrangements to acquire the technologies needed. These lessons are taught to their peers and observed by the math, science and technology instructors who provide feedback on lesson development, content, questioning and classroom organization strategies and the appropriateness of the technology used. The feedback from each instructor is compiled into one document and students receive one common grade for each of the three courses.

Data Collection and analysis

Data collection methods included observations of microteaching, analysis of lesson plans and content of both instructor feedback and student reflections. These multiple methods of data collection were used to triangulate the themes of technology use that emerged during analysis. Rigorous content analysis occurred as we examined the students' words and actions, (Maykut and Moorehouse, 1994) and categorized the use of technology in a variety of ways to understand the preservice teachers' perspectives on technology integration and the teaching of elementary science.

Findings

Four themes of technology use emerged: (1) technology as a knowledge source, (2) technology as data organizer, (3) technology as information presenter, and (4) technology as facilitator.

Technology as knowledge source

Many lessons used the WWW as a source of information. This was characterized by pre-determined websites, worksheet style questions, and, in most cases, lower level thinking skills.
For example, in a grade three lesson, the preservice teachers provided bookmarked websites on clouds, required the group to observe the types of clouds shown, and read the information given. They then drew the clouds as seen on the computer screen, and provided responded to worksheet questions as they documented the characteristics of each cloud. These worksheets were then pasted in their science journals to become part of their science notes.

In other lessons, a number of sites were pre-selected and this information then became the focus of the lesson. In a lesson on bald eagles, students were organized into groups and each given a folder, four questions and a list of websites from which to elicit the information. The next step of the lesson as observed and documented in their lesson plan showed the importance of the technology in providing the knowledge. The plan states: …"When all groups have completed the questions, the class will come together for discussion. Each group will be given the chance to explain their answers to questions three and four (all the questions if we have time). The teacher will then give a summary to the discussion about the causes for population decrease of bald eagles". In another lesson, students were provided with the software "A World of Plants" and were instructed to listen to the story on seeds and use the information to answer the questions on the investigation sheet.

As indicated in the examples, there was a heavy reliance on the technology to provide the content knowledge for the lessons. The learner involvement became one of reading and writing the information that was then used in whole group question and answer sessions, with the teacher highlighting the main points. The preservice teachers had merely substituted the traditional textbook and allocated a large amount of time to copying information from the technology rather than involving the learners in meaningful science activities.

Technology as data organizer

Many lessons involved collection of numerical data such as recording temperatures, densities, and masses. Some students used technology in the form of spreadsheets or databases to organize this data.

These lessons typically involved small groups collecting and inputting data, which was then compiled into a whole class document. In a lesson on Healthy Heart, students recorded their pulses at rest and after running in place for two minutes. These data were then recorded onto a spreadsheet that was set up in advance by the teachers. Bar graphs were then constructed from the data with the teachers asking the students to observe the graphs. In another activity on computing density of candy bars, the same format was followed. The teachers had the spreadsheet already outlined and the students went to the computer and added their information in the appropriate columns.

While collection and imputing facilitated observation of whole class data, students showed significant weaknesses in their ability to involve the class in data analysis and in the use of other skills such as extrapolating and making predictions from the trends and or patterns indicated. In some cases, they struggled with converting from the tabulated information to the appropriate graphs and showed weaknesses in manipulating the technology to construct the graphs. Some students literally fell apart when they attempted the graph construction and the steps were not indicated in the plans they were following. However, other students stepped forward to assist, demonstrating that among the group there were different levels of skills and confidence with technology use.

Technology as information presenter

This was the most common use of technology among the preservice teachers during the microteaching activities. Many of them simply used the computer as a glorified overhead projector; paying special attention to colors, fonts and transitions. While presentation software lends itself to nonlinear forms of communication; students utilized it in a linear, lecture-based fashion. Students learned how to develop PowerPoint presentations and were able to vary sound and colors and to import images. In most cases, hands-on activities were incorporated into the lesson. However, the technology was used for information presentation and subsequent fact recall on prepared worksheets. Few deliberate attempts were made to make the presentation relevant to the hands-on activity. In a lesson on leaves, students were provided with a leaf and instructed to measure the length and width and to observe the veins using magnifying lens. This generated many activities at each worktable but with the introduction of the PowerPoint students merely sat, watched and listened to the information being given about leaves.

Technology as facilitator

Active involvement in learning science is a hallmark of the National Science Education Standards. They advocate for the learning of science as inquiry as a central learning goal for all students and state that this cannot be met by having the students memorize facts. It can be met only when students frequently engage in active inquiries. (NSES, 1996). In some lessons, the technology was used to facilitate the inclusion of a number of skills into the lesson. Some of these were allowing for observation and description, critical thinking and the construction of explanations. These were integral components in facilitating inquiry and were essential for the success of the lesson. For example, teachers took digital photographs of animals in their natural habitats displaying various kinds of camouflage. These images were projected via presentation software and formed the basis for the discussions on how animals use camouflage as a survival mechanism. Students were instructed to observe, talk among themselves about their observations and to recognize and construct explanations why camouflage was important to the animals being observed. Their responses were solicited in a whole group discussion and the preservice teachers facilitated higher order thinking skills as they interacted with students.

Another lesson began with students sharing their experiences about a trip made to a lake, pond or to the sea. The preservice teachers then projected an image of a group of individuals floating in a body of water while reading and doing other activities. The class was asked if this was similar to their experiences and were instructed to suggest reasons for the phenomenon being observed. Students were given time to observe and think and then a discussion around the pictures solicited the students responses which were written on poster papers and hung to one side of the room. The lesson continued as students placed eggs in pure water and in salt solutions of varying concentrations noting that the more concentrated the solution the higher the eggs floated. Using the questions developed from this activity, students developed hypotheses about density. At the end of the lesson, the image of the floating people was again projected and students were required to write their own explanations of the occurrence.

Discussion

The goal of this study was to explore how preservice teachers incorporated technology into their integrated lessons during their microteaching activities. Our results parallel findings in K-12 classrooms with inservice teachers and technology. The preservice teachers displayed various levels of technology use ranging from additive and nonessential to being an integral aspect of the lesson. Four use of technology emerged; as knowledge source, data organizer, information presenter, and as facilitator. Preservice teachers also displayed differing levels of competence with the technology. Some were unable to deviate from the lesson plans and showed signs of nervousness and apprehension in instances when things did not go as planned while in such instances, other students were eager to lend a helping hand

The microteaching allowed the preservice teachers to bring together some components of good teaching including curricular integration, reflection and content-specific uses of technology.
We observed the use of the technologies in a variety of ways, ranging from simple presentations to computer simulations, resources for content and spreadsheets for data recording, analysis and constructing graph. In addition, further analysis suggests that the preservice teachers were beginning to value the use of computer technology in teaching science in elementary classroom. Many reported in their reflections that they had developed some level of comfort with using technology in their teaching. In part, they had developed an appreciation for technology as a tool to facilitate the learning of science. These results also offer clues and direction related to efforts to sensitize and expose preservice teachers to the use of technology in teaching and will provide a framework for us from which to consider our efforts to prepare technology-savvy science educators.

Conclusion

The study provided support for collaboration between content-specific teacher educators and educational technologists. Preservice teachers were engaged in the use of technology as a teaching tool and consequently developed new perspectives on the use of technology in their teaching. However, a crucial and obvious component to incorporating technology advances in the classroom is to ensure that teachers are comfortable and knowledgeable with its use as a tool to facilitate learning. The development of a cadre of teachers armed with the capabilities to effectively integrate technology into the teaching of science in elementary schools will require the integration of technology into the science education course and the ability to work through simulated teaching experiences such as a microteaching activity.

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TECHNOLOGY & EDUCATION
THE RESEARCH ON WHERE WE HAVE BEEN
A VISION OF WHERE WE ARE GOING

Elizabeth G. Pryor, Ph.D.
Research Center for Educational Technology
Kent State University
United States
egpryor@kent.edu

If we want teachers to create exciting and engaging learning contexts which respects all students' right to learn, the best way to do this might just be to create exciting and engaging learning contexts for teachers that respects their ability to shape education.
(Riel, 2001.)

One major finding of the 1998 *Teaching, Learning, and Computing Study* (Becker & Riel, 2000) was that the role of the student as a learner in the classroom mirrored the role of the teacher in the larger educational community. Students in classes taught by teachers who were engaged in a range of professional development endeavors are asked to think deeply about issues, generate their own ideas, work collaboratively on projects, share and evaluate their own work in a public forum, and use technology to support these types of activities. This finding points to the need to create learning experiences for educators that reflect the learning environment we want for our children

Produced by the Research Center for Educational Technology at Kent State University, the CD-ROM, *TECHNOLOGY & EDUCATION: THE RESEARCH ON WHERE WE HAVE BEEN • A VISION OF WHERE WE ARE GOING,* is designed for university faculty working with preservice educators, staff developers in a preK-12 environment, and practicing teachers engaged in study groups. The purpose of this session is to demonstrate the use of an interactive CD-ROM that was developed to actively engage teachers in reflective dialogue regarding best practice research, their teaching philosophies, and instructional practices.

Session participants will have the opportunity to navigate the CD-ROM as facilitators guide them through the layers of information. Facilitators will also report on the usage of the CD-ROM since its release in August 2001 and feedback that has been received from educators both at the university and K-12 level. Some of the primary users of the CD at this time are teaching faculty that are involved in PT3 initiatives.

The content of the CD-ROM illustrates how technology is changing our lives and our schools. A video message by Dr. Thomas Carroll, former Director of the *Preparing Tomorrow's Teachers for Technology* program, addresses the issue of teachers and their changing role in the classroom. Dr. Linda Roberts, former Director of the Office of Educational Technology for the United States Department of Education, speaks to the importance of research in educational technology.

The CD takes an in-depth look at current research findings on the impact of technology on teaching and learning. Dr. Henry J. Becker & Dr. Margaret Riel (University of California at Irvine), who conducted the research on the *Teaching, Learning, and Computing* study, talk about the significant findings of this work. Dr. Rob Tierney (University of British

Columbia), one of the researchers in the *Apple Classroom of Tomorrow* (ACOT) project, shares results from his ACOT research.

The CD also provides real examples of how these important research results translate into the classroom. A series of guided discussion questions and related staff development activities can be accessed during the course of the CD. These can be used as a stimulus to engage educators in deep conversations about the implications that educational technology has for a real classroom. Content of the CD crosses all disciplines.

The creators of the CD strongly suggest that it be used in a discussion group setting where education professionals and/or teacher education students collaboratively study some current research and issues surrounding technology and its impact on teaching and learning. Viewers are challenged to call on their collective wisdom as practitioners to examine the value and potential of emerging technologies on teaching and learning.

The Research Center for Educational Technology (RCET) was founded in 1999 to provide a collegial network for university researchers and preK-16 educators committed to studying the impact of technology on teaching and learning.

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ICT for Pre-service Teacher Educators

Petrea Redmond
Faculty of Education
University of Southern Queensland (USQ)
Australia
Email: redmond@usq.edu.au

Abstract: Pre-service teachers have diverse perceptions of ICTs in educational forums. This paper discusses one University's attempt to assist pre-service teachers to use and plan for ICTs as an integral part of the learning process for early childhood, primary and secondary students through their completion of a 1-semester course.

Introduction

Treuhaft (1995) states that "Educational institutions do not exist in a vacuum", and as such we must reflect current trends in society. As technology pervades our society we must ensure our graduating students have the knowledge, skills and attitudes to educate our children to participate in tomorrows world. One of the underlying issues for teacher educators in 21st century is to promote the capacity of Information Communication Technologies (ICTs) to improve teaching, learning and assessment in classrooms.

In 1997, Education Queensland released their "Schooling 2001 Project". The aim of this project was to improve student learning outcomes though the integration of technology (Education Queensland, 1998). Funding was provided to state schools, to achieve a number of targets. These include: the use of computers in every classroom across all key learning areas and all year levels, school networks that give every classroom access to the Internet, and all teachers with a minimum level of skill in the use of computers for learning.

Funding, personnel and professional development opportunities were available to assist all teachers to reach the Minimum Standards for Teachers in Learning Technology (1998). These standards cover four main areas: IT skills, curriculum applications including classroom planning and management, school planning and student centred learning. It is expected that all practicing teachers in Education Queensland will achieve the Minimum Standards by the end of 2001.

Context

In 2000, USQ introduced a course, "IT for Educators" as an elective course for teachers in response to Education Queensland's Minimum Standards for teachers. In 2002 this course will become a core course for all Bachelor of Education students. One of the benefits for our students taking this course is to increase their employability by Education Queensland, the major employer of our graduates.

Education students at USQ can now access ICTs in their pre-service education in four ways. Firstly, in first year students complete an "Introduction to Computers" course, which is taught by another faculty and is not linked to education. All students within the University complete this core course because it is seen as an essential element forthe employment future of all Australian professionals. Secondly, students can take courses in ICT's in education as a major (6 courses), a minor (4 courses) or electives. Thirdly, students are briefly exposed to ICTs in the context of their general study courses. And finally, the "IT for Educators" course is now a core part of the course for all Bachelor of Education students in the areas of early childhood, primary and secondary. This course gives pre-service teachers experiences to ensure students can demonstrate the Minimum Standards for teachers by graduation. Universities are unable to credential students and formal credentialling must occur when they take up their first teaching position in a State School.

The IT for Educators course comprises of the following major areas:

- Review of Basic IT skills: word-processing, file management, Email, Internet searching, PowerPoint, basic web authoring, and different forms of electronic communication;
- Discussion of Education Queensland's Policy and Guidelines for Using Computers in Learning;
- Demonstrating educational uses of the web; and
- Planning for curriculum and technology integration.

Students engage in individual and group activities both online and in person where they investigate the possible uses of technology in the field of education. Unfortunately many students have limited experience either using or observing appropriate use of technology in the classroom; this results in significant discussions regarding use of ICTs to support teaching, learning, assessment and administration within educational contexts.

Assessment within this unit takes several forms: a portfolio of samples demonstrating students IT skills, a short teaching session where students teach a IT micro-skill within a lab situation, contributions to multiple electronic communication forums, and the planning and preparing of a teaching unit or series of learning episodes where curriculum, literacy, and technology are integrated to solve a problem or perform a task.

Conclusion

There have been significant developments in ICTs, their access and use in all educational facilities. Teachers' current skills, pedagogy, beliefs and attitudes will influence how the computer is used in their classroom. Sheingold (1991, p18) states "it is not the features of technology alone, but rather the ways in which those features are used in [the classroom] that shape its impact'. Prior to completing the course, pre-service teachers preconceptions regarding the use of technology in classrooms is usually limited to drill and practice use for fast finishers and word-processing of reports.

Rosenberg (2001) and others have stated that teachers must change from sage on the stage to the guide on the side. This course focuses on the new role of educators as being one of a facilitator or manager of learning rather than one of imparting knowledge. Students are required to create real or life-like tasks where the use of ICT is integral to the learning process and curriculum is student centred. Students are aware that how they use technology in their classroom after graduation is not limited to their personal IT skills and it will depend on the resources available, their personal pedagogical style and their ability to create a flexible learning environment.

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Technology Integration: A Practical Model

Stephen R. Rodriguez, Ph.D.
College of Education
Texas A&M University-Corpus Christi (USA)
Stephenr@tamucc.edu

Abstract: The concept of technology integration has emerged as a key to effective use of technology in K-12 schools. This discussion presents a concrete model incorporating specific steps which teachers can follow when planning for technology integration.

To integrate means to make whole by bringing together parts. Thus technology integration as related to teaching may be defined as the act of utilizing appropriate forms of technology to enrich or complete instruction. Of course, use of technology may be more or less appropriate for given instructional goals and specific target audiences. Similarly, use of technology does not necessarily insure that instruction will be more effective than instruction which omits use of technology. However, many agree that technology—on the whole—is a "good thing," insofar as it holds high potential to enrich instruction, to motivate students, to further attainment of curricular goals, and to prepare students to survive in our technology-rich world. As always, one should avoid using technology just because "it's there," but should rather plan to use technology in ways that will truly have positive effects on students' learning.

Learning with Technology: A Task Focus

What kinds of tasks are most beneficial for students when using technology to learn? The ACTIVE framework provides general guidance on the kinds of learning tasks that fit well with technology use (Grabe & Grabe, 1998). The framework describes the characteristics of learning tasks which are well suited to student use of technology:

1. *Active*: tasks should require that students transform information into personal knowledge;
2. *Cooperative*: tasks should require meaningful interaction among students;
3. *Theme-based*: tasks should allow for flexibility, should be multidisciplinary, and should be based on an organizing theme;
4. *Integrated*: tasks should emphasize content area knowledge and require use of technology tools to encourage learning that content in meaningful ways;
5. *Versatile*: tasks should make efficient use of technology skills and develop skills that can be reapplied later;
6. *Evaluative*: tasks should allow for assessment of students' ability to use the targeted skills and knowledge.

The ACTIVE framework provides useful guidance for educators in considering which kinds of learning tasks would most appropriately involve student use of technology.

Steps for Technology Integration

What steps can a practicing teacher take to incorporate technology into teaching? There is no single, "right" answer to this deceptively simple question. The model presented here is derived from the author's personal experiences as a professor of educational technology and as an instructional designer. It is intended as a beginning point for planning for technology integration. Teachers should keep in mind that additional related insights may be gleaned from related literature and their own "trial and error" experiences (cf. Roblyer & Edwards, 2000; Grabe& Grabe, 1998; Jonassen, Peck, & Wilson, 1999).

Step 1. *review the technology landscape*: The teacher should first determine what technological resources are available at the school. Are open computing labs available? What resources are available in individual classrooms? Is portable or wireless equipment available on a pre-scheduled basis? Answering these questions is an important first step in the planning process.

Step 2. *identify the learners*: The teacher should next consider the characteristics of the intended learners. Thoughtful consideration of students' age, cultural background, reading ability, technological competence, and interests can improve the likelihood of successful instruction.

Step 3. *identify the curricular focus*: The teacher must pinpoint which curricular goal is to be addressed. It is important to keep in mind that instruction should focus on attainment of clear instructional goals and objectives, not upon development of technology skills in and of themselves although this can be an "added bonus."

Step 4. *specify the teaching team*: Although an individual can teacher can make effective use of technology with students, teachers should also consider a team-based, multidisciplinary approach under which teachers work collaboratively across multiple subject areas such as writing and social studies, or whatever.

Step 5. *specify the learning task(s)*: Here the teacher specifies the nature of the problem or project which will be posed to students. The focus should be on a traditional curricular student outcome such as understanding the water cycle or the three parts of the federal government. The timeframe for the instruction should also be specified. A rubric or other guidance explaining what students are expected to accomplish or produce should also be developed along with other supportive instructional materials.

Step 6. *specify how students will use technology:* Hand-in-hand with step 5, the teacher must determine how students will use technology to accomplish the task at hand.

Step 7. *learn to use the technology as students will:* The teacher must be able to demonstrate how students are to use technology and be able to guide them through the process. This requires that the teacher can actually perform the tasks expected of students and related preparation may be required.

Step 8. *prepare students for technology use:* Depending upon the level of students' existing skills, it may be appropriate for the teacher to spend some time instructing students on the actual use of required technology, though this is clearly not the overall purpose of the total instructional plan.

Step 9. *implement the plan with students*: This step is self-evident; the teacher tries out the complete plan with students.

Step 10. *evaluate results:* Here the teacher reviews student projects and collects attitudinal data to ascertain how students felt about the instruction, what suggestions they may have for improvement, and whether instructional goals were attained. Results should be used to revise the plan for next time.

In closing, the model suggested here provides a planning framework which teachers may use to begin their technology integration efforts. Teachers are encouraged to see additional related literature on this critical matter.

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Infusing Technology in the Classroom: Positive Intervention Makes the Real Difference in Student Learning

Linda Runyon, Ed.D.
Department of Communications
Robert Morris University
United States
runyon@robert-morris.edu

George W. Semich, Ed.D
Department of Communications
Robert Morris University
United States
semich@robert-morris.edu

Abstract: The emphasis on technology as a tool for instruction has intensified as the public's belief and reliance on computers has increased. School districts are demanding that new teachers have the knowledge, skill, and expertise to integrate technology in public school classrooms to enhance student learning. This emphasis has required preparing institutions to re-evaluate, review, and restructure programs to ensure that new professionals have opportunities to practice integrating technology. The process of reviewing programs to integrate technology as an instructional tool is the first step to ensuring that new teachers are prepared. The second and most difficult step is to implement necessary changes into existing programs. At Robert Morris University, we have begun the process of review, implementation, and continued evaluation of our English education program that will allow our students to integrate technology into their classrooms as an instructional tool to increase student learning.

Introduction

Infusing technology into classroom instruction is a major part of technology plans for most public schools, colleges, and universities today. The goal is to implement various instructional technologies and media for the improvement of student learning and retention. Education budgets at all levels reflect increasing monetary support for technology as the major learning tool. The issue, however, is not to use financial resources to provide technology as a "stand alone" educational add-on, but the effectiveness of using technology to improve student learning. It is important for new teachers to understand when and how to use technology to aid students' learning in classrooms to understand and apply concepts and information for various content areas. Specifically, new professionals need opportunities in their training to focus on discerning what technologies can be applied in various contexts and concepts to address student learning styles, interests, and specific subject areas and themes. As Dale Mann (1999) argues, technology does work—with some students and some of the time—not with all students all of the time. Teachers must be given opportunities to share, discuss, and experience appropriate ways to utilize technology in classrooms as they would any other pedagogical methodology. In this way, educators will go beyond using instructional technologies merely to justify expenditures to infusing technologies in a manner that creates a positive intervention in student learning.

Using technology as a positive intervention implies a conceptual understanding of technology as more than a motivational tool or a substitute for more traditional types of instructional methods or pedagogy. It means that technology must not be thought of as a reward for students who have finished their schoolwork. Understanding technology as a positive intervention means that teachers do not use technology for drill and skill programs for remedial students and a reward or enrichment activity for their gifted and talented students; instead, technology must be thought as a way to help all children, whatever their ability level, use technology in the same ways they use and are given access to other intervention techniques and methods.

Enabling preservice teacher candidates to have the experiences and information necessary to infuse technology in classroom planning and to understand its use as an intervention is a difficult task for many preparing institutions. Stand-alone college technology courses do not appear to help preservice teacher candidates understand how to infuse or integrate technology as a tool for learning. Our experiences working with both classroom teachers and preservice teacher candidates at Robert Morris University, has led to a shared concern that technology has become the primary goal while the pedagogical goals of the lesson are secondary. In these cases teachers use rather than infuse instructional technologies.

Restructuring the RMU Program

In restructuring our program, the questions for us became, how do teachers design classroom instruction in ways that infuse instructional technologies for a positive learning intervention and how can we teach this to our preservice teachers? The answer lies in teaching careful planning. Lesson planning can follow a design format such as *ASSURE* (Heinich et al, 2000). This design formula considers such pedagogical factors as: anticipate audience (A), state objectives (S), select technology (S), utilize technology (U), require learner participation (R), and evaluate lesson (E). Certainly not unique, this formula follows a general blueprint for lesson plan design with one exception—integration of technology. In this model, teachers first anticipate the type of learners in their classrooms and second write the objectives for the class from a pedagogical point of view based on the specific course outline. Technology planning then occurs in the execution the objectives of the lesson. Thus, technology is selected to better facilitate the objectives of the lesson and the type of learners in the class. Next, the teacher must utilize the technologies in a professional manner. A fluid delivery helps to ensure learning; therefore, we require our students to practice their delivery. Finally, the preservice teacher with the help of the instructor and a videotape of the practice lesson reviews the objectives and determines the best way to assess the lesson and the learning that occurred within the classroom. Essentially, this design formula promotes a positive intervention of technology into teaching. The answer to our first question, then, was to use the *ASSURE* model in conjunction with our lesson plan design to help our preservice teachers infuse technology into their lesson plans.

How to teach the model was fairly simple, the difficult part became in teaching our preservice teachers when and how to implement technology as a learning tool, our second question. They understood and could generate lesson plans based on the *ASSURE* model, but could not evaluate the effectiveness of their use of technology on learners. Our challenge became how to help our preservice teachers know when they should and should not use technology in classroom instruction.

In deciding on the use of technology in the classroom, Zaho and Cziko (2001) noted that there are three conditions for teachers to consider using technology:

1. The teacher must believe that meet a higher-level goal than what has been used.
2. The teacher must believe that using technology will not cause disturbances to other higher-level goals that he or she thinks are more important than the one being maintained.
3. The teacher must believe that he or she has or will have sufficient ability and resources to use technology.

These three conditions must be met prior to the implementation of any instructional technology in the classroom. Using technology for the sake of demonstrating that technology was applied to the lesson but without regard to the fundamental or primary of objectives for student learning would certainly be a waste of time for students. A distinction must be made between using technology and integrating technology for learning. It should also be noted that many of the skills in computer technology require time, support, and colleagues to work with to move toward this integration process for effective lesson planning (Sheingold and Hadley, 1990). A positive intervention of technology in teaching is a matter of training, expertise, and creativity on the part of the teacher. It is a basically a process of delivery for the learning objectives.

Newman (1990) argues that educators must determine whether the technology intervention has changed or not changed the educational environment, and subsequently, the learning or pedagogical goals established by the teacher. The argument has been that technology stimulates or demands positive transformations in instruction (cf. International Society of Technology in Education, 1998; Means et al. 1993; Papert, 1993.) Research indicates that technology interventions have not produced the desired outcomes (e.g., Bruce & Rubin, 1993). The fact that teachers do experiment with the technologies inside and outside of their classrooms and the public's instance to provide instructional technologies in public schools should not, however, be the intended reason for using it.

Newman (1990) examined this issue of intervention and formulated the framework for six critical questions. These include the following:

1. What is the pedagogical goal of the lesson, and what pedagogical theory does it satisfy?
2. What is the instructional intervention that has the potential to achieve the identified pedagogical goal?
3. As the intervention is implemented, what factors enhance or inhibit its effectiveness in achieving the pedagogical goal?
4. How can intervention and its implementation be modified to achieve more effectively the pedagogical goal?
5. How has the instructional environment changed as a result of the intervention?
6. What unanticipated positive or negative effects does the intervention produce? (Reinkins & Watkins, 2000).

By using Newman's questions in conjunction with the *ASSURE* model, we thought our preservice teachers would be better prepared to evaluate the use of technology as an instructional tool for learning. The following sections examine the data we collected for evaluation of the program and the recommendations we have made for the future.

At Robert Morris University, all students are required to take two technology courses as part of their core requirements. In addition, our preservice teachers are required to use technology in many of their courses and educational requirements. We realized, however, that our preservice teachers were not required to carefully evaluate the use of technology as an instructional tool for public school students. Although there are several ways to help preservice teachers learn to evaluate their use of technology in the classroom, we decided that the best approach for our students would be to design a culminating component to their methods course that would enable them to first integrate technology into instruction, and then to "test" the effectiveness of that technology.

Implementing the RMU Program

Our next step was to test and evaluate our belief that the *ASSURE* model and Newman's questions would help our preservice teachers make appropriate technology decisions. Through observations of presentations, interviews with the preservice teachers, and analysis of their lesson plans we were able to test our theory and evaluate our effectiveness of teaching the infusion of technology as a learning tool.

The course, Infusion of Technology in Classrooms, is taught as an integrated technology component for our preservice secondary English teachers during their Instructional Methods block prior to student teaching. Our students met with the instructor each Friday for approximately three hours. The initial sessions focused on understanding the application of instructional technologies in public school classrooms. These sessions, which were primarily hands-on, allowed students to review the basics of the technological skills they currently have and to build on these skills. Our students learn, for example, more sophisticated PowerPoint techniques for presentations, basic web design, integration of clip art and animation into presentations, how to write to CDs, and how to participate and set up threaded discussions. More importantly, our students learn how to apply these technological strategies to classroom discussions presentations, demonstrations, skill practices, simulations, and cooperative learning to positively influence student learning.

This component is taught in one of the university's presentation/laboratory classrooms. These classrooms are equipped with an instructor console that has a computer with Internet connection, a document camera, a microphone, two VCRs, a tracking camera (to tape student presentations), a CD player, and approximately 20 student computers with Internet connections. Teaching in these classrooms allows the instructor to demonstrate a technique and then have students immediately practice that technique. Our preservice teachers are familiar with using the equipment found in these presentation/laboratory classrooms. Approximately 70-80% of all classrooms at RMU have document cameras, computers, Internet connection, VCRs, and projectors for instructors and students to use for demonstrations, presentations, and instruction.

The final sessions focus on the infusion and evaluation of technology on instructional practice. In these sessions, our preservice teachers first design a lesson plan for their future public school students. Next, we ask them to integrate technology as an instructional tool in the lesson plan and link the technology to the specific objectives and method of the lesson. Often, this is the most difficult part of the course for our students. They are comfortable with the use of technology—many of them want to use as much technology as possible; however, they are not comfortable with evaluating its effectiveness. Prior to presenting the lesson plan to their peers, therefore, they must provide a rationale for the technology they choose. In short, they must explain how learning would be enhanced or improved by the technology intervention over traditional or non-technological methods.

Lesson plans are evaluated using a variety of design criteria including: the objectives, the technology, and the assessment of the objectives. We focus on how technology intervention enhanced the learning objectives. We ask students to explain how the lesson could be taught without the use of technology and to compare instruction. This is a way of overseeing that there is not a misuse or unnecessary use of the instructional technologies. To illustrate, one student created a series of grammar exercises with sound and pictures in a game format. She called her CD – *Grammar Safari*. Essentially, her use of technology provided a series of challenging questions used for bonus points. Another student introduced *The Canterbury Tales* by using PowerPoint slides to explain Middle English and medieval writing. She also added an Internet URL that connects students to a site where excerpts from *The Canterbury Tales* is read aloud. Other preservice teachers created threaded discussions on the Internet on various literary topics, while others led research groups to discover historical backgrounds and related literature and still others created CD packages for collaborative learning exercises. The importance of this preservice lesson presentation design is to encourage teachers to make choices about the selection of technologies to have a more positive influence on student learning.

Evaluation and Recommendations for the RMC Program

After the first few sessions of the technology component, our preservice teachers showed a high degree of mastery in the use of instructional technologies. Our goal to have our preservice teachers demonstrate their knowledge of integrating technology as an instructional tool by crafting a lesson where a specific technology is linked to a method, to meet the lesson objectives was met. The challenge for our preservice teachers was understanding the use of the instructional technologies more from the standpoint of motivation or as means of providing variety to lesson planning.

The decision to incorporate this technology component during the four week block, proved to emphasize technology as another strategy teachers had to improving instruction, rather than as an "add on" to a lesson for the purpose of fulfilling a district or school requirement to use technology in some way in the classroom. Our preservice teachers were able to effectively evaluate the use of technology as an instructional tool in this setting.

The fact that our preservice teachers are successful in evaluating technology as an instructional strategy is encouraging. We realize, however, that the setting (a university classroom filled with friendly peers and helpful instructors) is not the real world. We recommend that as a next step, our preservice teachers plan, teach, and evaluate lessons using technology as a tool for learning in their classrooms during student teaching. We also recommend that these preservice teachers teach technology lessons as they are being evaluated by university supervisors who have been trained in the ASSURE model. Further, we recommend that our preservice teachers teach the same lesson to two groups of students—once without the use of technology and later with technology, measure student learning, and then evaluate the use of technology as an instructional tool. In these ways, we hope to encourage our preservice teachers to continue to evaluate carefully their choice of technology and to provide additional date an the effectiveness of technology as an instructional tool in public school classrooms.

The infusion of technology as a positive intervention for student learning requires training in how to *best* use these technologies to meet the learning objectives. The research has attempted to clearly demonstrate the positive results of technology intervention, but given the number of variables associated with the teaching/learning process, it is difficult at best to show definitive results. Many researchers are continuing to explore this technology intervention, and perhaps in the future there will be studies that may bring conclusive evidence to the forefront. One researcher, R. Kozma (1991, 1994) offered an interesting and functional interpretation in referring to technology not as a medium to deliver information per se, but rather as a device to connect the learner with that medium to construct knowledge. It may also be the efforts of the preservice teachers at Robert Morris University and other colleges and universities that will help provide the necessary research answers to the use of instructional technologies as positive interventions for student learning in the classroom.

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Preservice Teachers Integrating Technology: An Update

Linda Runyon
Department of Communications
Robert Morris University
United States
runyon@robert-morris.edu

Donna Lund
Department of Communications
Robert Morris University
United States
lund@robert-morris.edu

Abstract: Elementary teachers often are required to integrate technology in their classrooms and to teach students to utilize technology. In Pennsylvania, preservice elementary teachers typically receive one course in technology instruction. Giving preservice elementary teachers the training and experiences they need to make valid decisions in the use of technology, as a tool for instruction is required of preparing institutions. In the program described previously, our goals were (1) to have preservice teachers mastered the use of technology for their personal needs, (2) to evaluate software packages, and (3) to create lesson plans that integrate technology in appropriate ways. The following discusses the program and provides an update on the changes and revisions we have made during the first two years of the RMU elementary certification program.

Introduction

Today, elementary teachers often are required to integrate technology in their public school classrooms. At best, most of these teachers believe that integrating technology means teaching their students how to use equipment or software. At worst, many teachers use technology in their classrooms as an add-on to satisfy requirements for their evaluations or to meet the demands of administrators. In Pennsylvania, preservice elementary teachers typically receive only one course in technology instruction. There is little or no attempt to demonstrate ways to integrate technology into their future classroom assignments in education or methods courses. It is important to give preservice teachers the training and experiences they need to make valid decisions in the use of technology as a tool for instruction. In the RMU elementary education program described at SITE in 2000, preservice teachers first were to master the use of technology for their personal needs (Lund & Runyon, 2000). Second, preservice teachers were to be taught ways to evaluate software packages. Next, our preservice teachers were to have opportunities to create lesson plans that integrated technology in appropriate ways. Finally, preservice teachers were to use technology in actual classroom situations with small groups of elementary students. Now in its third year, the elementary education program at Robert Morris University is being evaluated for its effectiveness in meeting the goals and objectives of the program.

As we began the evaluation process, we first turned to the research on teacher training and technology. We discovered that many researchers and experts agreed that it is important to continue to stress the importance of using technology as an instructional tool rather than as a "add-on" to instruction. Maeers et. al (2000) argue that preservice teachers need opportunities to learn and use technology and to have instructors model technology as an instructional tool. We have found that the more comfortable and familiar our preservice teachers are with instructional technology the more likely they are to use it and, more importantly, the more likely they are to integrate technology for personal uses.

The Program: A Review

Given the opportunity by the Pennsylvania State Department of Education to develop a new elementary education degree program with a focus on integration of technology, Robert Morris University (RMU) responded by incorporating technology throughout the program—specifically in all education and methods courses as reflected in department syllabi. The integration of technology in course assignments illustrates to preservice teachers in a concrete manner ways in which technology can and should be used by educators as a tool instead of a "by-product." Some examples of learning activities in various courses include:

- searching for appropriate Internet sites and creating hyperlinks for elementary students.
- corresponding via e-mail to elementary students.

- evaluating software packages in content areas such as interactive reading software for reading and language arts methods.
- creating graphic organizers and data bases, using commercially packaged software such as PowerPoint™ and Claris Works for Teachers™
- evaluating on-line lesson plans and teacher materials
- using scanners to integrate pictures of students' work into text and presentations
- evaluating video segments for use in the classroom.

Through these courses and activities, preservice teachers learn that technology is a natural extension of their lessons and can be incorporated in the classroom as a tool for learning. They learn when the use of technology is inappropriate as well as when its use can enhance instruction.

At RMU preservice elementary education majors are required to take 15 credits of technology courses: nine from the college technology core and six from the RMU core. With this background, students are prepared to effectively use technology to teach content in specific subject areas. These technology core requirements are not intended to make technology experts of elementary majors: rather, the goal is to produce competent, confident elementary teachers who are comfortable with the use of technology as a tool when implementing successful teaching strategies. To accomplish this goal, RMU faculty used the National Education Technology Standards published by the International Society for Technology in Education as a model for designing courses and assignments.

The Program: an Update

Elementary preservice teachers in the Robert Morris University elementary education program have used technology as a tool for their own learning in many of the institution's core courses that they have taken. Specifically, they have been required to use word processing software in their Communication Skills I and II courses, and to incorporate graphics, tables, and charts into these documents. They have had some experiences with Internet research and have used technology to help in preparing presentations especially in Communication Skill III-V. More importantly, instructors have modeled the use of technology as an instructional tool. Our preservice teachers have finished two "stand alone" technology course (Tech Literacy for Educators I & II) that focus on configuring hardware to meet the specific needs of their future classrooms. Preservice teachers learned, for example, how to set up equipment, cable scanners, printers, monitors, and document cameras together. They learned how to use digital cameras and video cameras. They also learned how to cable VCR and DVA players to other equipment. Our intent was not to make technology "gurus" out of our preservice teachers, but to give them the information and skill they would need to perform basic maintenance and trouble shooting on the types of equipment they find in their classrooms. In this way, we hoped to give our elementary preservice teachers the ability to lessen instructional "down-time" waiting for the technology specialist or support staff. We do realize that most public school classrooms will not be equipped with the amount of technology that we require of our elementary preservice teachers, but we feel that it is important for our preservice teachers to become familiar and comfortable with a variety of technologies.

As our first group of elementary preservice teachers completed Tech Literacy for Educators, we began evaluating ways in which we could improve and expand technology literacy. Our elementary preservice teachers were extremely helpful in voicing their views about the course and the ways they thought it might be improved. With the help of our preservice teachers, we have begun the process of reorganizing and restructuring the course to better meet their needs.

In addition to the technology courses, our preservice teachers have completed Developmental Literacy and Children's Literature. Both of these courses require our preservice teachers to utilize the information they received in their technology course and to integrate technology into these areas. Preservice teachers in Children's Literature, for example, have created spreadsheets, graphic organizers, and charts using the computer and appropriate software. They have begun work on a database for teacher recourses and a course web page that will continue to be updated each semester.

The technology requirements for our preservice teachers has meant that instructors in these courses have had to reevaluate their own teaching, assignments, and requirements to provide preservice teachers the opportunities they need to understand the use of technology as a learning tool. As Basinger (1999) argues, institutions that reported the highest levels of student technology skills and experiences were ones that did not demand several stand alone technology courses, but those hat integrated technology throughout the teacher training program.

As RMU began to design the elementary education program, the concerns about the demands placed on faculty were discussed and ways to resolve these concerns were explored. This demand on the RMU faculty has meant that seminars to disseminate information about the use of technology in curricula design, software availability, and hardware updates must convenient, appropriate, and timely. Faculty interaction must also take place to ensure that the necessary skills have been taught and that assignments build on one another instead of conflicting or overlapping. Since adjunct faculty who are full-time elementary classroom teachers teach many of our method courses, full-time RMU faculty must work with adjunct faculty to ensure that the level of technology integration modeling is maintained. This also means that RMU must remain committed to providing faculty development and resources.

Our preservice teachers have had to make adjustments as well. No longer is the course over at the end of the semester. The information they learn in one course has been integrated into another. In fact, this concept of demonstrating how information should be used from course to course has been working so well with the technology that we have begun to incorporate it in content courses. The work done in Children's Literature, for example, is expanded in Reading and Language Arts methods and used in Science, Social Studies, and Mathematics methods.

Currently, these preservice teachers are in their third year of the program and are enrolled in Educational Assessment. This course will require them to create ways to assess student learning. It will also require them to plan and evaluate the ways in which they organize and deliver instruction to their future students. The goal of this course is to help preservice teachers understand the ways in which technology might be used as an instructional tool to both aid student learning and to aid in student assessment.

Future Plans

As our first class of elementary preservice teachers are finishing their course work, we are making plans to have our adjunct faculty (those elementary classroom teachers) come to the campus for training on the equipment our students have been using. We are also planning workshops for these teachers in the ways to integrate technology as an instructional tool for public school elementary students. We plan, for example, to have these adjunct faculty develop units in content areas that require their students to use the Internet, scanners, and document cameras. We also plan for these teachers to learn to use and teach PowerPoint in their classrooms. Adjunct faculty will be asked to bring an existing lesson plan and to integrate technology into that plan with the help and guidance of RMC full time faculty. Then, teachers will teach the plans with and without technology to groups of their students. RMC full time faculty will be available to assist the teachers in the classroom. Finally, these teachers will evaluate the effectiveness of technology as an instructional tool. We feel that it is important for our adjunct faculty to go through this process with us so that they can better evaluate our preservice teachers in their methods courses and during student teaching.

In addition, our future plans include a post baccalaureate program in elementary education and a masters program and exploring the possibility of a doctorate in elementary education or curriculum and instruction. Many of our current preservice teachers are expressing an interest in continuing their education at RMU. Several of our adjunct faculty and their colleagues have asked about the possibility of completing a doctorate at RMU.

A Final Word

The use of technology in elementary preservice teacher programs requires a new mind set for instructors and elementary preservice teachers. Programs such as ours are beneficial only when elementary preservice teachers are given clear instructions, time to practice, and requirements to integrate technology throughout their program. This means that instructors must work closely together to ensure that technology requirements remain consistent and yet build toward helping elementary preservice teachers become familiar with the use of technology as a tool, not as an add on, and helping elementary preservice teachers distinguish when technology enhances rather than detracts from learning.

We had an advantage when we began our elementary education program; we had never had such a program at Robert Morris University. We, therefore, did not have to deconstruct traditional practices. We did not have the political or territorial conflicts that other institutions might encounter. We are able to experiment and change as we discover problems and solutions within our program. With the help of our elementary preservice teachers, we are continuing to refine and hone our program to meet their needs and the needs of public school children.

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Shifting the Teacher and Student Roles in the Classroom
Blending Web Design and Service Learning for Classroom Change

Chris Sande, Teacher
Rogers High School: Spokane, Washington
chrisS@sd81.k12.wa.us

Anuja Dharkar, Curriculum Specialist
Macromedia: San Francisco, California
adharkar@macromedia.com

Abstract: Students in the process of learning web design are often unable to experience the real-world design process that takes place between a client and the web designer. Interpersonal and group dynamic skills are essential in order for one to be successful in education and business. By linking Web design and service learning, students have an authentic experience to learn and apply these skills while designing web sites for their community. Community organizations are often without time or skill to build their Web sites and students can fill this need. To provide for these student experiences, two main changes need to occur in the classroom dynamic: a paradigm shift from teacher to facilitator and shift from student to team player.

Service learning provides students with skills for teamwork, individual responsibility, and accountability. These skills help students become productive members of their communities by forming a connection with local organizations and community members. Professional Web designers also rely on teamwork, individual responsibility and accountability when developing a Web site. Using Web design skills in service learning accomplishes two main goals. First there is an authentic, real audience and/or client for whom students can build Web sites. Second, students can apply the universal values and skills of service learning to provide them with an authentic Web development experience. Using Web design skills in service learning allows students to become active participants in their communities while applying knowledge and skills from the classroom. Students can make connections in the community, transfer community service concepts to Web design, and practice the professional skills of Web design. To support this type of work, teachers need to be prepared to shift their roles in the classroom and provide students with experiences that will promote teamwork.

Shifting the Teacher Role

Service learning requires building ties in the community. To promote the authentic experience of working with actual organizations, teachers need to expand their classroom roles to build relationships outside the classroom. This action causes teachers to move towards a facilitator role as they forge relationships and set up explicit expectations between the classroom and community organizations. The facilitator role becomes important in preserving outside relationships with the classroom and helps to model professional Web design and development practice when the project begins. The teacher can maintain instructing and helping students accomplish Web development work for the community. A successful example of this type of work is the Hands on the Land project conducted through the Wilderness Technology Alliance (WTA). This project links classrooms with federal lands. Teachers, with the help of the WTA plan the visitation and exploration of the site, build the expectation and relationship, and coordinate student Web site production. This method helps the teacher transition towards the facilitator role.

Shifting the Student Role

Professional Web design requires team participation. To successfully model and engage students into the professional team process, teachers must help student understand the dynamics of team interaction. A possible method to help students understand the importance of teamwork would be to engage students in other activities that involve teamwork. For example, the Wilderness Technology Alliance (WTA) has created a model for teaching students about teamwork and the important skills that team building provides. During a two-week summer camp teachers will take students on a weeklong hike to collect data on Mt. Rainier and then these student groups will apply their team building skills to creating a Web site to represent the data they collected. These team skills will help students model professional practice and ease their transition into group work for outside clients. Teachers create links between professional practice, classroom practice, and a familiar environment for teamwork such as the wilderness.

Conclusion

When teaching Web design, teachers will need to shift the roles in the classroom to provide an authentic learning experience. As the facilitator of the classroom, teachers will build their role by creating ties in the community and helping students model professional behavior. As exampled by the WTA and it projects, there is much success that stems from building partnerships and helping students learn to be better team players.

The pedagogical scenario: as a tool of professional development in the in-service teachers and pre-service teachers.

Dilmeire Sant'Anna Ramos Vosgerau
PHD Candidate – Montreal University.- Canada
Pontifical Catholic University of Parana – Brazil
CNPQ – Scholarship holder
santannd@magellan.umontreal.ca

Jacques Viens
Montreal University
Canada
jacques.viens@UMontreal.CA

Abstract: Within the framework of our research-action-training, we propose the interaction among the in-service teachers and pre-service teachers in professional development courses for the conception and implementation of a pedagogical scenario to integrate ITC into the classroom.

As a consequence, both in the creation and implementation of the scenario, our aim is to allow in-service teachers and pre-service teachers in professional development to go through a socio-constructivist learning experience which is to the same extent a sharing experience in a practical learning community that will provide a new belief concerning the development and use of pedagogical scenarios.

Introduction

The Internet contains a growing number of resource sites containing pedagogical strategies and practices linked to various educational content. These sites contain suggestions for lesson planning procedures, integrating TIC, and at times, various other tools which may enable their application in the classroom.

These procedures are meant to guide the teacher in planning the learning process, while taking into account the different variables such as teaching tools, participants, context, as well as the question of who may contribute or thwart the learning process. The result of this planning is called the pedagogical scenario or lesson plan. The majority of these scenarios, which are available in the database and on the Web, have been devised by students of education as part of their coursework.

The Study

Within the framework of our research-action-training, we propose the interaction among the in-service teachers and pre-service teachers in professional development courses for the conception and implementation of a pedagogical scenario to integrate ITC into the classroom. This training takes place within a course conceived as a professional training laboratory, at the University of Montreal.

In this course the learning and teaching socio-constructivist dimensions such as collaborative learning, student centered learning, stimulation leading to learning autonomy in a meaningful and realistic context (Viens, 2000) are taken into account. Thus, the in-service teachers and the pre-service teachers are invited: to participate in pedagogical and technical training workshops; to group up in working teams made up of one in-service teacher and three pre-service teachers; to hold individualized meetings with the tutor as a group; to take part in the discussions forum; finally, to contribute to *Les Scenaristes* site in the creation of the pedagogical scenario for ITC integration. In this way, in-service teachers and pre-service teachers become members of the same working team.

In order to construct a lesson plan, *Les Scenaristes* site proposes a systematic procedure in five phases:situation analysis, lesson plan design, pedagogical material production, lesson plan application, and finally, the evaluation and revision of lesson plans and pedagogical material.

The pedagogical procedure of the lesson plan design contains five elements: situation, learning situation, objectification situation, evaluation situation and transfer *(réinvestissement)*. These are presented as the basic elements of a lesson plan, which must be combined and orchestrated according to the needs of the students in question, as well as the peculiarities of the learning context

While in traditional practice, the conception of a pedagogical scenario is considered an instrument for teaching planning; we see it, from a socio-constructivist perspective, as a tool which leads, in the first place, to reflection before, in and after action; *adding* they fix an interpretation and a solution, but are open-ended and easily revised; they take account the external factors and they use them in order to consolidate the learning experience (Carrol, 2000), and above all, it is an instrument to share experiences and practices.

However, in the first steps of our research, we noticed that in order to conceive a pedagogical scenario from this new paradigm, there are barriers to be overcome, such as the association of the scenario to a traditional pedagogical planning, closely related to objective cognitivism, beliefs related to its use as well as models and recipes which provide an anticipative vision of reality. These beliefs appear already at the beginning of our research and they oppose to the socio-constructivist dimension we wish to follow in both its conception and implementation.

As the activities develop, the groups are led, by the tutor, to reflect on the roles of each of the actors of the scenario: teachers and students, as well as on the importance of providing the models of the necessary tools for the support of learning in a socio-constructivist context, such as the suggestions for the implementation of evaluation tools and the strategies and questions of objectification. We hope that the teacher will venture beyond pedagogical planning in order to implement a new approach set out by the education reform.

Bearing in mind that the research is still in the data collection phase, it seems to be too early to make conclusions. Nevertheless, we can state that that there is a growing interest in this problematic on the part of the teachers dealing with evaluation tools in education, as well as on the part of the students engaged in coursework projects. Consequently, we need to reflect on the priority level which the elaboration of these tools might occupy in the process of lesson planning, as well as on the importance it might have in supporting the teacher in the milieu of a new pedagogical practice.

Nevertheless, we believe that an essential advantage of the scenario is misunderstood: its role as a tool to share pedagogical practice and tools for this practice.

Therefore, both in the creation and implementation of the scenario, our aim is to allow in-service teachers and pre-service teachers in professional development to go through a socio-constructivist learning experience which is to the same extent a sharing experience in a practical learning community that will provide a new belief concerning the development and use of pedagogical scenarios.

Conclusions

We believe that the study of this educational device will enable us to know more about the priorities set out by teachers in connection with their training in TIC. We also believe it is possible to observe the position which planning, elaboration, and lesson plan tools have in the formation of a new pedagogical practice, using TIC in order to support it.

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Developing Appropriate ICT Competencies in Trainee Teachers: An Australian Example.

John Schiller
The University of Newcastle
NSW, Australia
john.schiller@newcastle.edu.au

Abstract: This presentation will explore the rationale for, the strategies used, and the initial implementation successes and failures as minimum ICT competencies were determined at a regional Australian university for each year of the four year, double degree teacher training programs. Catering for the diverse ICT needs of nearly 2000 early childhood, elementary and high school teacher trainees necessitated changes in program structure, modification of existing courses, creation of new course components, changes in assessment requirements, establishment of additional infrastructure, and training of staff. Issues such as staff involvement in the decision making processes, determining entry ICT competencies of entry level students, providing for ICT skill development, assessing ICT milestones and future challenges, will be explored.

Introduction

Although Information and Communications Technologies (ICT) have been used in some aspects of undergraduate teacher training programs for many years in Australian universities, it is only in the last few years that any systematic attempt has been made to identify and clarify expectations of minimum ICT competency standards for all graduates from teacher preparation programs.

This presentation will explore the rationale for, the strategies used and the initial implementation successes and failures as one regional Australian university determined minimum ICT competencies for each year of its four year, double degree teacher training programs. Catering for the diverse ICT needs of nearly 2000 early childhood, elementary and high school teacher trainees necessitated changes in program structure, modification of existing courses, creation of new course components, changes in assessment requirements, establishment of additional infrastructure, and training of staff.

In 1998, the NSW Department of Education and Training (New South Wales is the most populated state of Australia), the major employer of graduates from university Faculties of Education, expressed concern that the minimum ICT competencies of many graduates from NSW universities did not meet the needs of the schools and that appropriate demonstration of ICT minimum competencies would be expected prior to an offer of employment. Although a report on "Preparing a Profession – Report on the National Standards and Guidelines for Initial Teacher Education Project (Australian Council of Deans of Education, 1998)" had identified 14 graduate attributes deemed as necessary for effective beginning teachers, including use of appropriate technologies, particularly information technologies to facilitate learning, for administrative purposes and for professional interaction, many Faculties of Education had only paid lip service to ensuring that these attributes were appropriately developed in all programs. The threat of the major employer for the state to refuse to offer teaching positions to graduates who did not meet minimum ICT competency levels focused attention on program redesign and changes in assessment processes!

Determining basic ICT competencies

Using a report "Computer Proficiency for Teachers", prepared for the Ministerial Advisory Council for the Quality of Teaching in 1997 (see http://www.det.nsw.edu.au/macqt/comppro.htm), the Faculty of Education at the University of Newcastle, Australia, redesigned programs and assessment requirements in an attempt to include the basic competencies identified as critical to beginning to teach in NSW schools. The report recommended that all graduates of initial teacher education courses should have as a minimum proficiency, ICT skills in the areas including:

- Basic operational skills including understanding the various components of the computer, using a variety of software applications such as word processing, database and spreadsheet functions, information retrieval, use of graphics, simple desktop publishing and use of drill and practice activities.
- Information technology skills including the ability to find information, select appropriate applications and software for the classroom, organise material sequentially, assess the relevance of information and present it appropriately.
- Software evaluation skills such as the ability to determine underlying pedagogical assumptions, gender and ethnic bias, educational relevance and suitability for the classroom.
- Pedagogical skills for classroom management such as the ability to create student centred learning environments, to develop innovative ways of using technology to enhance the learning environment and to encourage students' creativity andresearch.
- Awareness of values and ethics related to the social and educational use of computers and associated software and applications

The report highlighted that the major challenge to be faced in the integration of technology in the classroom would be the pedagogical implications, the impact on the structure and content of curriculum, classroom organization and practices and the changed role of the teacher.. Moreover, the report argued that the key issue is pedagogical rather than technical, that teachers need to come to terms with the pedagogical challenges posed by effective classroom use of ICT (p.5).

Implementing a basic ICT skills approach

The first steps to implement these recommendations were taken in 1999 by a part time lecturer who developed a matrix to map where these skills were dealt with across all existing teacher education programs provided by the Faculty of Education in Early Childhood, Elementary and High School specializations. These matrices demonstrated that few ICT skills were covered within courses and that there was a completely ad hoc approach to development of ICT skills across all teacher education programs. To ensure that basic ICT skills were required of all teacher education students, a series of tutorial sessions were established in the first year core course on learning processes which was taken by all beginning students. However, the range of ICT skills of the tutors presenting these sessions was so variable that the decision was made to supplement these computer lab based sessions with workshops for those students who needed additional help. A part time lecturer presented these workshops and devised a self help manual to cover basic skills of word processing, presentation, email use, web page construction, spreadsheet use and software evaluation. At the university level, infrastructure was set up to provide every student with a free, Internet based 'Studentmail' email address and self-instructional software was evaluated and purchased so that all students could access online tutorials to learn basic and advanced use of a wide range of software applications.

The poster session will present data collected from all first year student teachers at the end of the first semester 2000 and 2001 which shows that there was a significant increase in student use of and perceived competency in a range of software applications but that there were still a surprisingly high proportion of first year university students who claimed only occasional use or no use of some software applications. Samples of scenarios used to develop basic ICT competencies and presented in tutorials will be shown. Positive and negative experiences in using an online tutorial system "Skillbuilder" will be outlined. The current assessment criteria for development of "Computer Competency Milestones" in MS Word, Powerpoint and Excel will be shown. Issues in convincing academic staff to embed ICT competencies in their course assessment will be explored and challenges in developing academic staff understanding of wider applications of ICT in all aspects of student teacher learning will be outlined.

Creating a Technology Competency Agreement between Colleges

Kathleen M. Sindt

The teacher education program at Montana State University - Billings (MSU-Billings) is in a unique situation in the types of students it receives. Approximately 40% of the student population in the teacher preparation program are transfer students from the community colleges in the region. We have formalized partnership agreements with many of these colleges.

The partnerships formed with the neighboring community colleges allow students who have completed an Associate's Degree to use this degree to show completion of the General Education requirements. Most of these students are ready to be formally admitted to the teacher preparation program.

One of the requirements to entry into the teacher education program is a basic computer competency. This competency can currently be met by either taking an introductory Educational Technology class, or by showing mastery of the skills taught in the introductory class.

The problem that has been occurring is that many of the students transferring from the partner schools have not been provided with an opportunity to meet the competencies prior to arrival at MSU-Billings. This puts them behind their colleagues who have had the chance to earn these competencies early in their college experience.

As part of the PT3 grant, the MSU-Billings educational technology faculty are working with faculty from the partnership schools to develop a plan to ensure that all students have the same competencies prior to applying to the teacher education program at MSU-Billings. The plan will include an agreement between faculty from the different institutions about what competencies need to be met by the students from the partner schools, and a plan for each institution, including MSU-Billings to institute policies to ensure these competencies are met. It will be up to each individual institution to determine the means by which the competencies are met by the students.

As competencies change, the faculties will need to continue to meet to update the competencies. Eventually, it is hoped that this process will be formalized and agreed upon by the administrations of the various institutions involved.

This presentation will discuss the process being used to reach an agreement between the partner institutions. It will include a discussion of the steps taken along the way by the various partners and the steps that need to be taken to formalize the agreement.

Meeting the Educational Technology Standards for Teachers: Measuring One College of Education and Human Services

By Kathleen M. Sindt
Assistant Professor
Montana State University – Billings
Billings, Montana

Introduction

In the fall of 1999, the college moved into a newly renovated and expanded facility. This facility has state of the art technology in each of the new classroom, including a digital projector connected to a DVD player, a VCR, an electronic overhead (ELMO) and an instructor's computer station. In addition, several new computer classrooms were added, as well as a set of wireless laptops.

As a part of a college wide effort to evaluate and improve the teacher education program, the College of Education and Human Services (CEHS) faculty wanted to know how well we are using the technology found in the new building to prepare our students to use technology in their classrooms upon completion of our program. The guidelines for judging the technology integration abilities of our students are the National Educational Technology Standards for Teachers (NETS•T) (International Society for Technology in Eductation, 2000). This paper discusses what activities the faculty members are doing to help prepare their students to be technology -using teachers.

Instrumentation

A survey instrument was created to evaluate how well the faculty was preparing the student population to meet the technology standards (See Appendix). The survey listed each component of the NETS•T and each faculty member was asked to check which of the standards they were addressing in each of their classes. The survey was designed to allow quick responses by the faculty. Once the results of the survey were received, each faculty member who indicated they were addressing the standards was sent a follow-up. The faculty was asked to describe the activities that they had the students engaging in that addressed the standards they had checked on the survey.

Results

Approximately eighty percent of the faculty (28 out of 35) faculty members completed the survey. Most of the faculty who did not respond are graduate faculty and do not teach students in the teacher preparation program. Of the faculty members who responded to the survey, only three of the faculty indicated they did not address any of the technology standards in their classes. The rest of the faculty indicated that they addressed at least one of the standards in their classes.

Of the faculty members who address the NETS•T in their classes, there are some differences in how many and what types of standards were addressed. The faculty who teach the general preparation level education courses that are required prior to admittance to the teacher education program use less technology in their classes than those faculty who teach the professional preparation classes (teaching methodology classes).

The general preparation faculty concentrate on aspects of Standards I: "Technology Operations and Concepts", II: "Planning and Designing Learning Environments and Experiences, and V: "Productivity and Professional Practice" of the NETS•T (International Society for Technology in Eductation, 2000). The aspects of the standards addressed in the foundational classes ensure that students can use technology to help with their own learning. These faculty members expect their students to be able to use and evaluate technology resources, to use technology in their own learning, and to apply technology to increase their productivity. The activities that these faculty have their student engage in center around using the Internet for research and in creating PowerPoint (Microsoft PowerPoint, 2001). presentations based on their research.

Prior to admittance to the teacher education program, students are encouraged to take the Educational Technology course. While this is not officially a requirement, the faculty of the teacher preparation courses expect their students to be proficient in technology prior to enrollment in these classes. The Educational Technology course concentrates on Standard 1: Technology Operations and Concepts, Standard V: Productivity and Professional Practice, and Standard 6: Social, Ethical, Legal, and Human Issues (International Society for Technology in Eductation, 2000). This course teaches students how to use several tools, including word processors, spreadsheets, databases, and a multimedia development too. In addition the students are expected to learn how to use the Internet effectively, know how to send and receive email and how to use peripheral devises, such as scanners, digital cameras, and printers. In addition, students participate in discussions related to copyright, equity, and diversity issues that are related to technology.

The faculty that teach the courses for professional preparation build on using the tools learned in the Educational Technology tend to concentrate more on Standards II: "Planning and Designing Learning Environments and Experiences", and Standard III: "Teaching Learning and the Curriculum" of the NETS•T (International Society for Technology in Eductation, 2000). In addition to and the students activities described above. In addition to the types of activities described above, these faculty members expect their students to create more extensive projects. For example, in Science Methods, students are exposed to several projects that involve technology, look at lesson plans that include technology and are that can be used with students. In Math Methods, students are required to teach their peers how to use various mathematics software programs, such as Tessellation Exploration (Lee, K, 2001) and Microsoft Excel (Microsoft Excel, 2001). They are also expected to incorporate technology into the required unit plan for the course. In Social Studies Methods, all students are expected to conduct research on a country. Part of the research includes finding web sites related to the country they are assigned. They are then expected to create a multimedia presentation using HyperStudio (HyperStudio, 1999) that incorporate graphics, sounds and the web sites that they found. In other courses, students evaluate software, and explore issues related to special education.

Conclusions

Based on the results of the surveys and follow-up responses, it appears that the faculty in CEHS are doing a good job of addressing many of the NETS•T. However, there are some gaps in where the standards are addressed and in which standards are addressed. Currently, Standard IV: Assessment and Evaluation, is only addressed a couple of times, and not in great detail anywhere in the curriculum. It appears that this is an item that needs to be included into the curriculum at some point.

Also, while most of the standards are addressed at the teacher preparation level, there is little carry over into the field experiences of the students. Students are expected to create a technology rich lesson for their introductory field experience seminar, but are not required to use this unit with children. Students are not required to use technology in their student teaching experiences at this time. This is an issue that will need to be addressed in the near future.

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Multi Media Meets Multiple Intelligences: Training Teachers for the New Century

Gail Slye, Drury University, US
Ed Williamson, Drury University, US

Introduction

The National Educational Technology Standards (NETS) Project, a program that concentrates on preservice teacher education as a division of the International Society for Technology in Education (ISTE), has defined specific concepts, knowledge, and skills considered essential in order to apply technology in educational settings. Preservice teachers participating in their preparation programs are expected to demonstrate competency in Technology Operations and Concepts. Requisite proficiencies range from using technology tools and information resources to increase productivity, promote creativity, and facilitate academic learning to examining acceptable use policies for the employment of technology in schools, including strategies for addressing threats to security of technology systems, data, and information. The availability of diverse multi-media based technology in the academic arena promotes a re-evaluation of traditional methodological strategies to now include concepts that promote the recognition of various categories of potential intelligences.

The theory of multiple intelligences was developed in 1983 by Howard Gardner, Hobbs Professor of Cognition and Education at the Harvard Graduate School of Education. Multiple intelligences theory holds that each person has abilities of varying degrees in several different and discrete areas. This is in contradistinction to general theories of intelligence that have been advocated during the past century. The theory promoted by Gardner in his 1983 book, *Frames of Mind*, claims that each individual has capabilities or potentialities in seven distinct areas: linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, interpersonal, and intrapersonal. Another area of intelligence according to Gardner in his 1993 book, *Multiple Intelligences: The Theory in Practice*, is designated the naturalist. Further possible areas of intelligence - spiritual, existential, and moral - are explored by Gardner in his 1999 book, *Intelligence Reframed*; however, after extensive discussion, Gardner (1999) has decided not to add them to the current framework. The key to understanding the theory of multiple intelligences is to recognize that each person has strengths and weaknesses in each of these areas, as well as a uniquely individual combination of abilities acquired from all intelligences. These intelligences are dynamic in nature rather than static, that is, they are capable of changing over time. This paper will explore the eight multiple intelligences that currently compose Gardner's theory and examine their relationship to educational technology.

Multi-Media Technology Meets Multiple Intelligences

The current culture of multi-media technology allows for many interactions between technology and multiple intelligences. Jonassen (2000) advocates the use of computers to support meaningful learning through cognitive tools. These "mindtools" are computer applications that require students to think in meaningful ways or produce actual representations of what they know through critical thinking.

Roblyer and Edwards (2000) state, "Gardner's theory meshes well with the trend toward using technology to support group work. When educators assign students to groups to develop a multimedia product, they can assign students roles based on their type of intelligence. For example, those with high interpersonal intelligence may be the project coordinators, those with high logical-mathematical ability may be responsible for structure and links, and those with spatial ability may be responsible for graphics and aesthetics" (p. 66).

Multi-media technology, in particular, is a remarkable vehicle for allowing the expression of multiple intelligences. Armstrong (1994) correctly ascribes the potential applications of the multiple intelligences theory with computer technology. The list of software recommended to activate multiple intelligences can serve as a template for the exponentially expanding varieties of software available to educators. With the rapid increase of software, both in sheer volume as well as complexity, applicable to each of the eight areas of multiple intelligences, there seems to be no limit to the integration possibilities of multi-media technology and multiple intelligences.

Drury University and Multi-Media Efforts in Teacher Preparation

The renowned Drury University teacher education program requires students to complete five foundation courses, including Technology in the Classroom, EDUC 200. This is a three-hour introductory course enabling participants to explore a number of technologies that can be used in the classroom. The course focuses on three areas: how to operate the technologies, how to use the technologies to enhance personal productivity, and how to use technologies in a learning/instructional environment.

Multi-media and multiple intelligences coordinate to create opportunities for both individual as well as group learning. In the case of the Drury University teacher preparation program, multimedia applications are stressed at both levels -personal and group. This allows for a synergistic confluence of multiple intelligences. On the one hand, individuals will draw upon their strengths in each of the eight intelligences to create a product. Conversely, a group project is enhanced due to each individual bringing into the mix a unique blend of intelligences that interact with the intelligences of the other group members. The result is the same, the whole is greater than the sum of the parts.

Specific Utilization of Multiple Intelligences through Multi-Media

Linguistic: Each of the course projects requires the students to use written and oral language skills. The Microsoft Power Point presentations contain text and Microsoft Word documents are required in the lesson plan presentation and the final project. The projects require the students to make oral presentations.

Musical: Each project allows the student to utilize musical selections to augment moods and experiences. In the lesson plan presentation and final project students may choose musical topics for their themes.

Logical-mathematical: The capacity to analyze problems logically is required in all of the assigned projects. Students may also choose mathematics for their theme in the lesson plan presentation and the final project

Spatial: Each of the projects features a need to recognize and manipulate patterns. To create multi-media presentations using the Microsoft Power Point software, students must be able to discriminate spatially and to integrate colors, graphics, and texts in a balanced format.

Bodily-kinesthetic: This intelligence is not just limited to sports or athletic activities, but it also includes the use of the individual body or parts of a body to fashion products. The field of multi-media presentations requires the use of the hands to create the text documents and the Microsoft Power Point presentations. Students must also demonstrate physical coordination to present their slide shows while delivering their oral presentations.

Interpersonal: This intelligence is utilized primarily through the presentation of finished products. It is used to the greatest extent during the group review process for the final project.

Intrapersonal: This intelligence is employed during each of the required projects for as students utilize the capacity for self-understanding, including personal desires, fears, and aptitude.

Naturalist: Students who select a science theme for their lesson plan presentations or the final project could be expressing and utilizing the naturalist intelligence.

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Preparing Teacher Educators to Use Technology: Applications and Perceptions of Technology Integration

T. Colette Smith
College of Education
Arizona State University
United States
tcsmith@asu.edu

Thomas A. Brush
College of Education
Arizona State University
tbrush@asu.edu

Abstract: The purpose of this paper is to describe a work in progress that reveals teacher educators' perceptions and applications of technology integration in the methods courses they teach. Data sources comprise of survey results and semi-structured interviews. The International Society for Technology in Education/National Council for Accreditation of Teacher Education (ISTE/NCATE) standards served as a model for the development of the online survey and interview questions. The Educational Technology Teacher Educator Survey (ETTES) was developed to measure technology integration skills, applications, and perceptions of teacher educators. Online survey administration and the interviewing process will be discussed.

Background

Teacher educators rarely utilize technology in their own research and teaching, therefore the realization of the demands on K-12 teachers to integrate technology into the classrooms does not exist (National Council for the Accreditation of Teacher Education [NCATE], 1997). It appears that teacher educators do not know the potential involved with integrating technology into the classroom therefore they basically use technology for administrative purposes (Wetzel, 1993).

Research suggests that the traditional teacher preparation programs are not up to par in the field of integrating technology (National Center for Education Statistics [NCES], 2000). In order to effectively integrate technology in methods courses, collaborative efforts should be maintained between the methods and educational technology faculty to develop technology appropriate activities (Brush, Igoe, Brinkerhoff, Glazewski, Ku, and Smith, 2001).

Purpose

This research effort is an attempt to identify the perceptions of teacher educators and effective applications that are implemented in the methods courses they teach. The study will identify the goals and objectives of teacher educators relating to their individual technology experiences to find out what technology activities and support will assist them in preparing future teachers. Teacher educators are the missing link to prepare future teachers to teach in the technological age. Teacher educators who are prepared and obtain a high level of confidence with integrating technology can successfully restructure the teacher preparation process.

This study investigates initiatives that assist teacher educators to integrate technology into the methods courses they teach. This study will answer the following questions:

1. Is there a significant difference between subject area and perceptions of technology integration?
2. What are the perceptions of teacher educators of technology integration in the subject area they teach?

The Survey

The ETTES is divided into four sections: (1) Technology Skills and Experiences, (2) Application of Technology in Instruction, (3) Perceptions of Technology Integration, and (4) Demographic Information. The first part of the survey, questions 1-8, ask participants to select what best describes their technology skills and experiences by answering if they can do a certain task with responses (1 = I can do this independently, 2 = I can do this with minimal assistance, 3 = I can do this with much assistance, 4 = I can not do this). Part II of the survey, questions 9-18, asks participants to select the number that best describes how often they apply technology integration skills during instruction (1 = Often, 2 = Occasionally, 3 = Rare ly, 4 = Never). Part III of the survey, questions 19-28, asks participants to select the number that best describes how strongly they feel about perceptions of technology integration (1 = Strongly Agree, 2 = Agree, 3 = Disagree, 4 = Strongly Disagree).

The finial section, section IV, asks participants for demographic information. The questions ask about employment location, methods courses they taught, years of teaching, employment status, level of education, computer usage, technology training, knowledge of technology, age, and gender.

Interview questions

The semi-structured interviews with teacher educators lasted approximately 35 to 45 minutes. The interviews focused on three areas as outlined in the survey: technology skills and experiences, applications in instruction, and perceptions of technology integration. The first section of questions asks teacher educators to describe training experiences and technology support. The second section of questions solicits modeling techniques, technology requirements of students, communication and classroom equipment. The third section asks about barriers, recommended changes, and improving technology experiences for teacher educators.

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Creating a Constructivist Classroom Using Technology: Preparing Preservice Teachers

One of the most effective ways to integrate technology into the teaching and learning process is to create a classroom environment based on constructivism, a theory that views learning as the product of experience and social interaction. Constructivist theorists contend that the learner is an active participant and builds knowledge based on individual experiences (Adams & Burns, 1999). The individual understands new experiences by relating them to prior experiences. Sense is made of the world by individuals synthesizing new experiences into what they have previously understood. According to K. Smith-Gratto (1995), if an individual's current experience doesn't make sense in relation to prior experiences, disequilibrium occurs within that individual. When disequilibrium occurs, the individual must readjust existing schemata or create new schemata in order to create meaning or understanding of the event that caused the disequilibrium (Smith-Gratto, 1995).

Creating meaning is at the very heart of constructivism. A constructivist-oriented approach is essential in a classroom if students are to develop problem solving and critical thinking skills and to apply, analyze, synthesize and evaluate knowledge, skills and attitudes (White, 1995). Constructivism can also provide a framework for using technology in productive, and interesting ways to support student learning. In a constructivist classroom, the learner is immersed in an environment that supports the way they learn. A constructivist learning environment encourages students to engage in the active process of creating, rather than acquiring knowledge.

In a constructivist classroom, technology can be used as a tool to help students gain a better understanding of their world by providing unique experiences and resources (Boethel & Dimock, 1999). When technology and constructivist ideas are combined, students become empowered and spend more time in active construction of knowledge. Technology provides resources for student use in problem-solving and reflection. Students using technology spend more time collaborating with other students and communicating with teachers when developing technology projects (Southwest Educational Development Laboratory, 1998).

According to C. White (1995), there are four major themes central to teacher education programs preparing preservice teachers for a constructivist classroom. These include modeling by both instructor and students, reflecting, involving the students actively, and developing a community of learners. The use of technology must also be the focus of teacher education programs integrating these four themes.

Research suggests that educational technology is most effective when used to enhance constructivist instructional strategies (Southwest Educational Development Laboratory, 1998). Using technology as a tool to enhance a constructivist environment should be integrated throughout teacher training programs. Preservice teachers must understand that technology supported learning environments provide a variety of computer-mediated communication methods to support conversation and collaboration in a constructivist classroom.

Reitz (1983) maintains that it is what teacher educators do, not what they say, that affects preservice teachers' learning. Therefore, in order to prepare preservice teachers to transform constructivist beliefs into instructional strategies, university faculty must themselves become what Connect University's Scott Noon calls a "Techno-Constructivist". These Techno-Constructivist are teachers who integrate technology into the curriculum so that it not only complements instruction but redefines it. These teachers have realized the full potential of technology to help children build on their own experiences, construct their own meanings, create products, and solve problems successfully (Education World, 2000).

The integration of technology is vital in teacher education programs preparing preservice teachers to teach in constructivist classrooms. The major components of modeling, reflecting, involving students actively, and developing a community of learners will be facilitated through the use of technology.

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Learning and the Use of Technology in Preservice Teacher Education: The Primacy of Interaction

Jean A. Steitz
Educational Psychology & Research
The University of Memphis
Memphis, TN 38152
jsteitz@memphis.edu

Susan Magun-Jackson
Educational Psychology & Research
The University of Memphis
Memphis, TN 38152
smgnjcks@memphis.edu

Abstract: This short paper reports on two outcomes from an ongoing evaluation of the infusion of technology into a large, multi-section, undergraduate preservice teacher education course at The University of Memphis. The two outcomes address how the students' (N = 294) assessed their own learning and how the students' rated their instructors. With both outcomes, student-student and faculty-student interactions were the important variables.

Only through assessment can we begin to focus on what is actually being accomplished with the infusion of technology in higher education classrooms. The question of whether or not to infuse technology is no longer the important issue. It is mandatory. As Dolence and Norris (1995, p. 2) have aptly explained in their book, "Transforming Higher Education: A Vision for Learning in the 21st Century," society is undergoing a fundamental transformation from the Industrial Age to the Information Age and students simply must be prepared. This is especially the case for preservice teachers who will be expected to use technology in the classrooms of tomorrow yet who are graduating from teacher preparation programs feeling unprepared (Johnson-Gentile, Lonberger, Parana, & West, 2000).

The use of technology will not replace the need for instruction and instructors. Students crave personal interaction and guidance (Carr, 2000). After all, education is basically a human endeavor (Theobald, 1997). As the past president of EDUCOM Robert Heterich stated, classrooms are highly personal, human-mediated environments (Noble, 1997, p. 6).

The purpose of this paper is to address "what happens" as technology is infused in a large undergraduate education course (N = 294), taught in 11 sections by different faculty. The course is a human development course required of all preservice teachers. Prior to the 1999 fall semester, the course was a traditional lecture-based, teacher-centered course, low (no) tech and high touch as differentiated by Green (1999). Beginning with the 1999 fall semester, the use of technology was infused throughout the course and the course became more medium tech and high touch (Green, 1999).

The sample size for the first semester evaluation was 207 students (70% response rate), primarily sophomores and juniors. The gender composition was 33 men and 174 women. The racial/ethnic composition was: 71 African-American, 121 white, 1 Hispanic, 14 other. The context for data analysis was multiple regression. The variables for the study included the: amount and quality of student-to-student interaction; amount and quality of student/faculty interaction; overall experience using technology; number of times the instructor e-mailed the student during the semester; amount of time the instructor used the available technology in the class; general rating of the instructor; student interest in using the Internet for schoolwork; amount of time the student used technology during the semester for schoolwork; and amount of problems the student had in using technology.

The first analysis addressed how the students' assessed their own learning. The dependent variable was called LEARN and consisted of three questions which addressed the amount of student learning, their motivation to learn and their familiarity with computers (Cronbach alpha = .82). The regression was significant, $F(6,188) = 16.59$, $p < .001$ and the variables accounted for 35% of the variance in LEARN. The significant predictors of LEARN, as determined by the standardized beta weights, consisted of student/faculty interaction (b = .20, p = .009), student-to-student interaction (b = .293, p < .001), the general rating of their instructor (b = .159, p = .016), and student interest in using the Internet for schoolwork (b = .174, p = .015). What the first analysis indicates is that as the quantity and quality of both the student/faculty and student-to-student interaction increased, the students' assessment of their own learning (LEARN) increased. In turn, as the students' assessment of their own learning increased, so did the general rating of their instructor and the students' interest in using the Internet for schoolwork.

The second analysis addressed, the students' general ratings of their instructor. The dependent variable was called INSTRUCT and consisted of a single question rating their instructor. In this analysis, LEARN became part of the independent measures. The regression was significant, F(5,194) = 15.46, p < .001, and the variables accounted for 29% of the variance in INSTRUCT. The significant predictors of INSTRUCT, as determined by the standardized beta weights, consisted of the number of times the instructor e-mailed the students during the semester (b = .180, p = .015), and the amount of time the instructor used the available technology in the class (b = .220, p = .001). What the second analysis indicates is that as the number of times the instructor e-mailed the students during the semester increased and the amount of time the instructor used the available technology in the class increased, the students' assessment of them increased.

It is important to note that the variables used in the study accounted for a small amount of the total variance in either LEARN or INSTRUCT. Since there has been very little data reported in this area and we know that much goes into student learning as well as evaluation of instruction, it is hard to say whether or not the amount of variance accounted for is small or indeed quite large.

What does this study mean? First, the results indicate that students do draw a distinction between student-to-student interaction and student/faculty interaction. The two types of interaction are different and serve different purposes. Classroom research has generally focused on the importance of student-to-student interaction, the incorporation of cooperative/collaborative learning activities and addressing the different learning styles of students. While student/faculty interaction has been shown to be an important factor in retention, scant research has been done to address the interaction in terms of student learning.

Second, the results from this study indicate that student/faculty interaction is just as important a factor in student learning as student-to-student interaction. It is not enough to just create an on-line discussion group for students. Students need feedback and guidance from instructors. Student/faculty interaction has traditionally meant time spent on teacher-directed activities inside the classroom and to a lesser extent, due to its time consuming nature, outside the classroom. With the infusion of technology the distance between the student and the faculty member is lessened and the dividing line between inside and outside the classroom becomes blurred in a very short period of time. In fact, faculty who received higher evaluations e-mailed students more times and used the available technology more often in their class. In turn, by increasing the amount of interaction via technology, students' learning increased.

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Using Web-Based Modules to Support an Introductory Computing Course for Preservice Teachers

Aileen Nonis
Assistant Professor
Instructional Technology, Curriculum and Evaluation
The University of Tennessee, Knoxville
anonis@utk.edu

Jennifer Summerlin
Graduate Teaching Associate
Instructional Technology, Curriculum and Evaluation
The University of Tennessee, Knoxville
summerlin@utk.edu

The utilization of online materials and/or online modules is being rapidly implemented in many higher education courses. With online modules students and instructors are not confined by the limits of scheduled face-to-face class time. Online modules can provide learners the opportunity to work at any time that fits into the individual's schedule and at there own pace. We decided to explore the potential of using online modules in our introductory computing course as a means for preparing prospective teachers to learn and teach with technology. This self-paced module is designed to help students understand the nature, purpose, and function of graphic organizers as a cognitive tool to represent information and support learning.

Preservice teachers at The University of Tennessee are required to take a semester long introductory computing course which covers topics ranging from word processing to Web page design. "Breadth" versus "depth" is a typical challenge for these types of introductory computing courses. Instructors struggle between (1) the need to cover a wide range of tools so students can begin to envision the possibilities of learning and teaching with technology, and (2) eliminating certain topics in order to focus on a smaller subset of skills and information in more detail. An ever-present challenge for course instructors is to provide students with optimal learning experiences, balancing acquisition and application of skills within a given, and often limited, period of time.

Due to there significant benefit as an educational tool, graphic organizers seemed to be an appropriate choice for our initial module. As part of the course, students learn how to use Inspiration, an electronic concept-mapping software application. Since time is limited, students are often introduced to basic graphic organizer formats (such as brainstorming webs and concept maps) and do not learn about other functions and formats that are available for representing information. Students may be unaware of the various types of graphic organizer formats such as Venn diagrams, Fish Bones, KWHL, T-charts, matrices, and cyclical diagrams.

However, students who participate in the online self-paced module are exposed to a wide variety of graphic organizers, their suggested uses, and their advantages. By asking students to complete a self-paced module, we believe that students will come to class with a broader understanding of graphic organizers and their educational applications. In a face-to-face class that follows, students can use software to create meaningful graphical organizers and apply the knowledge gained from the module.

Because of time constraints, we see the value of using online modules to prompt the thinking, learning, and reflecting process prior to formally introducing a topic in class. We believe this pre-exposure will facilitate more informed in-class discussions and a more complete understanding of the subject matter. However, as with all out of class assignments, it is essential that students are interested in completing the assignment. Therefore, our challenge has been to ensure that the modules we develop actively involve students in constructing their understanding of the topic as opposed to passively reading information from a computer screen.

To facilitate active student involvement, interactive components were developed within the online module using Flash software. This type of interaction allows students to view a "show me" sample on screen, followed by the opportunity to construct their own graphical organizer. In addition, students are provided with immediate feedback regarding their performance at frequent intervals throughout the simulation.

The online graphical organizer module will be pilot tested during the spring 2002 semester. Preservice teachers enrolled in the introduction to instructional computing course will have the opportunity to explore the content of the site as an online self-paced module. By allowing instructors to cover essential topics in an online environment, we believe this module will assist instructors in maintaining the breadth necessary in introductory courses. Moreover, online modules will conserve the limited face-to-face instruction time for in-depth coverage of more complex topics. Finally, the interactive format of the online module facilitates an active learning experience that increases student participation both in and out of class.

Technology Standards in Teacher Preparation - ISTE NETS Distinguished Achievement Award Program

Harriet G. Taylor
ELRC – 111 Peabody
Louisiana State University
Baton Rouge, LA 70803
Phone: 225 578 1356
E-mail: taylor@lsu.edu

Lajeane G. Thomas
ISTE NETS Project Director
Louisiana Tech University
P. O. Box 3161
Ruston, LA 71272
Phone: 318 257 3923
E-mail: lthomas@latech.edu

2-3 representatives of the first group of ISTE NETS Distinguished Achievement Award institutions

Abstract:

The National Educational Technology Standards for Teachers (NETS*T) have been widely adopted by teacher preparation institutions. The ISTE NETS Distinguished Achievement Award has been created to recognize institutions that have exemplary examples of integrating the NETS*T standards into their teacher education programs. The first awardee institutions are to be announced in February with a second round of competition in April.

This presentation will include information about the award process with an emphasis on criteria for the April solicitation of nominees. It will also provide details of the first group of 6 awardee institutions, including concrete examples and models of the programs. This should be of value to those just starting the technology infusion process as well as those who have already made significant movement towards NETS*T implementation in their programs.

ISTE NETS on the Digital Edge: Accomplished Teaching With Technology

Lajeane Thomas, Louisana Tech University, US
Don Knezek, ISTE, US
Dianne Porter, Louisiana Tech University, US

DESCRIPTION: Session features video exhibits of National Board Certified Teachers using technology effectively in their classrooms and associated curricular activities addressing ISTE NETS and NBPTS standards.

SUMMARY:
The purpose of this session is to inform the audience of exciting new resources for use in a variety of professional development environments that are designed to be used in preparing teachers or teacher candidates to use technology effectively in their classrooms. This session will provide video examples of exemplary teaching supported by technology with reflections from both the ISTE NETS for Teachers standards development team and National Board for Professional Teaching Standards (NBPTS).

The International Society for Technology in Education (ISTE), the National Board for Professional Teaching Standards (NBPTS), and Apple Computer joined forces to support new electronic learning environments where teaching resources and collaboration can occur. The resources will strengthen the mentoring relationship between the preservice teacher and experienced educators who guide them through the capstone student teaching and field experiences and/or provide opportunities for teachers to communicate for purposes of exchanging ideas for effective teaching.

Research has indicated that successful development of new teachers depends heavily on the student teaching experience. Key elements in the success of the new teacher include the collaboration and communication between the student teacher, the university supervisor, and the cooperating teacher; as well as, the models for excellent teaching that the student teacher observes and interacts with during this important phase of preparation. The Digital Edge project strengthens key experiences for student teachers by developing new strategies for a technology-based learning and communications environment. This environment provides a communications vehicle for a cohort of highly effective teachers who guide student teachers in their development.

A digital library of videos show examples of effective teaching with technology. National Board Certified Teachers (NBCTs) were videoed and support materials for each lesson including the teachers' own reflections were developed. Their reflections and those of National Board and ISTE representatives provide insights into the lessons and how those lessons address best classroompractice as well at NBPTS standards and National Educational Technology Standards (NETS).

The university teams and the NBCTs will develop curricula for integrating the digital library resources systematically providing resources first for early childhood and upper elementary; and then middle and secondary grade levels over the course of the project.

The project cohorts of ten -- one University Supervisor, three Preservice Teachers, plus their three respective National Board Certified Mentors and three K-12 Cooperating Teachers -- will begin Fall 2001 using their redesigned student teaching curriculum, digital video resources, and collaborative environment at each of the three collaborating university partner institutions: California State University, San Marcos; George Mason University, and Louisiana Tech University. The video exhibits, curriculum activities, and online collaborative environment may also provide opportunities for professional development and collaborations among inservice teachers as well.

The strong collaboration among the National Board Certified Teachers (NBCTs), university and K-12 faculties, and the preservice teachers will establish new learning environments resulting in future generations of teachers with high professional expectations and abilities related to effective use of technology in the classroom.

Participants will leave this session having experienced visual examples of how technology can be used effectively to support student learning, reflections from highly accomplished teachers (National Board Certified Teachers) on the lessons and how technology standards and National Board for Professional Teaching Standards have been met within the lesson, and with information regarding how the resources from this project can be accessed for use in their districts, universities, or classrooms.

Resources can be found at the following Internet locations: http://cnets.iste.org, http://www.nbpts.org and http://www.apple.com
Contact information: Lajeane Thomas, phone: 318 257-3923; email; lthomas@latech.edu

An Award Winning Technology in Teacher Education Program: Description of a Comprehensive Approach

Ann Thompson, Director, Center for Technology in Learning and Teaching, Iowa State University, USA,
eat@iastate.edu

Denise Schmidt, Associate Director, Center for Technology in Learning and Teaching, Iowa State University, USA,
dschmidt@iastate.edu

Abstract: The structures developed in the comprehensive technology in teacher education program recognized in 2000 by AACTE for "Best Practice in Teacher Education" are described. These structures include a technology mentoring program for faculty, a faculty technology scholar program, a school-based technology integration model that created technology-rich field experiences for students, a minor for preservice teachers in educational computing, and an undergraduate technology club for preservice teachers. The interconnection of all the structures is emphasized.

Introduction

Technology as a tool to improve teacher education is the primary vision that drives the comprehensive technology in teacher education program in the College of Education at Iowa State University. This innovative approach involves technology integration initiatives that impact the entire teacher education curriculum, including collaborative efforts with the College of Arts and Sciences, the College of Engineering, and PreK-6 schools. In the program, Iowa State University strives to prepare educators who are leaders and change agents in their schools and districts, who examine the role of technology in education, and who share their knowledge with colleagues and students. The program was recognized by the American Association of Colleges for Teacher Education (AACTE) in 2000 for Best Practice in Technology Integration in Teacher Education.

The purpose of this paper is to describe the structures and approaches that have been developed in this award-winning teacher education program. The major objective of the paper is to provide generalizable information that will be useful to other teacher education programs. Emphasis will be placed on the systemic and comprehensive nature of the technology in teacher education program at Iowa State University. We begin with a brief summary of the documented need for technology in teacher education programs like the one described here.

Need for Technology in Preservice Teacher Education

Although preservice teacher education is the logical way to address the PreK-6 technology use problem, little has been done by most teacher education institutions to help faculty use instructional technology or to prepare preservice teachers who are capable of using technology in classrooms (Schrum, 1994). After completing a comprehensive review of the literature on information technology and teacher education, Willis and Mehlinger (1996) concluded:

> Most preservice teachers know very little about effective use of technology in education and leaders believe there is a pressing need to increase substantially the amount and quality of instruction teachers receive about technology. The idea may be expressed aggressively, assertively, or in more subtle forms, but the virtually universal conclusion is that teacher education, particularly preservice, is not preparing educators to work in a technology-enriched classroom (p. 978).

In 1998, the International Society for Technology in Education (ISTE) was commissioned by the Milken Exchange on Education Technology to survey schools, colleges, and departments of education to identify how they were preparing new teachers to use technology in classrooms (Milken Exchange on Education Technology, 1999). The primary purpose of the survey was to collect baseline information about the preparation of preservice teachers to use technology. Approximately one-third of the schools of education across the nation responded to the survey. Findings from the survey indicated that the technology skills of teacher education faculty are comparable to the technology skills of the students they teach; however, most faculty do not model the use of technology in their teaching. Although technology is accessible in the PreK-12 classrooms where preservice teachers receive their field experience, most preservice teachers do not use or integrate technology during their field experiences. One recommendation fom the Milken Exchange report was for researchers, professional societies, and education agencies to provide models that would identify, study, and disseminate effective uses of technology for both teacher education and PreK-12 schools. Preservice teacher education programs can significantly impact the future use of computer-related technology in PreK-12 schools by effectively preparing teachers who have the knowledge and the ability to use and integrate computer-related technology to enhance teaching and learning (Berney, 1991). Several expert groups strongly suggest that colleges and universities must take a leadership role in preparing preservice teachers to use and integrate computer-related technology in schools (Espinoza & McKinzie, 1994; International Society for Technology in Education, 1998; Office of Technology Assessment, 1995).

It is with these needs in mind that the teacher education program at Iowa State University has worked to establish a comprehensive approach to effectively integrating technology. The structures described in this article provide the basis of the program.

The Structures

Several inter-connected technology integration structures that have been designed and implemented to enhance faculty development, teacher education courses, field experiences, and extracurricular activities for students are described in this paper. Collectively, these structures serve to improve the quality of the teacher education program through the careful and meaningful integration of technology. The structures that will be described include a nationally-recognized technology mentoring program for faculty, a faculty technology scholar program, a school-based technology integration model that creates technology-rich field experiences for students, a minor in educational computing program, teacher education courses in which faculty members model effective uses of technology, and an active undergraduate student organization called TECC (The Educational Computing Club). It is important to note that the department emphasis began in the early 1990's and that most of the structures have developed over a number of years (Thompson, Schmidt, & Hadjiyianni, 1995). One of the structures, the educational computing minor, was started in 1984, and although requirements for the minor have changed over time, it has continually provided the program with a core group of student leaders who positively influence students and faculty in the program.

Technology Mentoring Program for Faculty

The technology mentoring program in the Iowa State University teacher education program has been in existence for eleven years. It may have the longest history of any such program in the United States and has been an integral part of our work in integrating technology throughout the program. The program began in 1991 and arose out of the need to provide more effective technology training experiences for the faculty in a large teacher education department. The original program developed from very practical considerations. It had become apparent that our workshop approach was not working and that faculty needed more individual attention. Given limited resources, the idea of using graduate students to provide the one-on-one experiences was especially appealing.

Thus, the program began in 1991 with the offering of the first graduate course, Curr 610 (Technology in Teacher Education). The seminar course included a field component and readings and discussions on issues in technology in teacher education. For the field component, the students were asked to mentor a teacher education faculty member for one hour each week during the semester. In the seminar class, discussion centered on both current readings and the mentoring experiences of each of the students.

The first semester of our mentoring experiment was successful, from the perspective of both the mentors and the mentees. Faculty participants were generous in their praise of the model, and the graduate students made it clear that the mentoring was an extremely valuable experience for them. Although we have changed and adapted our model over the years, the basic structure remains much the same. In ten years, we have had more than 100 graduate students work as mentors and more than 50 faculty members participate as mentees. Many of our graduate students have gone on to establish similar programs at colleges and universities around the country.

Faculty Technology Scholar Program

Started through our PT3 Implementation grant, the faculty technology scholar program provides opportunities for faculty to focus upon developing classroom applications of technology. Through the grant, faculty are provided release time to work on technology, and graduate students assist them in this work. All of our technology scholars have also participated in the mentoring program and so come to the technology scholars program with previous experience. The technology scholars program builds on their previous experience by providing time and development support. Most of our faculty participants have chosen to use a summer month to work intensely to develop new technology-rich approaches in their courses. The technology scholars meet regularly to share ideas with each other and they also participate in workshops together. Faculty in the program include methods instructors in reading, mathematics, and science and also foundations and multicultural education professors. Applications developed by the scholars have included video case work in mathematics, palm pilot applications in science, and virtual reality applications for methods courses.

School-Based Technology Integration Model That Creates Technology-Rich Field Experiences for Students

The Milken Exchange Report (1999) indicates that most teacher education students are not using technology in their field experiences. One obvious explanation for this problem is that PreK-6 schools may have neither the technology nor the teacher expertise to make such field experiences possible for students. In the early years of our technology in teacher education program, we found that many students were not finding opportunities to use technology in their student teaching and pre-student teaching field experience. In order to address this problem, we identified several partner schools and began work with technology integration with these schools.

The professional development model that emerged from this work shares characteristics with our one-on-one mentoring programs. We found that teachers in the partner schools were looking for technology solutions to instructional problems and that the needs of each teacher were different. Thus, we developed a model that allows teachers to work individually on their classroom technology integration ideas.

Each month, a team of technology experts spends one day in each of our partner schools. The team includes Iowa State education faculty, graduate students, technology consultants from our local Area Education Agency, and a master teacher in the area of technology who is in residence at Iowa State. Teachers in the partner school sign up for a two-hour period to work with the team, and during this time, a substitute teacher takes their class. Teachers are asked to bring an instructional issue to their inservice time and then are provided assistance in addressing this issue. Teachers may also bring team members back to their classes to provide assistance when they are trying their technology application in class.

Like the Iowa State faculty, participating PreK-6 teachers have been very positive about the individual assistance provided in this inservice model. After several years of work with our PreK-6 partners using this model, we now have technology-rich PreK-6 classrooms as placement sites for our preservice teachers. The preservice teachers themselves also bring expertise to the field, and they now have the opportunity to share this expertise and thus further develop the technology integration in the partner schools.

We believe that the field experience component is extremely important in preparing future teachers to use technology in schools, and that meaningful school partnerships are essential for technology in teacher education programs.

Educational Computing Minor

In response to the need to prepare preservice teachers to use and integrate computer-related technology throughout the curriculum, a minor in educational computing was designed for undergraduate students at Iowa State University. The minor, which was established in 1984, is offered for those teacher education students who wish to prepare themselves to become leaders in the use of technology in schools. Between 60-80 students majoring in early childhood education, elementary education, and/or secondary education are currently enrolled in the educational computing minor. All students in the minor are required to take at least 15 credit hours of coursework in educational computing and related areas.

Currently, the educational computing minor includes six courses: five instructional technology courses and one engineering course. In addition to the introductory instructional technology course and the three upper-level technology courses, students enroll in one engineering course offered by the College of Engineering. Faculty in the College of Engineering at Iowa State University have developed a course entitled "Toying with Technology." In the course, students examine how technological innovations work and the engineering principles behind them. Also, students are required to participate in a technology field experience. During this pre-student teaching technology field experience, preservice teachers have the opportunity to work in classrooms with area PreK-6 computer-using educators.

In recent years, students who have completed the minor have been the target of recruiting efforts, both in Iowa and around the country. As school districts work to improve their use of technology in schools, they seek out the Iowa State University students who have a specialization in this area.

The Educational Computing Club (TECC)

In addition to the educational computing minor, students have the opportunity to participate in extracurricular and leadership activities involving technology. In 1996, the Educational Computing Club (TECC) was established by a group of preservice teachers in the College of Education at Iowa State University. TECC is an undergraduate student organization in the Department of Curriculum and Instruction that strives to help students learn more about technology use in the department and in PreK-6 learning environments. Although most TECC members are early childhood, elementary education, or secondary education majors, students from other university departments such as computer science, management information services, and industrial technology have joined the club. Currently, there are about twenty active members in TECC who organize and participate in the variety of activities the club offers. Many of TECC's activities involve working with teachers and students in PreK-6 classrooms and assisting the faculty, staff, and students in the College of Education with the use and integration of technology.

Students: the Product

The ultimate products of all the structures in the technology in teacher education program at Iowa State University are the students who graduate from the program and begin their teaching careers. We are striving to prepare students who have had extensive experience learning and teaching with technology and who have the vision necessary to assume leadership in PreK-6 technology integration. With this goal in mind, the structures described here are all continually evolving as technology, students, faculty, and PreK-6 teachers all change and develop. The structures all work to reinforce each other in the creation of a comprehensive approach to technology integration.

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The Impact of an Intensive Technology Integration Internship Program on Pre-Service Teaching Practices

Lee Vartanian
ACTT Now Program (PT3)
Old Dominion University
United States
lvartani@odu.edu

Abstract: Old Dominion University has partnered with Brunswick County Public Schools (Virginia) on a mutually beneficial program aimed at improving the instructional technology practices of Old Dominion's pre-service student-teachers and Brunswick County's in-service teachers. Part of the ACTT Now PT3 Program (Aligning Certification with Teacher Training), the ACTT Now internship program brings student-teachers from Old Dominion University—an urban university in Norfolk, Virginia—to Brunswick County—a poor, rural county, two hours from Norfolk. ACTT Now interns act as technology-integrating student-teachers exploring the rich variety of instructional technology options at their disposal in Brunswick County Schools.

Introduction

One impediment to the integration of technology in schools is the lack of instructional technology training in pre-service institutions. Studies have shown that new teachers have not received adequate training in instructional technology at their university (Hargrave & Hsus 2000). Consequently, many of today's teachers are unprepared and disinclined to integrate technology into their classroom.

As a result of the increasing importance of technology in our society, teacher colleges and K-12 schools are attempting to train and encourage teachers to use technology in their lessons. Nationwide, new standards for student technology use in K-12 have been implemented (ISTE 2000). At the college level, program planners are frantically beefing up the technological components of their teacher training programs. At the national level, technology standards have been developed for the accreditation of new teachers, as well (NCATE 2000). However, even new teachers, recently out of university, are generally not given the kind of training and exposure they need in order to be proficient and feel comfortable integrating technology into their teaching (Solmon 1999).

The Internship Program

The ACTT Now internship program is one component of the ACTT Now program (Aligning Certification with Teacher Training) that aims at promoting the integration of technology into everyday instruction in Brunswick County Public Schools. Operating in conjunction with Old Dominion University's Darden College of Education, the ACTT Now internship program is a fully credited alternative to the standard student-teaching model provided by the university. The program seeks to prepare pre-service student teachers to become effective, confident teachers and technology leaders in their schools. The high emphasis on instructional technology training and everyday use provides ACTT Now interns with a structured and supportive environment to experiment with new technologies.

The ACTT Now internship program uses a unique approach to accomplish its technology goals. A weeklong orientation program starts off the semester. In addition to introducing instructional technologies, the orientation schedule includes interactive seminars on subjects like classroom management and goal setting. Once school starts, two-hour technology seminars are held each week to continually introduce new classroom technology strategies. The interns are then expected to implement what they have learned in their classrooms and include it in an electronic technology portfolio they are required to create.

The program lasts a full semester, according to Brunswick County's schedule (18 weeks). Because Brunswick County is 100 miles from Old Dominion, all of the interns stay in houses that the school system rents and furnishes for them (with internet connectivity), free of charge. Additionally, the interns are provided the use of a personal laptop computer for the duration of the program and a $4,000 stipend. Generally, they teach for half of each school day, taking on full instructional responsibility during that time. The rest of the day, they use for lesson planning, observation of other teachers, tutoring, and curriculum planning.

Results

The ACTT Now internship program has completed three semesters since its inception in the Fall of 2000. To date, 29 interns have participated in the program. A variety of assessment strategies have been used to determine the strengths and weaknesses of the program. Surveys and recorded interviews have been utilized to assess intern's perception of technology. Through these surveys, it has been found that interns learn more about how technology can be used in the classroom than they did during their pre-service training. Perhaps the most significant finding from these surveys has been that every intern, without exception, has felt that this program has better prepared them for teaching than a standard student-teaching experience. Not only do ACTT Now interns feel like they are more familiar with the latest classroom technologies, they feel like they have attained a higher degree of comfort and confidence managing the classroom than they would if they had participated in a more traditional student-teaching setting.

Interns are required to document every time they use technology in the classroom using a simple technology log. With the information contained in the technology logs, the ACTT Now staff is able to assess what kinds of technology the interns use in their classrooms and how frequently they use it. From the three semesters of the internship program, it is clear that each group of interns has succeeded the previous group in the diversity and number of instructional technology applications in their classrooms. During the first semester of the program (Fall 2000), the interns began using digital projectors, the Internet in their classrooms, and simple presentational programs such as PowerPoint. The second semester saw interns moving past the initial steps of the first interns. Aided by a group of interns who had prior experience with technology, the Spring 2001 interns used a variety of educational software options, developed and implemented web quests, created personal web pages, used digital cameras, projectors, and mobile laptop labs. The third semester (Fall 2001) has been the most successful semester so far. This cadre of interns has exhibited a focused and consistent effort to integrate technology into their classes. They have succeeded in making technology a central part of their instruction. Three of the interns modeled their unique technology infusion strategies in training sessions attended by Brunswick in-service teachers. A few others have taken the initiative to help start a monthly technology training seminar for the parents of their students and interested members of the Brunswick community.

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Simulations, educational technology, and teacher preparation: Working towards authentic student experiences in a required technology course

Rick Voithofer, Ohio State University, US

Abstract

This study examines efforts to improve students' knowledge of and comfort with technology by incorporating simulations and constructivist strategies in a short (five week) educational technology course serving 150 students. The web-enhanced lecture/lab course is offered as one of the first courses in a year-long M.Ed. teacher preparation program at a large urban Midwestern university. The study uses multiple data sources including questionnaires, professor and teaching assistant field notes, course projects, and online postings in order to determine how students responded (in terms of efficacy, knowledge, and comfort using technology) to a simulation in which they acted as a consultant hired to help a fictitious teacher become compliant with the six (6) ISTE National Educational Technology Standards (NETS) for teachers.

Introduction

The five week course examined in this study (ET700 – not the real course number) was offered during the summer in 2001. ET700 is the only required technology course for pre-service teachers in a year-long M.Ed. program at this university and is generally taken as one of the first classes in the students' coursework. In response to research indicating a single stand-alone technology course is not sufficient to prepare pre-service teachers to use technology effectively in their early practice (Hunt, 1994; Moursund & Bielefeldt, 1999; Wetzel, 1993) the teacher education program in which ET 700 is offered is moving towards an infusion model of technology across multiple courses (Topp, Thompson, Schmidt, 1994).

Using a web-enhanced (WebCT) lecture/lab format, ET700 provides students with basic technology skills (Strudler, 1991) in web development, presentation software (e.g., Microsoft PowerPoint), and spreadsheets (i.e., Microsoft Excel) and teaches them how to evaluate technology resources (i.e., web sites and educational software), use electronic communication including discussion boards and create lesson plans that incorporate technology in teaching higher order thinking skills including problem solving. A consistent challenge in ET700 has been offering students an authentic context in which to complete course projects because most students in the course have had no classroom teaching experience.

During the quarter in which this study took place the course incorporated a new strategy. Students were asked to engage in a simulation in which they acted as a consultant to help a fictitious K-12 teacher (i.e., teacher-client) become compliant with the ISTE National Educational Technology Standards (i.e., NETS) for teachers.

Through the use of web-based resources, scenarios, and online discussion, students constructed a teacher-client profile that provided the foundation for all course projects. Online resources to complete the teacher-client profile included links to local school districts and schools, national curriculum standards for K-12 general education and subjects including English, Science, Math, and Foreign languages. The teacher-client profiles required students to consider issues related to technology integration including school environment and resources, classroom makeup and technology resources, and the teacher-client's pedagogical philosophy and attitudes towards technology. Students created all course projects for their teacher-client.

Students leave ET700 with a complete web-based teaching portfolio that includes all course projects, as well as their reflections on these projects. The course teaches students a constructivist approach in which technology is treated as only one aspect of the classroom ecology.

Theoretical Framework

Constructivist theories (see Ernest, 1996) and theories of situated learning (Brown, Collins, & Duguid, 1989) were used to guide course planning, delivery, in-process course modifications, and evaluation. The planning of discussions and lessons surrounding the introduction of technical topics reflects, in part, the social constructivist positions of Vygotsky (1962), and his followers. At the same time the ways in which the technical material was introduced reflect the influence of the constructivist theories of individual knowledge building following von

Glasersfeld (1994), situated learning (Lave and Wenger, 1991), and instructional design for constructivist learning (Duffy & Jonassen, 1992; Willis & Wright. 2000).

Data Sources

Data collected for this study includes questionnaires administered online to students at the beginning and end of the course, online postings of students on a discussion board, course projects and papers, and professor and teaching assistant observations and field notes.

The initial questionnaire included questions about students knowledge of and comfort with various media and computer technologies including, word processing, computer graphics, videography, spreadsheets, databases, platform knowledge (i.e., Macintosh and Windows), desktop publishing, web authoring, email, digital photography, presentation software, asynchronous and synchronous online communication, and lesson plan development. Students concluded the course by filling out a questionnaire that contained many of the same questions as the original questionnaire, as well as the following open ended questions:

1) How helpful did you find the teacher-client profile in creating a context for your assignments? In your response, please address what information that your drew from to create your profile (i.e., links to national curriculum standards, links to school districts and schools, personal experience, etc.). How did the profile influence your thinking about your projects?

2) How would you describe your general level of knowledge and comfort using technology to teach after taking this course? Please be as specific as possible.

Other sources of data include students online postings in which they discussed their attitudes about and comfort with technology, reactions to course readings that focused on more critical examinations of technology in education (Healy,1998; Postman, 1992). Course assignments including a final reflection paper in which students assessed how their projects met the six ISTE standards.

In addition to the above mentioned data sources, the professor visited each lab session daily and took field notes focusing on student's processes of learning software, questions about the teacher-client profile, and interactions with each other and the teaching assistant. The professor took these notes as a participant observer helping students with technical and conceptual issues. Teaching assistants also took field notes related to how students were utilizing their teacher-client profiles and progressing through their assignments.

Preliminary Results

Initial analysis of the data indicates that students were most knowledgeable and comfortable with basic word processing, email and web browsing. Their low self reporting of knowledge and comfort with lesson plan creation is consistent with this course being an early class in their teacher education program. For most of the measures that asked questions about desktop publishing, graphics, multimedia development, database software, etc. students answered with means for knowledge and comfort below two (out of five). Therefore students entering into the course generally possessed little more than basic knowledge about computers and Internet technologies and had little methods background in education.

Initial analysis from field notes (Professor and TA) indicates that many students struggled with writing the profile although they were supplied with all the basic materials of the profile including information about local school districts, classrooms, and curriculum standards, classroom considerations relating to special needs students, multicultural issues, and the use of technology resources. The assignment was vague enough so that students would not follow a formula, but rather work through their dissonance to see the interrelationships between each aspect of a class including technology. By the end of the quarter students had been required to refer to their teacher-client profiles to complete all course assignments including a web site/educational software evaluation, spreadsheet and presentation software project, and technology-based lesson plan. The final course assignment was to write a reflection paper reviewing how student's projects had helped their teacher-client meet the 6 ISTE NETs standards for teachers.

Many students in their reflection papers and end-of-course questionnaire indicated that the teacher-client profiles were helpful in thinking about their projects by giving them concrete design parameters. In addition, TAs who had taught the labs before, indicated that projects were more consistent, compared to previous classes, with one another in terms of grade and subject appropriateness due to the profile. A closer examination of the reflection papers, however, revealed some of the disadvantages of the simulation. One observation that became immediately apparent when reading the reflections papers is that the teacher-client profile represented a static snapshot and that it did not and could not capture the ever changing dynamics within a K-12 classroom.

Conclusion

Other areas that are receiving further analysis of the data in this study include comparing students comfort with and knowledge of educational technology integration before and after the course. This data will be further compared with field notes taken towards the end of the quarter to determine if students self-reporting were consistent with the field notes. In addition, a closer analysis will be undertaken of the students' projects to determine which classroom issues students gave their primary pedagogical attention. This will provide further evidence of how successful the teacher-client simulation was in inviting students to think beyond computer skill acquisition to the multiple issues affecting successful technology integration.

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Practical applications of technology in the General Methods course

Roxanne Walker Bridges, College of St. Catherine, US

Beginning in the 2001-02 school year, the College of Saint Catherine implemented a requirement of lap top computers for all new Education majors. This created an opportunity for the faculty to reexamine their teaching methods and course content. How could courses be designed so that technology would be utilized during class and for outside class projects? Successful instructors in higher education know that adults are self-directed and expect to take responsibility for their decisions (Knowles, 1984). Technology enhanced instruction that allows students to follow at their own rates on personal computers allows self-direction and personal responsibility.

General Methods and Teachers as Leaders are two of the foundation courses in the Education program. The students are preservice teachers who have little, if any, experience in the classroom. Along with inexperience in the field of teaching came students with varying levels of technology expertise. Pedagogy and foundation information had to be taught along side technology instruction. Collaborative learning, multimedia presentations, and interactive learning have been used in other higher education classrooms with mixed success (Taylor, 2000). St. Catherine's was very supportive in providing in-house training for faculty and staff. Despite the support of time, materials, and a technology team, the challenge to implement came in changing how the faculty teaches classes. This is not unique to St. Catherine. Kim Carter (2001) sees teaching teachers to use a new approach to teaching has a major challenge in the k-12 setting and college setting. Only through continuing practice and a willingness to risk can a lap top program exist and hopefully improve.

As students in the General Methods classes searched the web for resources, they were pleased with the amount of resources available to educators. The instructors facilitated the "surfing" by providing web links and teaching students how to use key word searches to find additional sources. Lesson planning, assessments, and sample lessons were abundant. One of the first tasks worked on together was setting up criteria to determine the usefulness and reliability of specific web sites. Technology assignments were given in the areas of philosophers of education, parental involvement, special education advocacy, assessment methods, and lesson planning. Students explored and wrote about two of the topics citing three web sources in each paper. This information was placed in a public file so that the entire class could access the information.

Deciding if a web site was reliable was done with a consensus model. The class would visit the sites and study the information. Criteria eventually evolved. Creators and authors of the web site were identified and any additional information, such as affiliations were noted. The critique continued by examining the content of the site based on our definitions. For instance, when a lesson planning site was presented, the objectives and plan itself were examined to make sure that the lesson was well organized. If a plan was sketchy or if components were missing, students begin to see this and comment.

In the attempt to make lessons coherent and uniform, a lesson plan template was also created. This occurred early in the term and the template was used for all lesson planning. As the students continue in the program, the template will be used to create future lessons in their special methods courses. This uniformity will allow the instructors to use common vocabulary and also provide a continuum of improvement. As the students become use to the template, they will be able to concentrate fully on the content of the special methods course rather than struggle with lesson plan format.

PowerPoint presentations were used extensively by both the instructor and the students. In order to encourage discussion, the PowerPoint presentation for the classes were emailed as an attachment to the students before the class. A copy was also placed in the public folder so that students could access it throughout the course. As compared to previous years, students came to class ready to discuss the information presented in the PowerPoint. Often they would bring questions that had arisen while they viewed it. Because they had the opportunity to preview it at their leisure, they could time to read it closely, review it, and respond to it.

Email was used extensively during the school term. Uses included questions to the instructor and assignments sent as attachments. One organizational trick that was learned is to use a specific address line with incoming email. By using a common subject, individual emails would be placed in a folder. It was not unusual when assignments were due for the instructors to open email and find 60+ responses and attachments. By using a coded address line, the mail will automatically go into a folder for viewing at a later time.

The students themselves used technology to enhance their units and assignments. Products ranged from brochures to PowerPoint presentations. Traditional assignments, such as creating a unit and producing a research paper, were done with the WORD program. Worksheets, assessment tools, including rubrics, and graphics were all submitted. The quality and creativity of the units this year are higher than previous years. Instructions on programs were offered in class with additional support from "brown bag" lunch instruction with the media specialist. This took pressure off the instructors and allowed students to progress at a rate that was comfortable for them.

Students also will have a complete electronic portfolio at the end of their teacher training. This portfolio will be burnt onto a compact disk. As students move through the program, the instructors will encourage additions to the portfolio. In Teachers as Leaders and General Methods, students created and inserted a cover page, resume, essay on why they choose teaching, and a philosophy of education.

Student opinions

At the end of the term a survey was distributed. Results showed that the majority of students found the technology component of the class at the right level. Frustrations, however, were noted.

"Have everyone's right email address." A comment like this shows the details that can easily be overlooked when setting up a lap top program. Generally students were positive about learning about a PowerPoint, templates, and what to look for when accessing a web site.

Most negative or neutral expressed opinions dealt with the cost of leasing a lap top computer. The students must lease a computer from the College of St. Catherine with the fee being levied each term. Although the lease fee may be added onto financial aid, many students were dismayed because they had their own personal lap top computers. This criticism became heard less often as the term progressed. Students appreciated being able to move readily from one site to another because everyone was using the same server and computer platform.

In conclusion, as the program moves into a second term, students and instructors both appear to be more comfortable with the use of laptops in the classroom. As instructors work through these first sections, journals of what worked and frequent meetings have eased some of the anxiety. The students in the program witness the extensive use of computers in k-12 settings during their field experiences. They know that personal computer skill, an electronic portfolio, and an ability to train other teachers in technology will make them much more marketable. The content of the classes will continue to be presented in a technology heavy way. The goal for the College is to give future teachers the ability to use technology to save time and help their own students flourish.

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Assessing Mentoring Teachers' Technology Proficiency: What Do They Have to Say?

C. Stephen White
Elementary Education
George Mason University
Fairfax, VA, USA
cwhite1@gmu.edu

Debra Sprague
Instructional Technology
George Mason University
Fairfax, VA, USA
dspragu1@gmu.edu

Abstract

This paper focuses on one teacher preparation program's efforts to address a lack of congruence between modeling the effective use of technology in university coursework and appropriate use of technology during the teacher candidates' field experiences (Strudler, McKinney, & Jones, 1998). Questionnaires were administered on technology proficiency and different uses of technology to 54 elementary mentor teachers who participated in a "clinical faculty" class designed to strengthen their mentoring of pre-service teachers. The mentor teachers' responses indicated self-perceptions of proficiency, areas of need for further training, and contradictions related to the teachers' self-perceptions of their skills and abilities

Theoretical Overview

Teacher candidates need opportunities to see, use, and implement technology during their field experiences, especially student teaching. Strudler, McKinney, & Jones, (1998) found that while effective modeling of technology in education courses had positive effects on students' attitude toward using technology, the improved attitudes were limited if teacher candidates were not provided opportunities to learn about and apply skills and strategies in field experiences and student teaching. To insure that teacher candidates have these opportunities, mentor teachers need to model the integration of technology in the curriculum. The purpose of this study was to examine the technology proficiency and different uses of technology of elementary mentor teachers who participated in a school/university partnership "clinical faculty" class designed to strengthen their mentoring of pre-service teachers.

During the 1998-99 academic year, George Mason University redesigned its teacher preparation programs in response to changes in state licensure requirements. In the program redesign, technology was integrated across all courses so students were provided with models of how to teach with technology (White & Sprague, 2001). Field experiences were also integrated into all coursework with a full time internship serving as a "capstone" of the program. In the first year of the program the pre-service teachers indicated that even though there was access to hardware in their classroom, some of the mentor teachers were not using technology in their teaching on a regular basis or were using technology in ways that were incongruent with the models of how to teach with technology provided in their coursework. Based on this feedback from these first year pre-service teachers, it became apparent that there was a need to work directly with mentor teachers on: 1) *how to use technology* (skills and proficiency) and 2) *how to use technology effectively* (integrating technology into teaching) in elementary classrooms.

Survey Administration and Results

Questionnaires were administered on technology proficiency and different uses of technology to 54 elementary mentor teachers who participated in a school/university partnership "clinical faculty" class designed to strengthen their mentoring of pre-service teachers. The surveys were developed to assess the mentor teachers' areas of interest for a session intended to provide different strategies for effectively integrating technology into elementary classroom instruction. The mentor teachers' responses provided information on self-perceptions of proficiency and areas of need for further training. Areas of highly perceived proficiency (over 70% of the mentor teachers responded positively to their perceived proficiency on particular types of technology) included performing computer basics, selecting software for a particular subject area or instructional goal, integrating technology activities into their classroom, and allowing students to use the Web to conduct research. The two lowest areas of perceived proficiency were using spreadsheets (44%) and databases (41%) while 62% of the teachers indicated that they could create graphics or digital displays and 61% indicated they have students create multimedia presentations (mostly with PowerPoint). In terms of proficiency as measured by the state technology assessment for teachers, 87% of the teachers indicated they were familiar with the Virginia Technology Standards for Instructional Personnel (TSIPS) while 75% of the teachers indicated that they had passed the TSIPs.

The responses indicated that there were contradictions and problem areas related to the teachers' self-perceptions of their skills and abilities. The teachers' perceptions did not match the expectations of technology proficiency outlined by the state department of education and the teacher education program. Virginia requires teachers to pass eight technology standards (TSIPs) in order to renew licensure (http://www.pen.k12.va.us/VDOE/Compliance/TeacherED/tech.html). These standards are assessed by the local school district. To determine proficiency, many of the districts require the teachers to either enroll and complete a technology course or produce a portfolio demonstrating their technology competencies. In terms of this research, 75% of the mentor teachers indicated that they had passed the state-required technology proficiencies and yet, many of them also indicated they did not typically use technology in their classrooms and were not familiar with databases, spreadsheets, or multimedia, although these areas were part of the state-required technology standards. A better assessment of teachers' proficiencies in the area of technology integration needs to be developed to determine if these teachers have truly mastered the competencies required by the TSIPs. The university also needs to work closely with these teachers to ensure that the skills learned in the district-required technology course transfer to actual practice within their classrooms. This will allow preservice teachers to see technology modeled in their field experience placements in addition to their teacher preparation courses.

Another area of interest has to do with the number of clinical faculty who felt comfortable sharing what they do with other teachers in the course. All of the teachers in this course were learning how to mentor a preservice teacher. Their principals had been selected them as outstanding teachers. These clinical faculty were being asked to supervise a preservice intern. Even more important they were asked to demonstrate how they teach and discuss their thinking behind each lesson, a process that requires them to be open to questions and to be reflective. However, when asked if they would be willing to share one idea they have for integrating technology only 21% were willing to share with their fellow teachers in the course. The majority of the teachers were unwilling to share despite the fact that 92% indicated they integrated technology regularly in their classrooms. If these teachers are uncomfortable with sharing their ideas for integrating technology with their colleagues, how open will they be to sharing their technology ideas with the preservice interns? Opportunities need to be provided that would allow mentor teachers to become comfortable with sharing their technology integration ideas with others. They need to be encouraged to present workshops or at local conferences so they gain self-confidence in sharing their technology integration ideas.

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Supporting Teacher Training Programs with an Electronic Reserve System (ERes)

Ed Williamson, Drury University, US
Gail Slye, Drury University, US

Introduction

Isaac Asimov said, "I do not fear computers, I fear the lack of them." The field of education seems to concur with this statement as a recently developed survey posed the following question: Are your teachers required to demonstrate technology skills for new or continued employment with your district? If technological competency is to be considered a decisive factor regarding teacher employment, then it is the responsibility of every teacher education program to provide the necessary training. According to the National Center for Education Statistics (2000), "the barriers most frequently reported by teachers to be 'great' barriers to their use of computers or the Internet for instruction were not enough computers and lack of release time for teachers to learn how to use computers or the Internet" (p. 89). The National Council for Accreditation of Teacher Education (NCATE) (2001) stipulates that institutions of higher learning must integrate technology into all aspects of their teacher education programs. The International Society for Technology in Education (ISTE) in affiliation with the National Council for Accreditation of Teacher Education has developed rigorous accreditation guidelines for the inclusion of technology in teacher preparation. The National Educational Technology Standards (NETS) Project (2000), a program that concentrates on preservice teacher education as a division of the International Society for Technology in Education (ISTE), has defined specific concepts, knowledge, and skills considered essential in order to apply technology within educational settings.

The Internet provides access to newly developed disciplinary and interdisciplinary databases; authentically-based, real-time experiences; and other communities not available through text-based material. Recent research and evaluation studies indicate that the school improvement programs employing technology in the areas of teaching and learning show positive results for both students and teachers. Responses of students regarding electronic instruction include the following positive observations: participation in class discussions took place without any one individual monopolizing the conversation; students felt that a greater depth of learning occurred; and the flexibility and convenience of on-line activities were considered beneficial (Brown, 2000). Negative aspects of electronic instruction include a feeling of disconnectiveness from class members with no face-to-face contact, a lack of consistent communications, technical challenges, and confusing feedback (Brown, 2000). In spite of the negative perspectives, technologically mediated instruction offered at a distance is becoming an important feature in the realm of higher education.

While many advantages to on-line instruction (ease of scheduling, convenience, lower cost) exist, numerous concerns (the quality of instruction, lack of interaction with faculty and fellow students, technical limitations) have also surfaced. This article examines a bridge between an on-line course and traditional classroom based instruction. Software developed by Docutek Information Systems, Inc. (www.docutek.com) has enabled faculty members at Drury University and over 220 other institutions of higher learning to utilize the best of both worlds. This software is ERes v4.1 and has been in use at Drury University since the beginning of the 1998-1999 academic year.

ERes Systems in the Literature

ERes is short for electronic reserves. ERes systems have helped to shape the teaching and learning environments of higher educational institutions around the world. Kesten and Zivkovic (1997) described ERes as a stand-alone system that used intuitive, point and click interfaces along with context-sensitive help. This eliminated the need for extensive technical training in order to use the system. Dugdale (1999) highlighted the scarcity of resources in academic libraries as well as pressures from growing student populations and the introduction of new pedagogical processes as the main reasons for the rise of ERes systems. Major institutions in the United States, such as Kent State University, have also utilized ERes (Kristof & Klinger, 2000). One possible limitation of ERes systems revolves around the issue of copyright infringement. An excellent article showing how Portland State University resolved this conflict is found in Anderson and DeMont (2001). One exciting application for the future is described by Rodoni, Bertone, and Estella at Santa Clara University in Santa Clara, California. These students acknowledge the current limitations of ERes allowing students and faculty the ability to search for course information only at their own institution. They conceptualized the creation of a collaborative function within the ERes system enabling students and faculty to search for course material from other universities as well as their own. This will provide a powerful tool for faculty collaboration and virtual learning (Rodoni, Bertone, & Estella, 2000).

Rationale for Incorporating ERes

One of the problems with traditional classroom-based instruction is the limitation of time. Students are expected to be in class at a certain time and to remain there until the class period is over. Professors are expected to have posted office hours and be available to their students. All of this depends upon time and physical proximity. It results in a synchronous dilemma. If the student or professor cannot be at a certain place at a certain time, then instruction and/or mentoring and advising cannot take place. What is needed is an asynchronous system. Better yet, a combination of the two.

The advent of email has made communication between students and professors a much easier task. It has limited the need for synchronous interactions. With email, a student can communicate with the professor from anywhere at anytime. This is the basic premise also of on-line, web-based education. The student and professor conduct their business in an asynchronous fashion. The lessons are posted to web sites and the students view the material at their leisure.

What about the students whose technical limitations (whether personal or computer-based) interfere with the learning process? What about those students who need the social interaction that comes from traditional classroom-based instruction? Fortunately, the issue is not an either/or proposition. There is a middle ground or bridge between the synchronous and asynchronous methods of teaching. This is the domain of ERes.

With the ERes system, a professor can make available on-line any course-related information. While students and professors interface in the traditional classroom environment, professors can also post messages for students to view when they access the ERes page, or students and professors can participate in an on-line chat room. These components provide for an educational experience that combines both in-class interaction and instruction (synchronous) and out-of-class (asynchronous) activities that are available anytime.

Drury University and Teacher Education

Drury University is a private, liberal arts university established in 1873. Drury offers numerous programs of study at the undergraduate and graduate level, including teacher education. Drury operates from two main campuses, in Springfield, Missouri and also Fort Leonard Wood, Missouri, with smaller, statewide satellite campuses in Rolla, Lebanon, Ava, Stockton, Thayer, and Cabool. Students wishing to be certificated to teach in Missouri may take introductory education courses at any of the satellite campuses, or they may complete their degree at either Springfield or Fort Leonard Wood.

In order to facilitate teacher training, Drury University faculty have begun utilizing the ERes system to provide students with necessary materials and asynchronous communication abilities. Drury University has made a commitment to provide current technological tools to students and faculty members.

Many of the students at the satellite campuses would be considered non-traditional. Since most of these students commute to class once or twice a week from a significant distance, it is difficult to schedule appointments with the education faculty members. One way of facilitating a balance is through ERes.

Specific Examples of Teacher Training Facilitation

During the spring semester 2001, one course (Teaching Methods of Elementary Science-EDUC 382) was conducted using ERes by posting course syllabus, scoring guides, lesson plan templates, a link to the School of Education and Child Development homepage at Drury University, and pictures. Other functions of the ERes page included the capability of posting announcements, discussion boards, chat rooms and links to education resources, the university library, and university homepage. Students do not have the ability to post material directly to the page (with the exception of the discussion board and chat room); this is the responsibility of the professor teaching the course. Students do have the ability to view and download any of the submitted lesson plans by entering a password.

While there are other programs and software available for faculty-student interaction, including some very high powered and sophisticated systems like WebCT, BlackBoard 5.02, or Web-Mediated CourseAssistant (Web-MC), what is sometimes needed is simply a way for faculty and students to interact without a great deal of extra features. ERes provides for the posting and downloading of information without requiring extensive training. Although it does not contain as many "bells and whistles" as other programs, it does meet the needs of the education students at Drury University. From one course using ERes in Spring 2001, the authors have expanded the use of ERes to include a majority of their courses.

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(Kristof & Klinger, 2000). One possible limitation of ERes systems revolves around the issue of copyright infringement. An excellent article showing how Portland State University resolved this conflict is found in Anderson and DeMont (2001). One exciting application for the future is described by Rodoni, Bertone, and Estella at Santa Clara University in Santa Clara, California. These students acknowledge the current limitations of ERes allowing students and faculty the ability to search for course information only at their own institution. They conceptualized the creation of a collaborative function within the ERes system enabling students and faculty to search for course material from other universities as well as their own. This will provide a powerful tool for faculty collaboration and virtual learning (Rodoni, Bertone, & Estella, 2000).

Rationale for Incorporating ERes

One of the problems with traditional classroom-based instruction is the limitation of time. Students are expected to be in class at a certain time and to remain there until the class period is over. Professors are expected to have posted office hours and be available to their students. All of this depends upon time and physical proximity. It results in a synchronous dilemma. If the student or professor cannot be at a certain place at a certain time, then instruction and/or mentoring and advising cannot take place. What is needed is an asynchronous system. Better yet, a combination of the two.

The advent of email has made communication between students and professors a much easier task. It has limited the need for synchronous interactions. With email, a student can communicate with the professor from anywhere at anytime. This is the basic premise also of on-line, web-based education. The student and professor conduct their business in an asynchronous fashion. The lessons are posted to web sites and the students view the material at their leisure.

What about the student whose technical limitations (whether personal or computer-based) interfere with the learning process? What about those students who need the social interaction that comes from traditional classroom-based instruction? Fortunately, the issue is not an either/or proposition. There is a middle ground or bridge between the synchronous and asynchronous methods of teaching. This is the domain of ERes.

With the ERes system, a professor can make available on-line any course-related information. While students and professors interface in the traditional classroom environment, professors can also post messages for students to view when they access the ERes page, or students and professors can participate in an on-line chat room. These components provide for an educational experience that combines both in-class interaction and instruction (synchronous) and out-of-class (asynchronous) activities that are available anytime.

Drury University and Teacher Education

Drury University is a private, liberal arts university established in 1873. Drury offers numerous programs of study at the undergraduate and graduate level, including teacher education. Drury operates from two main campuses, in Springfield, Missouri and also Fort Leonard Wood, Missouri, with smaller, statewide satellite campuses in Rolla, Lebanon, Ava, Stockton, Thayer, and Cabool. Students wishing to be certificated to teach in Missouri may take introductory education courses at any of the satellite campuses, or they may complete their degree at either Springfield or Fort Leonard Wood.

In order to facilitate teacher training, Drury University faculty have begun utilizing the ERes system to provide students with necessary materials and asynchronous communication abilities. Drury University has made a commitment to provide current technological tools to students and faculty members.

Many of the students at the satellite campuses would be considered non-traditional. Since most of these students commute to class once or twice a week from a significant distance, it is difficult to schedule appointments with the education faculty members. One way of facilitating a balance is through ERes.

Specific Examples of Teacher Training Facilitation

During the spring semester 2001, one course (Teaching Methods of Elementary Science-EDUC 382) was conducted using ERes by posting course syllabus, scoring guides, lesson plan templates, a link to the School of Education and Child Development homepage at Drury University, and pictures. Other functions of the ERes page included the capability of posting announcements, discussion boards, chat rooms and links to education resources, the university library, and university homepage. Students do not have the ability to post material directly to the page (with the exception of the discussion board and chat room); this is the responsibility of the professor teaching the course. Students do have the ability to view and download any of the submitted lesson plans by entering a password.

While there are other programs and software available for faculty-student interaction, including some very high powered and sophisticated systems like WebCT, BlackBoard 5.02, or Web-Mediated CourseAssistant (Web-MC), what is sometimes needed is simply a way for faculty and students to interact without a great deal of extra features. ERes provides for the posting and downloading of information without requiring extensive training. Although it does not contain as many "bells and whistles" as other programs, it does meet the needs of the education students at Drury University. From one course using ERes in Spring 2001, the authors have expanded the use of ERes to include a majority of their courses.

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Pre-service and In-service Teachers' Knowledge, Experience, and Perspectives on Portfolio Assessment: A study in Taiwan

Hsiu-Ping Yueh, Ph.D.*
Chih-Yin Hsiao**
Shan-Hsin Chiang, Ph.D.***
*Department of Agricultural Extension
**Center for Computers and Information Network
***Center for Teacher Education
National Taiwan University
yueh@ccms.ntu.edu.tw

ABSTRACT: This study focuses on pre-service and in-service teachers' knowledge, experiences, and views of portfolio assessment and its use in school settings, as well as the possibility of applying portfolios in their classrooms. This paper first describes the rationale of portfolio assessment; then describes the research purposes and questions as well as methods used in the study. It also reports the results of data analyses and provides conclusions and implications in relation to portfolio practice and teacher education.

Rationale

Portfolio assessment has become more and more popular within general educational settings (Simmons, 1990). It presents one of the alternative ways to measure student performance in a broader range and context that measures both the product and the process of students' learning and also values the evaluation of students' achievement along with their effort and improvement (Tierney, Carter, & Desai, 1991). Paulson, Paulson, and Meyer (1991) proposed one of the most specific definitions: "A portfolio is a purposeful collection of student work that exhibits the student's efforts, progress, and achievement in one or more areas. The collection must include student participation in selecting contents, the criteria for selection, the criteria for judging merit, and evidence of student self-reflection" (p. 60). Portfolio assessment allows students to learn different kinds of complex skills and to demonstrate their ability in an authentic context where their learning occurs naturally. On the other hand, portfolio assessment also provides teachers the opportunity to observe students' performance in the authentic context and to get rich information and valuable quality of data for evaluation and instruction. In this regard, portfolio assessment could be a very powerful technique to serve as both instructional and assessment tools for program with special objectives, which can help teachers in a variety ways.

As researchers have pointed out, there certainly are both positive and negative aspects of the use of portfolio. Calfee & Perfumo (1993) conducted a nationwide survey of portfolio practice that includes states, districts, schools, school teams, and individual teachers, focusing on writing assessment. They found that teachers who are in portfolio movement show an intense commitment and personal renewal. On the other hand, most teachers experienced portfolio practices revealed that they have been struggled with management problems such as time and organization in using portfolio and some teachers even thought that the portfolio was not worth the effort (Salinger and Chittenden, 1994). Moreover, another major concern about the portfolio assessment is that it has often been criticized as lack of technique adequacy such as validity was assumed to exist and reliability were not discussed (Calfee & Perfumo, 1993; Moss, 1992, 1994; Nolet, 1992). Still another critical issue in using portfolio in the classroom has to do with the amount of support from the school or district. However, Salinger and Chittenden (1994) claimed that, even though portfolios may not have spurred instructional reforms in their district, the use of portfolios with the intention of assessing instruction helped improve their program.

Since the concepts of portfolio assessment are still relatively new to many educational practitioners, teachers may need to improve professional development to be able to implement portfolio practice effectively (Calfee & Perfumo, 1993). Both pre-service and in-service teachers need to be trained to have better understanding of theories and practices of portfolio assessment and well as to increase their awareness of emerging perspectives of portfolio and the technology applications. While the portfolio assessment is especially not yet so prevalent in schools of Taiwan, it is very important to understand to what extent teachers are acquainted with the idea of portfolio assessment and how well they have prepared to take this movement. Therefore, this study set forth to investigate pre-service and in-service teachers' experiences of, and attitudes toward their use of portfolio assessment in classroom practices. Moreover, this study tries to examine how the knowledge and experience of portfolio assessment as well as some background variables can affect both pre-service and in-service teachers' willingness in implementing any kind of portfolio practice in their teaching.

Methods

The target subjects were both pre-service and in-service teachers who had or are enrolled in the Education Program of a university in northern part of Taiwan. A survey questionnaire developed by the researchers composed of 50 Likert-type questions and 6 open-ended questions were distributed to collect knowledge, experiences and views of 124 subjects on portfolio assessment and electronic portfolio application.

Results

Most pre-service and in-service teachers in this study stated that they have none to few experiences in portfolio practices. Some of them have learned theories and applications of portfolio assessment in pre-service or in-service training courses, and many of them have shown positive attitude toward the portfolio assessment approach. Moreover, the results of data analysis reveal that there was a statistically significant difference in knowledge, experience, and perspectives scores between pre-service and in-service teachers. In addition, most teachers in this study preferred using portfolio as a tool of their professional development rather than to use it as an assessment tool while they attested to the fact that time and their abilities are two of the greatest limitations in implementing portfolio practice in the classroom.

Based on the findings of this study, two major suggestions are made to the field. Firstly, while the concept of portfolio assessment are still relatively new to both pre-service and in-service teachers, the teacher education programs should consider carefully to include theories and applications of portfolio assessment in the curriculum. Secondly, results of this study shown that most teachers in this study preferred using portfolio as a tool of their professional development rather than to use it as an assessment tool would convey an important message to the field of education and some further studies are required to explore further information.

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PT3 SECTION

SECTION EDITORS:

Mary Thompson, University of Houston
Jerry Price, University of Houston

Teamwork... Collaboration... Learning... Integrating... Mentoring— these words permeate the project papers presented in the following pages and form the basis of the common language shared by all PT3 grant participants; they have been goals and many have become accomplishments over the past year. They form the vocabulary of a common endeavor of which we should be proud. 142 papers covering several different aspects of PT3 grants from across the country will be presented at SITE 2002. While the foci of these papers are broad and diverse, the common endeavor, the infusion of technology into pre-service teacher education, ties them together in a way that facilitates dialogue. And yet, effective dialogue requires not only a common vocabulary but also a time and a place, just the sort of time and place provided at SITE 2002.

SITE 2002 provides us with the invaluable opportunity to share our experiences in achieving these goals and allows us the opportunity to reflect. In all good design, a time for reflection and evaluation is provided. Whether at the end of a project or as an ongoing part of it, reflection allows participants to both look back and attempt to see forward. As we all discover, however, the reflective process can be difficult and time-consuming— it is sometimes simply easier to continue forward without looking back. SITE 2002 offers the time and opportunity required for reflection. Whether nearing the end of a grant cycle or only at the beginning, we are all at a point where reflection and evaluation are advisable and necessary.

As groups with a shared vision for the future of pre-service education, we can use this time to reach out to our fellow grantees and provide them with the benefits of our experiences. Shared knowledge regarding what has worked and what has not may keep others from treading treacherous paths or guide them toward success. Along with sharing our advice and successes, we can also share our perspectives on working as teams to create change in a changing world.

This conference also provides the opportunity for communication between different PT3 groups as they share the results of the past year's work and their plans for the sustainability (sustenance) of their work.

While we reflect on accomplishments, we need to look realistically at what remains to be done. Sustainability of the progress that has been made and the changes that have been engendered by these grants can also become a focus of discussions at the conference.

Above all, see this conference as an opportunity, to share, reflect, and renew. Look to the progress that has been made in the past year and share the pride of every presenter in their accomplishments.

Mary Thompson is a Doctoral Student in Instructional Technology at the University of Houston in Houston, Texas.

Jerry Price is the College Information Services Manager in the College of Education at the University of Houston and the Technical Coordinator for AACE and SITE 2002.

Sharing Expertise: The Technology in Urban Education Summit

Ronald J. Abate
Cleveland State University, USA
r.abate@csuohio.edu

Judy I. Stahlman
Cleveland State University
j.stahlman@csuohio.edu

Kathleen Benghiat
Cleveland State University
k.benghiat@csuohio.edu

Abstract The Modeling Instruction with Modern Information and Communications technologies (MIMIC) Project housed in the Cleveland State University (CSU) College of Education sponsored a Technology in Urban Education Summit in Spring 2001. Serving as a dissemination component of a PT3 Implementation grant, this event explored current, relevant educational technology and possibilities for its integration in urban K-16 classrooms. This paper provides an overview of the Summit and presents practical recommendations based on data collected from the Summit participants.

Overview

A Technology in Urban Education Summit (Techs in the City) was held at Cleveland State University (CSU) as a dissemination component of the MIMIC Project which supports educational technology mentoring for higher education faculty by technology-proficient K-12 classroom teachers. The Summit brought together local, state, and national educators who share a common interest in educational technology. Faculty representing nine urban universities, and eight Ohio Colleges of Education joined with MIMIC participants and K-12 classroom teachers from urban districts to share perspectives on teaching with technology.

Techs in the City consisted of a day of presentations and conversations culminating with an in-depth panel discussion focused on timely issues surrounding the implementation of educational technology in urban K-12 schools. A marketplace of interactive presentations highlighted the ongoing educational technology activities of participants from the CSU College of Education and MIMIC partners Baldwin-Wallace College, Notre Dame College of Ohio, Ursuline College, and John Carroll University. Many of the Summit presentations provided insights into how faculty/mentor teams work to examine pre-service education curricular goals and implement technology that is appropriate and specific to achieving those goals. Additional presentation topics included technology integration in specific content areas, digital video, technology use in K-3 settings, program evaluation, and professional development in educational technology.

Eleven Round Table discussions were conducted midway through the day. The Round Tables provided participants with opportunities to enter into discussions about specific topics of interest such as educational technology publication, classroom videotaping, and technology integration in K-12 urban schools. Each discussion was facilitated by an expert on the topic. In addition, informal activities and breaks were scheduled throughout the day to encourage continued dialogue among participants. Urban educators with expertise and rich backgrounds in teaching, research, and administration presented a panel discussion, which capped the Summit proceedings. A video of Summit highlights was shown to close the day's events.

Participant Feedback

A survey form was distributed as attendees exited the Summit. The survey consisted of 25 Likert scale response items and 10 open ended questions. Thirty-two of the 65 attendees, 49 percent of the participants, completed the survey. An online follow-up survey was conducted approximately two months after the Summit. Seventy four percent of the participants completed and returned the follow-up survey.

On the initial survey, three questions were posed for each of the four types of sessions; morning interactive, Round Table discussions, afternoon interactive and the Panel discussion. The first question related to level of interest generated by the Summit, a second addressed each session's connection to the Summit theme, and the third dealt with the perceived usefulness of the session. The scale for response was Strongly Disagree, Disagree, Agree/Disagree, Agree, and Strongly Agree. Ninety three percent of the respondents "agreed" or "strongly agreed" that the interactive sessions and Round Tables were interesting, related to the Summit, and were useful. Seventy five percent of the respondents "agreed" or "strongly agreed" that the Panel presentation had the same characteristics but six respondents either "strongly disagreed" or "disagreed" with the statements in regard to the Panel discussion.

Five Likert scale questions were posed on overall Summit satisfaction. The same response scale was employed. One hundred percent of the respondents either "agreed" or "strongly agreed" that the Summit was interesting, the companion video was enjoyable, and that they looked forward to meeting next year. Ninety three percent of the respondents either "agreed" or "strongly agreed" that they would be able to use the ideas presented at the Summit in their work.

The responses to the follow-up survey were quite consistent with the participants' initial feelings about their experiences. Eighty three percent of those responding indicated they "agreed" or "strongly agreed" that they have used information attained at the Summit. Fifty three percent "agreed" or "strongly agreed" that they have tried new technology as a result of the Summit.

Open-ended questions were presented regarding educational technology ideas that participants could use on their own, Summit strengths and needed improvements, and suggestions for next year's Summit. Overall, the open-ended comments were very positive. Contacts and collaborations were key aspects of participant satisfaction. In particular, the opportunity to engage in one-on-one conversations was significant to participants. Increased awareness of Internet materials appeared to have influenced some participants to examine the potential of web-based instruction, and exposure to software and hardware broadened participants' use of new technologies. Two areas of discontent were the small size of some of the presentation rooms and the short duration of the interactive sessions. Based on the number of open-ended responses, the presentations were enjoyed the most by the participants. However, the participants appreciated the Round Tables and opportunities for informal interactions, which served as mechanisms for extending the information presented in the sessions. Comments on the positive nature of the networking appeared in numerous responses.

Additional comments suggest that there was a mixed reaction to the Panel discussion. While some participants found the discussion pertinent, many others found the format limiting since audience participation in the discussion was minimal. Several suggestions were made for future Summits including the addition of "how-to" sessions, cutting edge technology demonstrations, more "hands-on" activities, and sharing exchanges.

Lessons Learned

The goals of the Summit were twofold. First, the Summit was designed to provide MIMIC Project participants with an informal but structured opportunity to disseminate information regarding their Project activities. Second, the Summit was designed to offer attendees new perspectives on integrating educational technology into urban pre-service education courses. Survey responses indicate that dissemination efforts were well received. Achievement of the second goal was supported by responses from the participant follow-up survey. Techs in the City met the needs of the intended audience. As such, a second Summit is scheduled for the spring of 2002. Well-received events such as the Round Table discussions, interactive presentations and the "highlight" video will be retained. The addition of a Reception/Poster session event will accommodate shorter, more intimate presentations and open up time for lengthier "hands on" interactive sessions in larger venues. Other suggested changes include a keynote address, cutting edge technology demonstrations and professional development sessions. Updates on the 2002 Summit are available at http://mimic.ed.csuohio.edu/summit.html

Providing for Student Professional Development as part of the Teaching, Learning and Technology Project

Valeria Amburgey, Ed.D.
Northern Kentucky University
College of Education, BEP 272
Highland Heights, KY 41099
United States
amburgey@nku.edu

Abstract: Northern Kentucky University's College of Education faculty want to ensure that their teacher education students are technology proficient. Students must demonstrate mastery of technology standards through their course assignments and professional portfolios. Students can only demonstrate technology proficiency if they experience effective and appropriate instructional applications of technology. Curricular review and the implementation of the Preservice Technology Leadership Program are some of the initiatives utilized by NKU to provide for professional development of teacher education students to be technology proficient.

Introduction

In 1998, the College of Education at Northern Kentucky University (NKU) adopted the ISTE Recommended Foundations for Teachers and a five-year *Technology Plan for the College of Education*. In May 1999, the Education Professional Standards Board of Kentucky implemented a new technology standard for beginning and experienced teachers. The statewide technology standard is based on the ISTE technology standards. NKU's College of Education recently adopted the National Education Technology Standards (NETS) for teachers to replace the 1998 ISTE standards. Adoption of technology standards, state mandates and four broad goals of a technology plan set the College on a course to infuse technology into the teacher education program.

The TLT Project

NKU received funding from the United States Department of Education (U S DOE) for a one-year capacity building grant in 1999 and a three-year implementation grant in 2000. These grants allow NKU to begin a full implementation of the five-year technology plan.

The goals for NKU's Teaching, Learning and Technology (TLT) Project are based upon three of the four goals outlined in the *Technology Plan for the School of Education*. The goals for this three-year project build upon the successful integration of technology into the teacher preparation curriculum by providing (1) *Technology-rich Environments* for students and faculty, both on-campus and in field placements; (2) *Faculty Professional Development* for NKU faculty; and (3) *Student Professional Development* that ensures students seeking initial teacher certification have the necessary skills and resources to use technology in their teaching and learning.

The third goal of the TLT Project includes the need to address professional development for students. Within the grant project several initiatives are in place to ensure that preservice teachers are trained on effective instructional applications of technology. Curricular review and reform is necessary to ensure that all preservice teachers will be trained and evaluated according to national and state technology standards. A new initiative, the Preservice Technology Leadership Program (PTLP) provides an opportunity for some preservice teachers to develop leadership skills and to collaborate with teachers from partner districts.

Curricular Review

NKU uses a continuous review and program evaluation model for curricular matters. Faculty who teach one or more courses in the teacher education program are often asked to identify which standards, including technology, are being assessed within the courses they teach. Program folios include matrices that identify each course and type of assessment for each standard. During the 1999-2000 academic year, matrices related to the technology standards were completed.

As part of the TLT Project, a maximum of five teacher education faculty members receive a one-course (3 semester hours) of reassigned time for the purpose of reviewing targeted teacher education programs in regards to the national and state technology standards. Faculty who participated in this curricular review during the 2000-2001 academic year noted discrepancies in the technology matrices. This group developed a technology utilization survey and began conducting interviews with elementary and special education faculty. During year two of the TLT project, the technology utilization survey is being administered to middle grades and secondary faculty. By the end of the TLT grant project, all teacher education programs that lead to initial certification will be analyzed and reviewed for levels of technology implementation and evaluation. This review will allow NKU to identify strengths and weaknesses within the teacher education program.

Preservice Technology Leadership Program

Another initiative within the TLT project is the Preservice Technology Leadership Program (PTLP). This program recruits a select group of preservice students in their first semester of professional coursework and pairs them with mentor teachers from partner districts. The students and teachers participate in 24 hours of training each year. The training sessions focus on learning how to use various hardware and software components. Outside of the formal training times, the mentor teachers and the preservice students collaborate on the instructional applications of the technology in which they have been trained. Collaboration includes participation in additional training from the partner districts and development of instructional activities. Mentor teachers and students are encouraged to try out the technology-rich activities and evaluate their use within a typical classroom environment. The mentor teachers and students provide additional professional development to the partner districts either through in-services/workshops at the district or technology seminars for the consortium. A few mentors and their students also present at the statewide technology conference.

Concluding Remarks

The TLT curricular review process has been instrumental in identifying strengths and weaknesses in the teacher education programs. A few of the curricular revisions made to the teacher education program have been based upon the data collected from the technology utilization survey.

PTLP has provided another means of collaboration between the College of Education and partner districts. Participants gain knowledge and skills on the use of technology and have the opportunity to share their experiences through leadership opportunities on campus and in the schools.

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A Framework for Integrating Technology into Teacher Preparation Programs

Staples Amy, UW-Milwaukee, US
Marleen Pugach, UW-Milwaukee, US
Dj Himes, UW-Milwaukee, US

The lack of highly qualified teachers for urban schools continues to be a well acknowledged problem nationwide. The educational needs of children and youth, and particularly for those who attend the nation's urban schools, can best be met by assuring that each student, no matter what school he or she attends, has a highly qualified, competent, and caring teacher (National Commission on Teaching and America's Future, 1996). Faculty at the University of Wisconsin-Milwaukee (UWM) define highly qualified teachers as those who (1) are deeply knowledgeable in the content areas they are to teach, (2) possess and demonstrate a high degree of pedagogical content knowledge, (3) engage in culturally relevant pedagogy to foster high levels of achievement for all learners and to bridge the discrepancy between primarily majority teachers and primarily minority students, and (4) embed technology across all aspects of their teaching as a central means of creating active, engaging, and challenging learning communities that enable their students to meet high standards of achievement. Teachers who possess these four qualities have the potential to close the perennial gap in achievement between students in urban schools--who typically are members of minority, and often lower socioeconomic, groups--and their more advantaged peers.

But if teachers in urban schools are to use technology to close the achievement gap, they must draw on technology to *transform* traditional teaching--teaching that to date has clearly left students in urban school systems like the Milwaukee Public Schools (MPS) the least well served. Technology holds unique potential for assisting teachers in moving away from traditional, teacher-centered instruction to highly engaging, challenging, student-centered learning environments. To reach this level of technology use, however, new and experienced teachers alike will require sustained professional development to acquire a vision of what is possible through the integration of technology-rich educational approaches--opportunities that were not in place prior to the receipt of a PT3 Implementation grant.

It is our belief that to be skilled in appropriate technology use, students must learn about technology through both explicit instruction via technology courses and through more integrated means within content area courses. As part of the work to integrate technology into our program, a framework for technology was developed. The framework was developed to help students consider their roles regarding technology (e.g., promoter of ethical practice, troubleshooter), how technology could be used to help them (e.g., teacher's assistant, teacher's tool) and how it could be used to promote learning (e.g., communicating or sharing information via various technologies) in their students. Using the ISTE standards and Collaborative Teacher Education Program for Urban Communities Core Values, the framework was constructed. The framework drove the revision of two required technology courses and stimulated the integration of technology projects in a number of content area courses.

This presentation will share information about the Collaborative program and the technology framework, as well as explain how coursework has shifted in both content and delivery. Examples of student and faculty projects will be shown.

Meeting NCATE Standards for Technology Integration: Survey Results of Technology Integration in an Elementary Education MAT Program

Cindy L. Anderson
National College of Education
National-Louis University
United States
clanderson@nl.edu

Arlene Borthwick
Technology in Education
National-Louis University
United States
aborthwick@nl.edu

Abstract: This article is a report on findings of a survey that was given as a pre- and post-test of an introductory technology in education course. Introduction to Technology in Education was integrated into two other courses. In general, students perceptions of their ability to operate a computer, use computer operating systems, increase their knowledge of computers and technology, evaluate software, use technology as a tool for instruction, using technology as a teaching tool, developing a technology plan, and disseminating their technology expertise increased.

In its effort to reform teacher preparation, NCATE has moved to ensure that teacher education candidates are prepared to use technology in teaching and learning. Expecting technology to be "central to teacher preparation in 2000 and beyond" (Wise, 1997-2001, p. 2), NCATE anticipates that technology will "be integrated throughout the curriculum, instruction, field experiences, clinical practice, assessments, and evaluations of the school" (Bradley, 2000, p. 2). As SCDEs develop curriculum and discuss instructional strategies to meet these standards, they turn to recent research and model programs for guidance.

Survey research conducted in 1998 by the International Society for Technology in Education (ISTE, 1999) initially suggested that integration of technology experiences in other coursework was more effective than a separate stand-alone technology course in helping preservice teachers to learn to use technology in education. However, a follow-up study of high-scoring institutions (as identified in the 1998 study) found that "technology courses within the teacher training program were rated as essential…followed by training integrated into other education coursework and informal individual learning (Bielefeldt, 2001, p. 9). The outcomes of these two studies reflect the various approaches being tried by SCDSs: stand-alone courses emphasizing tool use or basic computer applications, integration of technology across the liberal arts and teacher education programs, or a well-coordinated combination of both. Deciding on the best approach was identified as an obstacle to infusing technology into preservice teacher education in an ERIC Digest written in 1995 (Ismat, A., 1995).

The National-Louis Preparing Tomorrow's Teachers to Use Technology grant, *Transforming Learning and Teacher Preparation through Technology-Rich Cohorts*, was designed to train elementary and secondary teachers for partner school districts participating in the grants using a program that differed from the traditional program by adding a strong element of technology training and providing students with Gateway laptop computers. This MAT program reduced the number of credit hours for Foundations courses and replaced those hours with an Introduction to Technology in Education course.

Preservice teachers involved at the beginning of this PT3 training program took three classes during their first semester, an Introduction to Special Education class, a Practicum I class and the technology class. The classes met one night per week with technology instruction occurring in an elementary school equipped with a Macintosh computer lab. During this one night per week, hours were allotted for the three-hour special education class and the three-hour practicum class, but the technology class was integrated entirely within the class time of the other two courses. The instructors of the classes met together and correlated their respective syllabi. As the other two classes covered topics that permitted the integration of the goals and objectives of the technology class, the technology instructor taught technology skills within that class. In this way, the two-hour Technology in Education course was entirely embedded within the other two courses.

To measure the success of this program, students completed a survey at the beginning and end of the semester of the program. This instrument was developed from one used by Anderson and Petch-Hogan (2001) and measured such areas as students' technology skills, their knowledge of the use of computers, their ability to evaluate software, their use of technology to facilitate instruction, their ability to use technology as a teacher tool, their ability to develop a technology plan, and their ability to disseminate their technology knowledge. Using a t-test, the pretest and posttest forms of the survey were analyzed to determine gains in these areas.

Results indicated that students perceived themselves as improving in several areas measuring the operation of a computer and peripherals. They learned to install software, explain the best operating conditions for computers, perform simple maintenance on their computers, and operate CD-ROMs. Areas that were not significant included operating computers, operating projection devices, hooking up external devices, explaining safety features, maintaining printers, scanners, and digital cameras. Mean scores for computer operation, hooking up external devices, and maintaining printers were high on the pretest, indicating that students felt they knew how to perform these areas before the semester

Results measuring student perceptions of their increased knowledge of computer operating systems indicated that students felt that they significantly increased in operating and navigating a Windows system, finding files in a Macintosh computer, making an alias in a Macintosh computer, changing settings in a Windows computer, making a shortcut in a Windows computer, and configuring peripherals in a Windows computer. Nonsignificant areas were initializing disks, operating a Macintosh system, beginning a program in both a Macintosh and a Windows computer, deleting programs in both a Macintosh and Windows computer, changing the settings on a Macintosh computer and finding files on a Windows machine. High mean scores on the first surveys for initializing disks, beginning and deleting software on a Windows computer, and finding a file on a Windows machine would seem to indicate that students already felt competent in these areas before the program began.

Results of student perceptions of their knowledge of the use of computers and related technology indicate that students felt that they gained in all areas: defining concepts related to technology, identifying major issues associated with the use of technology, identifying ways that computers can be infused into the curriculum, taking steps to keep knowledge up-to-date, and identifying sources of technology information. Using the integrated format for this course in educational technology seems to have made students feel that they improved in their knowledge of the use of computer technology.

Results for evaluation of software were also generally significant. Students felt that they increased in their ability to identify the purpose of a software program, match student characteristics to software, identify characteristics of software for instruction, evaluate the content of software, match the difficulty of the software with the learner, evaluate documentation, and determine teacher options. Setting up software options for use was nonsignificant.

Results on the surveys measuring the use of technology to facilitate instruction reported a significant increase in all the subskills that measure this area. Students reported a significant increase in their ability to use technology for instructional practice; set up the classroom for technology instruction; use tutorial programs, drill and practice programs, problem solving programs, tool software for both students and teachers, and assistive technology; evaluate the effectiveness of applications; use the Internet for research; use multimedia, and create Web pages. The only area they failed to demonstrate a significant increase was in use of the Internet for online learning activities.

Results of students' perceptions on how technology can be used as a teacher tool were also largely significant. Students reported an increase in their ability to use a word processor to develop learning tools; search the Internet for lesson plans and information to aid teaching; use listservs, bulletin boards, use IEP generators; use word processors to create IEPs; and use portfolio software. There was nonsignificant gain in using utility programs, using databases or spreadsheets, using email, conducting regular backups of data, and transferring files between computers. Initial mean scores for utilities and using email were high, so students felt they already knew how to do these. The remaining areas were skills for which the students reported little gain.

Results of students' perceptions of improvement in their ability to develop a technology plan were all significant, indicating that students felt they were better prepared to create a technology plan. These areas included identifying goals for using technology in education, identifying how technology could be implemented in the curriculum, planning appropriate classroom changes, ensuring equitable access, creating guidelines for technology use, developing a budget, determining funding, and writing grants to obtain technology.

Finally, survey results measured students' perceptions in their ability to disseminate their technology expertise. The skills measuring this area were all significant with the exception of one, making presentations about technology. They did feel that they made significant gains in their ability to maintain a file of information on technology, provide consultation to colleagues and parents, and prepare written reports on technology.

To summarize the results of the survey on integrating technology in education students seem to indicate that while their hands-on technology skills did not increase in all areas, they felt that they increased their knowledge of effective planning and integration of technology into the classroom in most areas. Like the findings of the initial study by ISTE, the students gained in these areas when they were provided technology instruction in an integrated fashion.

Future research should explore other methods for training teachers to use technology. Since the Beilfeldt findings indicated that strong technology-using teacher education institutions provide a class for skills, this should be a focus of future research. Since these students did not report significant gains in all the computer operation skills on the survey, the Technology in Education class might be offered as a separate class, allowing for more time to make students comfortable with their laptops. These findings could be compared with the integrated method used in this study. This research could help identify which method is most effective at training teachers to use technology.

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Faculty Use of WebCT: Impact of P3T3 Faculty Development Initiatives

Hua Bai
Purdue University
1442 Liberal Arts and Education Building
West Lafayette, IN 47907-1442
baih@purdue.edu

Suttichai "Tom" Chuvessiriporn
Purdue University
1442 Liberal Arts and Education Building
West Lafayette, IN 47907-1442
chuvessi@purdue.edu

James D. Lehman
Purdue University
1442 Liberal Arts and Education Building
West Lafayette, IN 47907-1442
lehman@purdue.edu

Abstract: A study conducted within the School of Education, Purdue University, explored how a PT3 implementation grant project helped the faculty integrate the use of WebCT in their teaching. Data for this study were collected using both quantitative and qualitative approaches. An online survey was conducted. In-depth interviews were conducted with 3 faculty members who had attended WebCT workshops and were using WebCT in their courses. The results indicated that the overall rating of support services to the faculty was high. However, the faculty suggested changing: 1) the structure of the workshops to facilitate learning of WebCT, and 2) the quality and timing of the assistance that the P3T3 staff provides.

Introduction

The implementation of educational technology has been closely linked to the evolution of faculty development (Shapiro & Cartwright, 1998). Previous research (Dusick, 1998; Matthew, Parker & Wilkinson, 1998; Quick, 1999) has indicated that training and support are two significant factors in helping faculty to effectively integrate technology into the classroom. A major goal of P3T3: Purdue Program for Preparing Tomorrow's Teachers to use Technology, a PT3 implementation grant project, is to prepare teacher education faculty to teach pre-service teachers in technology-rich environments, modeling approaches that future teachers should use themselves. To achieve this goal, P3T3 provides activities and extended support for faculty members. These include: 1) workshops on various technology topics, 2) help sessions, and 3) one-on-one faculty assistance on technology integration. For more information about P3T3, please visit our website at: http://p3t3.soe.purdue.edu.

WebCT is a web-based course development and management tool that allows faculty to construct and manage online courses, put materials online to supplement existing courses, create online communication environments, and keep track of students' performance electronically. It is the "standard" platform for web-based courses and course support at Purdue University. To help faculty master the tool, P3T3 offers three workshops that provide step-by-step guidance for course design using functions available in WebCT. In addition, the P3T3 staff provides assistance for those who have difficulty when using it.

Study on the P3T3 Project WebCT

This study collected both quantitative and qualitative data. An online survey was conducted to obtain general information about faculty use of WebCT. Twenty-two faculty members from the School of Education participated in the survey. Results showed that 77% of the participants had attended P3T3 workshops on WebCT. All participants incorporated WebCT into their teaching. Most (59%) used WebCT for basic content presentation such as putting course notes, syllabi, and assignments online. Many (41%) posted and organized students' grades and used the quizzes/survey feature. WebCT e-mail (71%) and discussion forums (82%) were among the most popular features. Few faculty members had experimented with the WebCT live chat feature. Among those who attended the workshops, 25% continued to seek help from the P3T3 drop-in help sessions, and 63% had requested one-on-one assistance. Besides the help from P3T3 staff, several faculty members had sought assistance from elsewhere, such as personal help from friends and peers, and help from various centers around the university. Overall, participants rated the services from P3T3 high: 50% great, 25% good, 6% ok, and 19% no opinion.

In-depth interviews were conducted with three faculty members who had attended WebCT workshops and were using WebCT to get more details regarding P3T3 project impact on faculty use of WebCT. In general, faculty members liked WebCT because it helped them better organize course materials for students. All three faculty members mentioned that, because of the features available in WebCT, they could conveniently make all course materials available in one place. Although all three liked WebCT, they thought the interface was not intuitive. Two interviewees found the P3T3 workshops very helpful in getting started with WebCT. However, one felt that they went by too quickly; he recommended they be restructured to accommodate less experienced users. Two faculty members had attended a P3T3 help session as well as requested one-on-one help available during the semester. One commented that the help sessions and the one-on-one assistance were very helpful. He added that he learned more from the personal help sessions than from the workshops. Another faculty member who had also requested help from the P3T3 staff commented that it was somewhat inconvenient to go for help to get answers to minor questions. Since the P3T3 project is not dedicated to WebCT support, the staff does not always know the answers to the questions. Therefore, this faculty member found it was quicker to go to the campus support group that dealt exclusively with WebCT. The one faculty who had never requested help from P3T3 explained that he didn't know much about the assistance available from P3T3 and had received support through the campus center instead.

WebCT is one tool that the P3T3 team supports. This study uncovered both positives and negatives. Overall, P3T3 faculty services are rated highly. However, there are concerns to address. The two major ones are: 1) structuring the WebCT workshops to facilitate faculty learning of the program and 2) providing quality and timely assistance. In brief, the workshops should be more hands-on and learner-centered with mastery of one topic before moving on to the next. Staff assistance should be promptly supplied by knowledgeable personnel.

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Results after two years of a Preparing Teachers for the Digital Age (PT3) Grant on a State University Teacher Preparation Program.

William Barker, Indiana University of Pennsylvania, US
Kurt Dudt, Indiana University of Pennsylvania, US

Introduction Three Pennsylvania state universities (Indiana, Clarion and Edinboro) successfully obtained a 1.73 million PT3 grant. We developed a plan to infuse technology into teacher education programs. We will present the first and second year results of this project for the fall and spring semesters for Indiana University of Pennsylvania faculty, students and course syllabi.

Sample The sample sizes are: 1999 Fall - 20 faculty, 571 students, and 13 course syllabi; 2000 Fall - 9 faculty, 566 students, and 10 course syllabi; 2000 Spring - 29 faculty, 837 students, and 20 course syllabi; and 2001 Spring - 25 faculty, 653 students, and 25 course syllabi.

Areas to be Assessed The areas of activity by pre-service students and faculty to be assessed using surveys include knowledge, attitudes, application, and integration. Knowledge represents what one knows and can do with respect to the use of technology in the classroom. Attitudes indicates how one feels about the use of technology in the college classroom. Application involves the ability to demonstrate the use of technology both in the college classrooms. Finally, integration requires the use various technologies alone and together in achieving the goals of the lesson plan for the college. We also collected a syllabus from most courses. Specific questions included: 1. Operating Systems Management (e.g. Windows, Macs), 2. Word Processing (e.g. Microsoft Word, Word Perfect, Claris), 3. Spread Sheets (e.g. Microsoft Excel), 4. Web Browsers (e.g. Internet Explorer, Netscape) 5. E-mail (e.g. Microsoft Outlook, Netscape, Eudora), 6. E-mail Distribution Lists (e.g. Microsoft Outlook, Eudora), 7. Presentation Software (e.g. PowerPoint, QuickTake), 8. Databases (e.g. Microsoft Access, Clasisworks), 9. Multi-Media Packages (e.g. CD Rom programs), 10. Video Conferencing, 11. Moderated Chat Rooms, 12. Internet in Teaching (e.g. Web CT, Course Info, Blackboard), 13. Digital Camera, 14. Laser Disc Player, 15. Scanner, 16. WWW/Internet Resources, 17. Computer Aided Graphics, 18. Ethical and Legal Issues (e.g. Copyright, Privacy) [2000 Fall and 2001 Spring only], and 19. Social and Human Issues (e.g. Empower Diverse Learners) [2000 Fall and 2001 Spring only].

Demographic Data Collection Demographic data were collected from pre-service teachers and faculty who teach relevant education courses. This included age, sex, year in school, number of credits, overall grade point average, major courses grade point average, socio-economic background, resident status, major, data available at admission to college, and other relevant information.

Instruments We developed Faculty, Student, and Syllabus instruments to assess the nineteen areas. They will be included for review.

Data Collection Baseline survey data for faculty, students, and course syllabi were collected during the initial year of the project (1999 Fall and 2000 Spring). Follow-up data were collected from each cohort during the second year of the project (2000 Fall and 2001 Spring).

Goals, Objectives, and Evaluation Goal Overview: To infuse instructional technology more deeply into the teacher education curriculum in both education core courses and selected majors. Students will be taught technology and it will be modeled for them by faculty teaching in the college of education core curriculum. To evaluate this goal we analyzed survey data for each years' cohorts and over time, i.e. baseline data for the year one cohorts and follow-up data for year two for the same yearly cohorts.

Goal - Objective 1: Train faculty to effectively and appropriately use and teach the key competency skills. This objective was evaluated by basic record keeping of attendance by faculty at workshops.

Goal - Objective 2: Have university faculty model how to teach effectively with technology in education core courses and elementary education/subject area courses. The collection, collation, and analysis of faculty surveys and student surveys for the same courses over time allowed us to evaluate this objective.

Goal - Objective 3: Create assignments within education core and subject area courses based upon the appropriate use of the technology areas. Pre-service teacher and faculty survey sub-scale data were used for this objective.

Goal - Objective 4: Revise course syllabi to reflect and recognize the integration of technology into the curriculum. Analysis of syllabi were used for this objective.

Results A brief summary of results by Objective will be presented.

Objective 1: The number of faculty attending various types of workshops will be presented for each year.

Objective 2: 1999 Fall Baseline Results - A comparison among **faculty and students** suggests that faculty and students are not in agreement with respect to how often technology is demonstrated in courses. For sixteen (16) areas the faculty ratings were higher than the student ratings and in one (1) areas the student ratings were higher. 2000 Fall Follow Up Results - 2000 Fall data when compared to 1999 Fall show that for **faculty,** meaningful decreases (effect sizes of .30 or larger in absolute size) occurred in all areas, whereas for **students,** no meaningful changes occurred. 2000 Spring Baseline Results - A comparison among **faculty and students** suggests that faculty and students are not in agreement with respect to how often technology is demonstrated in courses. For sixteen (16) areas the faculty ratings were higher than the student ratings and in one (1) areas the student ratings were higher. 2001 Spring Follow Up Results - 2000 Spring data when compared to 2001 Spring show that for **faculty,** meaningful increases (effect sizes of .30 or larger in absolute size) occurred in " 6. E-mail Distribution Lists (e.g. Microsoft Outlook, Eudora)" Effect Size (ES) = .31; "11. Moderated Chat Rooms" ES = .85; "12. Internet in Teaching (e.g. Web CT, Course Info, Blackboard)" ES = .43; and "15. Scanner" ES = .34, whereas, meaningful decreases occurred in "10. Video Conferencing" ES = -.39 and "14. Laser Disc Player" ES = -.30. For **students,** meaningful increases occurred in " 4. Web Browsers (e.g. Internet Explorer, Netscape)" ES = .47, " 5. E-mail (e.g. Microsoft Outlook, Netscape, Eudora)" ES = .39, " 7. Presentation Software (e.g. PowerPoint, QuickTake)" ES = .36, and "16. WWW/Internet Resources" ES = .39.

Objective 3: 1999 Fall Baseline Results - A comparison among **faculty and students** suggests that faculty and students are not in agreement with respect to how often assignments based upon appropriate use technology are created in courses. 2000 Fall Follow up Results - 2000 Fall data when compared to 1999 Fall show that for **faculty,** meaningful decreases (effect sizes of .30 or larger in absolute size) occurred in all areas, whereas for **students,** one meaningful increase occurred in " 1. Operating Systems Management (e.g. Windows, Macs)" ES = .30. 2000 Baseline Results - A comparison among **faculty and students** suggests that faculty and students are not in agreement with respect to how often assignments based upon appropriate use technology are created in courses. For sixteen (16) areas the faculty ratings were higher than the student ratings and in one (1) areas the student ratings were higher. 2001 Spring Follow up Results - 2001 Spring data when compared to 2000 Spring show that for **faculty,** meaningful increases (effect sizes of .30 or larger in absolute size) occurred in" 6. E-mail Distribution Lists (e.g. Microsoft Outlook, Eudora)" ES = .48, "11. Moderated Chat Rooms" ES = .85, and "17. Computer Aided Graphics" ES = .35, whereas, meaningful decreases occurred in " 2. Word Processing (e.g. Microsoft Word, Word Perfect, Claris)" ES = -.40, " 8. Databases (e.g. Microsoft Access, Clasisworks)" ES = -.54, and "14. Laser Disc Player" ES = -.30. For **students,** meaningful increase occurred in " 2. Word Processing (e.g. Microsoft Word, Word Perfect, Claris)" ES = .32, " 4. Web Browsers (e.g. Internet Explorer, Netscape)" ES = .45, " 5. E-mail (e.g. Microsoft Outlook, Netscape, Eudora)" ES = .33, " 7. Presentation Software (e.g. PowerPoint, QuickTake)" ES = .35, and "16. WWW/Internet Resources" ES = .46.

Objective 4 - 1999 Fall Baseline Results - A comparison among **faculty, students, and the syllabus** suggests that faculty and students are not in agreement with respect to what is in course syllabi. 2000 Fall Follow up Results - 2000 Fall data when compared to 1999 Fall show that for **faculty,** meaningful increases (effect sizes of .30 or larger in absolute size) occurred in " 4. Web Browsers (e.g. Internet Explorer, Netscape)" ES = .40 with all other showing decreases except for " 1. Operating Systems Management (e.g. Windows, Macs)". For **students** meaningful increases occurred in " 1. Operating Systems Management (e.g. Windows, Macs)" ES = .36, " 2. Word Processing (e.g. Microsoft Word, Word Perfect, Claris)" ES = .36, " 4. Web Browsers (e.g. Internet Explorer, Netscape)" ES = .39, and "16. WWW/Internet Resources" ES = .37. 2000 Spring Baseline Results - A comparison among **faculty, students, and the syllabus** suggests that faculty and students are not in agreement with respect to what is in course syllabi. For fourteen (14) areas the faculty percentage was equal to or higher than the student percentage and in three (3) areas the student percentage was higher. For fourteen (14) areas the syllabus ratings were equal to or lower than the faculty or student ratings. 2001 Spring Follow up Results - 2001 Spring data when compared to 2000 Spring show that in the **syllabus,** meaningful increases (effect sizes of .30 or larger in absolute size) occurred in " 1. Operating Systems Management (e.g. Windows, Macs)" ES = .49, " 2. Word Processing (e.g. Microsoft Word, Word Perfect, Claris)" ES = 1.60, " 4. Web Browsers (e.g. Internet Explorer, Netscape)" ES = .89, " 5. E-mail (e.g. Microsoft Outlook, Netscape, Eudora)" ES = .98, " 7. Presentation Software (e.g. PowerPoint, QuickTake)" ES = .49, and "16. WWW/Internet Resources" ES = .35.

Discussion All of the above will be discussed and various theories put forward to explain why things happened this way.

Assessing of the ISTE NETS for Teachers

Helen C. Barrett
School of Education
University of Alaska Anchorage
United States
helen.barrett@uaa.alaska.edu

Abstract: Learn about performance-based strategies for demonstrating achievement of the ISTE NETS for Teachers, including web-based basic skills assessments, performance tasks, electronic portfolios, and observation tools. Preview a new publication from ISTE that provides a Framework for Assessing the NETS-T.

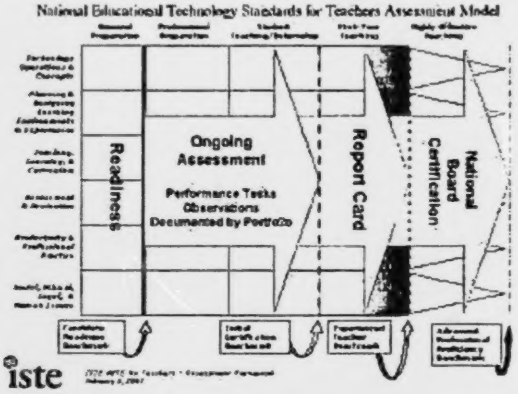
Background

This paper will cover the process that has been conducted to develop an assessment system covering the ISTE NETS for Teachers. Following that description, the Assessment Component of ISTE's 2001 PT3 Knowledge Development Catalyst Grant will be described, entitled the STATE project (Supporting Technology and Assessment in Teacher Education).

The NETS for Teachers Project held a focused Assessment Writing Meeting in Tempe, AZ in December, 2000. Through an exhaustive selection process, an elite group of educators from across the nation were selected to thoughtfully examine the issues of assessment and technology. The contributing team members included teachers, technology coordinators, administrators, teacher educations, college of education administrators, and professionals from the assessment community. Four subcommittees were formed, each of which worked on different strategies to assess the National Educational Technology Standards for Teachers. The areas of focus for each subcommittee and their tasks were:

- -General Preparation – Listed specifications for the assessments meeting the tasks described in the profile;
- -Performance Assessment Tasks and Rubrics – Developed a meta-rubric to address the Professional Preparation and Student Teaching/Internship Profiles
- -Electronic Portfolio – Outlined the process and content for development of an electronic portfolio for the Professional Preparation and Student Teaching/Internship Profiles with links to the First Year Teacher Profile, and
- -Observation and survey Tools - Identified a series of options to address the Student Teaching/Internship and First Teacher Profiles.

The outcomes of the Assessment Writing Meeting contribute to the basis of this presentation. Additional specific products and ideas from the meeting will be found in later ISTE publications. ISTE has based the NETS for Teachers Assessment Model on NCATE's Specialty Areas Studies Board (February, 2000) Principles For Performance-Based Assessment Systems in Professional Education Programs. The NETS for Teachers project used the following diagram as a framework for the Assessment System to address the attainment of these standards.



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The rows going across the chart represent the six individual standards, the columns represent the four profiles identified as phases in a teacher preparation program, and the boxes in the chart represent individual standards within each profile. At least three benchmarks were identified for which assessments were considered:

- **Candidate Readiness Benchmark**: at the end of the General Preparation, or at entry into the Teacher Education Program (the "solid" line). At that point, the teacher education program needs to determine the readiness of the teacher candidate to have the technology skills to be successful in both Methods and Student Teaching.
- **Initial Certification Benchmark**: at the end of the Student Teaching/Internship and graduation from a Teacher Preparation Program (the dashed line). At that point, the program needs to determine the readiness of the *graduates* from a teacher education program to be successful using technology in the classroom.
- **Experienced Teacher Benchmark**: at the end of the First Year of Teaching, when Schools of Education may need to prepare a USDOE Report Card on their graduates (Higher Education Act. Title II, Section 207) (the dotted line). At that point, ISTE defines the professional proficiency with technology of all experienced teachers.
- **Advanced Professional Proficiency Benchmark**: In the future, ISTE will be working with the National Board for Professional Teaching Standards to develop an advanced certificate to recognize those highly effective teachers who integrate technology into their classrooms and who provide models for others to emulate.

PT3 Knowledge Development Catalyst Grant.

ISTE's PT3 Catalyst grant will address the first two benchmarks, because they are within the direct control of teacher education programs and consistent with PT3 funding. The last two benchmarks will be addressed at a later time. The STATE project will use both traditional hands-on workshops and distance learning strategies to deliver the training on technology-supported assessment strategies. Dr. Helen Barrett has already provided traditional, face-to-face workshops on Electronic Portfolio Development for PT3 grantees at Montana State University-Northern, Iowa State University, University of Central Florida, and National-Louis University. She has also provided distance-delivered workshops for PT3 grantees Clarion University and Indiana University of Pennsylvania, using a combination of video tape, CD-ROM, live CUSeeMe videoconferencing, and telephone conferencing.

Specifications for the assessments of the General Preparation Profile (1st Profile)

Colleges of Education are at a crossroads in determining how to assess prospective teachers' knowledge and skills in use of technology prior to admission into the core program. Universities are asking for a set of tools to select from to assist them in determining whether or not a student has sufficient technology skills and knowledge to enter into the teacher preparation program. This assessment should determine if a prospective teacher has the prerequisite skills to participate in and eventually facilitate learning activities for students that focus on the teaching and learning with technology. It is not expected that there is one solution to assessing this profile. Rather, this group examined both commercial and non-commercial options and described ideal options that currently do not exist. In addition to the quality factor, important issues the group considered were scalability, economics, and equity of student access. The specifications developed with accompanying examples and narrative should provide guidance to Colleges of Education in making a decision that fits their unique circumstances.

Through a partnership with several assessment developers, this project will partially cover the development of an on-line assessment that will be made available to SCDEs at a no cost (for students taking a "practice test") or at very nominal cost once the assessment is validated, to provide a much-needed tool to assist with determining readiness for using technology in Teacher Education programs, as well as access to a system for remediation of basic technology skills.

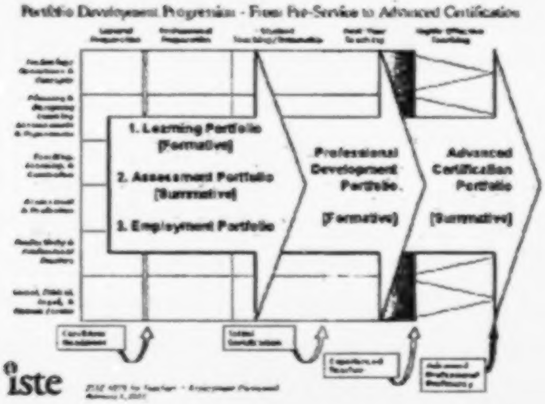
Performance Assessment Tasks and Rubrics to address the 2nd and 3rd Profiles

Another group in the Writing Team Meeting addressed performance assessments that may be used in an exam setting, or as part of the on-going assessment in a course and/or at the end of a program of study that may form the contents/artifacts for a portfolio or as part of an overall assessment of prospective teachers' competence in meeting the standards. The group took into account the variety of types of teacher preparation programs and the various settings in which they occur. This writing team developed a sample rubric that could be used to assess the attainment of these standards. A variety of performance assessments need to be gathered as part of this project, and will be published by ISTE in an online Clearinghouse on Electronic Portfolio and Performance Assessment.

The NETS Leadership Team has developed preliminary rubrics to assess the NETS for Teachers. These standards will be shared with the group at the conference, to get a first round of feedback on the content. There will also be an opportunity to give feedback online through the ISTE NETS website.

Electronic Portfolios and rubrics for 2nd and 3rd Profiles with links to the 4th Profile

The task of that Writing Team was to define the purpose, audience, process, and various development strategies for using technology to maintain authentic samples of a prospective teacher's work, demonstrating achievement of not only the ISTE NETS-T Standards, but also the School of Education's teaching standards and any other standards that the student is responsible for demonstrating. The purpose of the electronic portfolio is to demonstrate the prospective teacher's growth and change over time, and will provide the ideal container to organize and document the various performance assessments that demonstrate achievement of the standards. This team described development strategies using a variety of software tools; possible contents of the portfolio and suggested table of contents; strategies for assessing these portfolios; strategies for scalability, or how to manage the assessment process with large numbers of students in a Teacher Education program. Suggestions were also made on how to extend the use of the portfolio that is developed at the end of the 3rd Profile, into the first year of teaching as a tool for professional development throughout the teacher's professional career, possibly preparing for the National Board for the Professional Teaching Standards.



The diagram above represents an adaptation of the Assessment Model to address the progression of the teacher candidate's electronic portfolio through the stages of the Teacher Education program into the classroom teaching experience and on to advanced certification, possibly through the National Board for Professional Teaching Standards. Students are encouraged to become a "digital packrat" from the beginning of the program. A student will create three types of portfolios. At first, the portfolio is a collection of products that the teacher candidate has produced in their coursework (formative). By the end of the Student Teaching program, the portfolio could be used for more summative assessment, to demonstrate achievement of any group of standards (i.e., NETS, INTASC). The teacher candidate can transform their portfolio into the format and content suitable to facilitate their seeking employment. Once in the teaching profession, the portfolio becomes a learning tool again, where teachers can document their work and samples of their own students' work. During the course of a teacher's career, the portfolio can be used for performance assessment, based on appropriate teaching standards. Finally, after years of classroom experience, the collection could be transformed back into a summative portfolio for National Board Certification.

The Electronic Portfolio Development team at the ISTE NETS Assessment Meeting developed a list of artifacts that could be included in an electronic portfolio to demonstrate achievement of the ISTE NETS for Teachers. In addition to artifacts that a teacher candidate may choose, the team also identified six required entries for the portfolio that demonstrate the appropriate standards. The writing team also adapted a generic "meta-rubric" to assess the electronic portfolio designed through this process.

Several major activities under the second goal of this project will be to provide training and technical assistance to SCDEs on the implementation of electronic portfolios to document the professional growth of teacher candidates, and will begin with training teacher education faculty members to create their own electronic teaching portfolios. The facilitator of this writing team, Dr. Helen Barrett, co-PI of this project, has done innovative work on electronic portfolios, and is a nationally recognized leader in this area. As Assessment Coordinator for the NETS project, she will coordinate the development and dissemination activities provided to SCDEs under this goal.

Observation and survey tools to address the 3rd and 4th Profiles:

Once prospective teachers move into their student teaching/internship experience, there is a need for classroom observation tools to assess appropriate uses of technology in the curriculum. Not only will this work assist with the assessment of prospective teachers by teacher education faculty and master/cooperating teachers, but also the instruments will potentially assist administrators as they assess the appropriate use of technology in the classroom. In addition to observational instruments, the use of survey information collected from students, parents, and other stakeholders, provides valuable data for assessing the impact of technology to support student learning. The writing team developed a series of observational assessment protocols that need to be field tested and validated before they can be made be available. This project will provide support for further refinement of the observational assessment protocols that were developed, so that they can be more widely disseminated to SCDEs. Dr, Doug Daniel, with ISTE's Assessment and Evaluation Department, will coordinate these efforts.

Preservice and Inservice Teachers Collaborating with Technology In K-8 Multicultural Classrooms: Year 2

E. Carol Beckett
Elementary Education
Arizona State University West
USA
ebeckett@asu.edu

Keith Wetzel
Elementary Education
Arizona State University West
USA
k.wetzel@asu.edu

Inés Márquez Chisholm
Elementary Education
Arizona State University West
USA
ines@asu.edu

Ron Zambo
Elementary Education
Arizona State University West
USA
ron.zambo@asu.edu

Helen Padgett
Project Manager, PT3 Grant
Arizona State University West
USA
helen.padgett@asu.edu

Mia Kim Williams
Instructor, PT3 Grant
Arizona State University West
USA
mia.williams@asu.edu

Mary Odom
Instructor, PT3 Grant
Arizona State University West
USA
mary.odom@asu.edu

Abstract: While computers and other technology have become more ubiquitous in public school classrooms, teachers who have graduated from ASU west's College of Education have reported feeling a lack of confidence in their ability to use the technology to reach lesson objectives. Our research has revealed that although students were experiencing models of technology integration in their teacher education courses, they were not experiencing exemplary models of technology use with children in the classrooms in local schools where they were assigned for field experience. Through a federal grant, we have been addressing this issue. This study reports on our efforts to address lack of exemplary practica sites – although a program developed in collaboration with school district partners. Together, the mentor teacher and student intern attended workshops, learned technology applications, and designed curricular units that incorporate the technology. Our evaluation of the Practicum Plus revealed that the program was effective in meeting the professional development goals. The preservice and inservice teacher pairs integrated technology into instructional Units of Practice (UOP) for culturally and linguistically diverse students in K-8 classrooms. Although the Practicum Plus program was found to be effective, the researchers also noted difficulties encountered in implementing the program on a broader scale.

Introduction

Preparing Tomorrow's Teachers to Use Technology (PT^3) staff, Arizona Classroom of Tomorrow Today (AZCOTT) teachers and education faculty at Arizona State University West are completing the second year of the Practicum Plus Program. The program provides technology professional development to K-8 preservice teachers and their mentor teachers. Preservice teachers are recruited from classes in the College of Education; mentor teachers are recruited from those local school districts in which preservice teachers complete their required internship experiences. The Practicum Plus Program prepares them to integrate appropriate technology into grade level curriculum. The inservice and preservice teachers experience the instructional applications of information technologies and learn to develop and implement an instructional Unit of Practice (UOP). Participants have opportunities to explore the integration of technology with multicultural and English as a second language instructional strategies so that they may provide maximized learning experiences which accommodate the rich cultural and linguistic diversity found in their classrooms.

The Practicum Plus Program, made possible through a PT^3 Grant, consists of collaborative, hands-on training in technology integration led by PT^3 staff, AZCOTT teachers and faculty in the Arizona State University West College of Education. The UOP is a framework for organizing content and embedding technology into teachers' classroom instruction. Components of the UOP bring into focus seven specific elements of instruction (i.e., Standards, Invitation, Situations, Interactions, Tasks, Tools, and Assessment) that align curriculum with developmentally appropriate standards across grade levels and content. Inclusion of State and national academic standards were a requisite part of the participants' UOPs. The *ESL Standards for Pre-K-12 Students* (TESOL, 1997) provides the framework for language activities that promote English language acquisition. The UOPs also incorporate Chisholm's (1998) six elements for technology integration in multicultural classrooms.

Diverse Populations and Technology

In 1998, 40 percent of the total school population in the United States were minorities (National Center for Education Statistics, 2000). By 2000 immigrants accounted for 8.6 million school-age children in our schools (Camarota, 2001). The number of school age children who spoke a language other than English and who had difficulty speaking English rose from 1.3 million in 1979 to to 2.4 million in 1995 (Federal Interagency Forum on Child and Family Statistics, 2000). American schools also serve children from a range of socio-economic backgrounds. In 1999, one in six children lived below the poverty line (Children's Defense Fund, 2000). Given that by 2006, half of all jobs in the United States will be in information technology or will require information technology skills (Carvin, 2000), it is imperative that this diversity of students have technology access and opportunities to use information technologies for authentic purposes involving problem solving and higher level thinking.

However, racial, ethnic and economic parameters determine children's access to technology. Households earning $50,000 to $75,000 are twice as likely to own a computer than those earning $10,000 to $14,000 (Nickell, 2001). Whereas 52 percent of White children use a computer at home, eighteen percent of Hispanic children do so (ERIC Clearinghouse on Urban Education, 2001). The proportion of rural Native American households with access to computers is nearly half that of the national average (Luening, 2000). Further, children from the poorest households and living with adults with the least schooling are least likely to have Internet access at home (Carvin, 2000, The Children's Partnership, 2000).

Though the number of computers at schools is increasing and school connectivity is rising, school access remains inequitable. Those with the largest concentration of children in poverty have a 9:1 ratio of students to computers as compared to the national school ratio of 5:1 (Cattagni & Westat, 2001). Sixty-eight percent of Hispanic children use a computer at school as compared to eighty-four percent of White students (ERIC Clearinghouse on Urban Education, 2001). Half of schools in the poorest communities report that students use the Internet (The Children's Partnership, 2001). And teachers in more affluent schools are more likely than those in the poorest schools to assign computer-related and Internet work to their students (Rowand, 2000).

Research on English language learners (ELLs) suggests that integration of technology can augment positive self-concepts, promote English and native language proficiency, enhance motivation, stimulate positive attitudes towards learning, improve academic achievement, and foster higher level thinking skills (Diaz, 1984; Knox & Anderson-Inman, 2001; Meskill, Mossop & Bates, 1998; Soska, 1994.) Technology, in conjunction with the teachers' goals, purposes and epistemologies, allows students to take control of their own meaning-making and creates socially-mediated literacy activities that foster the development of language and thinking (Meskill, Mossop & Bates, 1998). When ELL students use technology in small groups, their verbal interactions enhance interpersonal and communication skills (Steinberg, 1992). Technology provides opportunities for cooperative learning which not only increase instructional effectiveness and efficiency, but also promote positive social interactions (Johnson, Johnson, & Stanne, 1986; Schlechter, 1990)

Technology-based activities can transform the classroom into a rich learning environment and prepare minority children for the technological world. While information technology has a potentially positive effect on ELLs, its presence in our schools is not sufficient. Teachers are central to the creation of a computer-supported learning environment that is learner-centered and motivating. Effective use of technology requires new teaching models where technology becomes an integral component. ELLs, often among the disenfranchised and the computer-destitute, need teachers who can effectively integrate information technologies and the Internet into the learning process. Withouot such teachers these children's exposure to technology remains limited and inequitable.

The Study

The investigators looked for answers to the following research questions. Question 1) How effective was the Practicum Plus program in preparing mentor teachers and their university practicum students to create a curriculum unit of practice in their K-8 classrooms? Question 2) How did mentor teachers and practicum students use the cohort listserve to support the community of learners? Question 3) To what extent have faculty participating in the Plus program learned to use and integrate technology in their subject area curricula and model the use of technology in their classes?

Method

Subjects

Participants (*43*) consisted of two groups, 19 university students who were in the semester prior to student teaching (12) or completing their professional education preparation program as student teachers (7); and 24 inservice teachers, 19 of which were supervising the participating interns/student teachers and 5 working on their own. The majority of students were in Elementary Education programs including Elementary, Bilingual, ESL, and Early Childhood Education.

Summer/Fall 2001

Emphasis of Course Section	Total Number of K-12 Teacher Participants
Elementary	31
ESL	7
Bilingual	5

As a result of suggestions from year one, recruitment for PLUS courses in year two included advertising earlier in the semester, presenting in student courses and at school faculty meetings, and early notification of PLUS course dates and locations.

Technology Questionnaire

A 42-item, Likert-scale questionnaire, which assessed teachers' beliefs and self-reported skill levels related to technology use and technology integration, was administered pre and post. (For a full description of the questionnaire see Zambo, Buss, & Wetzel; 2001) The pretest was administered the first day of the workshops in the summer of 2001. The posttest was administered on the last day of the workshops in November/December of 2001.

Questionnaire items were developed to provide coherent sets, which formed subscales that could be more readily analyzed. Subscales completed by both inservice and preservice teachers were: 1) general confidence in using technology; 2) confidence in computer setup and general operation; 3) confidence in using non-computer equipment; 4) confidence with software selection and use; 5) confidence in addressing students with special needs; 6) confidence in developing lessons with technology; 7) beliefs about appropriate use of computers; 8) beliefs that computers are integral to classroom instruction; 9) beliefs about the cost effectiveness of computer integration; 10) knowledge about the technology standards; and 11) knowledge and beliefs about UOP.

Cronbach's alpha for the total test was .92. Individual subscale alphas ranged from .90 to .49 with a median of .79. The test overall was reliable. Mean pretest subscale scores for all subject combined ranged from 2.76 to 4.70 on a scale from 1 to 6 with 6 being the most positive. Mean posttest scores were generally higher and ranged from 3.46 to 5.28.

Repeat measures analysis revealed scores on 8 of the 11 subscales (1-6, 10-11) increased significantly ($p < .01$) from initial testing, prior to the workshop, to testing at the end of the semester. All eight subscales with significant gains were those related to confidence in, or knowledge of, various factors. This is a strong indication that the workshops were effective in increasing teachers' confidence and skills in those targeted areas.

The subscales that did NOT show significant increases were those related to beliefs (numbers 7, 8, & 9 from above). This is an indication that the students and teacher who participated in the workshops came with a predisposition in favor of educational technology. The workshops did not increase these factors that were already at high levels at the time of the pretest.

One-way Anova detected between-subjects differences for group (preservice teachers vs. inservice teachers) on one pretest subscale and on one different posttest subscale. On the pretest, preservice teachers scored higher than inservice teachers on the belief that computers were integral to instruction with means of 5.11 and 4.38, respectively [$F(1, 42) = 8.53, p < .006$]. This difference had dissipated and was not significant by the time of the posttest with means of 5.04 and 4.72 for preservice and inservice teachers.

On the posttest, preservice teachers were more confident in developing technology lessons than were inservice teachers with means of 5.12 and 4.50 respectively [$F(1, 42) = 5.86, p < .020$]. This difference was not significant on the pretest with means of 3.76 and 3.71 respectively. Although the confidence had increased for both groups, the increase was larger of the preservice teachers. This may be attributed to the fact that the majority of preservice teachers were also taking methods courses during the Fall semester, concurrent with workshop activities. Lesson planning is a major component of methods courses and most likely confounded the effects of the workshop.

Discussion Board

The five cohorts of the PLUS program participated in on-line discussions through an electronic course using Blackboard. The purpose of the discussion board was threefold:

- To provide the participants with skills of electronic communication,
- To encourage collegial sharing, and
- To create a community of learners who could interact beyond the time and place of the actual workshops.

Participants consistently used the discussion board to share teaching ideas and resources, for reflection and discussion of activities that occurred during the PLUS course time, to stay abreast of current events that had impact on their classrooms, to share information about websites, information about how to accomplish assignments, and to support each other on how to implement new information and technology applications into their classrooms.

Unit Of Practice

A rubric was used to evaluate and identify proficiency levels for each category of the UOP: Standards, Invitation, Situations, Interactions, Tasks, Tools, and Assessment. Each was evaluated on a scale of Accomplished, Developing, or Emerging (http://www/asu/pt[3]).

Results from analysis of the Unit of Practice generally agreed with the results from year 1. Participant's strengths were in the Invitations, Tasks, Interactions, and Situations components. Additionally there was an increase in percentage of participants achieving the *Accomplished* level in the standards components including the TESOL standards for English acquisition by bilingual and ESL teams.

Faculty Technology Use

During the past two years 13 tenured and tenure track ASUW faculty participated in the PLUS program. The faculty were surveyed to determine the extent to which they have modeled the use of technology in their classes with an open-ended survey item: Write a brief description of how you are using technology in your teaching to help our university preservice teachers incorporate technology in their work. Data was categorized and tabulated in these categories: technology for course structure, use of web resources, and student assignments using technology.

70% of the faculty reported using technology in their teaching. Uses clustered around five areas: faculty using technology to present information to the class such as semantic nets using Inspiration, PowerPoint or HyperStudio (67%); threaded student on-line discussions (44%); Blackboard assignments and discussion areas (22%); incorporation of web resources for readings, simulations and links to National Educational Technology Standards for Students and Teachers (http://cnets.iste.org) and State academic standards (22%); structured lessons requiring students to use technology in and out of class for graphing of data, multimedial book construction, digital portfolio, etc. (56%).

Discussion

In this model of teacher preparation, the preservice and inservice teachers participate in technology integration workshops together during the summer. In the semester following the training, the preservice student helps to implement the technology-rich unit created in the workshop. The researchers found that the mentor teachers and the preservice students appreciated the opportunity to work together prior to the practicum experience. In addition to the trust established between the pair, they also increased their knowledge of hardware and software and confidence in their ability to design and implement technology in the curriculum.

In comparison to the previous year, the units of practice created during the training were better designed and more complete. Further they included the TESOL standards which helped to meet the needs of second language learners in our urban schools.

Finally, the faculty who participated in the training also adapted many of the technology rich activities for their courses. Faculty use of technology was not the primary purpose of the Plus program, but the benefits for faculty were evident. For example, many of the faculty used the Unit of Practice format for lesson planning in their courses. Thus, students in their courses incorporated technology in each of the assignments involving lesson planning.

Although this model of professional development was found to be effective, the researchers noted that the implementation of the Plus program was difficult. For example, it was not easy to locate the mentor teacher to match with the student in the early summer, months before the practicum semester. Typically, the field placement office finalizes the matches just before the semester begins. Consequently, we recommend that universities contemplating the adoption of similar professional development models, consider this difficulty. If the problems involved with creating the mentor and student teacher pairs can be resolved, then this program model is promising.

Despite the extended efforts to advertise and recruit participants for the PLUS course, year two enrollment numbers were lower than year one. Several factors seemed to affect enrollment:

- Repeat participation by mentor teachers was low without financial or graduate credit incentives for teachers attending the course a second year while working with a new preservice teacher.
- Unstable school district environments, resulting from negotiations of teacher contracts and salary issues, hindered the mentor teachers' enthusiasm to participate in the program.
- Changes in district or school administration, teacher requested school changes, and new school openings hindered mentor teacher recruitment and placement with preservice teacher because location and/or grade level of teacher was uncertain.
- Students experienced conflicts with the PLUS course schedule and required program courses that they needed to complete during summer session.
- Mentor teachers who were required to attend district training or teach district summer school were also not able to attend due to scheduling conflicts.
- The preservice /mentor teacher pair was not established until after the PLUS courses had begun. Mentor and/or preservice teachers who might have attended, did not because they were uncertain if their counter part would be interested, or in the case of the mentor teacher, if they would actually receive a preservice teacher.

Year 2 results compared very favorably to year 1 in most aspects. It is apparent from the results, there was an overall increase in UOP development as regards the inclusion of appropriate standards and in technology integration and applications by all participants. Preservice teachers and mentor teachers used the discussion board effectively as a communication tool. Additionally, University faculty reported greater emphasis on inclusion of technology in their own teaching, providing further modeling of technology in classrooms. The only aspect of the workshops that did not compare favorably to year 1 was in recruitment of participants. This issue has been evaluated and is being addressed for year 3 planning. Plans include relocating the workshops sites to a central location at the ASUW campus, and offering a more flexible schedule in order to accommodate schedules of preservice and mentor teacher routines and responsibilities.

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Using Immersive 360 Degree Images to Enhance Active Involvement and Comprehension in the Learning Process

Peggy Benton (Peggyb@sfsu.edu), Mercedes del Rosario (merce7@sfsu.edu)
and Yen-Ling Shen (Yshen@sfsu.edu)

Teaching with Technology PT3 Grant, Instructional Technologies Department
San Francisco State University
United States

Abstract: The purpose of this paper is to introduce three types of panoramic or 360° by 360° immersive images as a powerful, active learning tool to enhance understanding in a wide array of curriculum initiatives. The underlying principles of learner control and active engagement, plus the power of contextual cues immersed in an entire scene will be demonstrated. Participants will experience the learning potential of this technology by visiting and exploring an entire context through this medium. The process of creating and using these images for use in the classroom and web-based learning activities is described. Curriculum can be augmented by re-purposing available immersive images integrated into lessons. Examples showing the use of these images in standards-aligned science and social studies integrated thematic lessons will be presented.

Introduction

Computer technology offers the capability of presenting text in combination with photos, illustrations, charts, graphs, audio, video and animated representations to enrich comprehension. In addition to still and animated images, now 360-degree panoramic images can be presented on CD-ROM or the web. In a 360-degree format, students can explore an entire virtual environment as if they were at the actual site. The term for these images is *immersive*. Learners are in control and can move about at will within rooms, around historical monuments and landmarks using the mouse or other mouse emulators such as a tablet or track ball. The 360-degree panoramic images provide learners with rich contextual and relational cues. They can see and explore such wonders as the Great Wall of China or take a virtual trip to the Grand Canyon and study striations in the rock formations, or they can freely roam the virtual White House.

Teachers want their students to be able to experience these environments in a meaningful, constructive way, to gather and evaluate relevant information. Immersive images offer this opportunity. Teachers report that students become more interested in academic content after a real or virtual field trip that brings the subject matter to life and gives them a lifelike experience. Since most students have limited opportunity to visit important sites relevant to their lessons, immersive images fill an important need.

Originally, the term *virtual reality* (VR) was used to describe computer presentation of digital still images in a 360° panorama format. Typical virtual reality software allows users to develop their own virtual environments by "stitching together" a number of flat images in such a way that the computer can present them as a seamless 360 degree panoramic scenes or environments. These images are an improvement over "flat" digital still photographs. They provide more information in one image; thus the learner can focus on particular selected areas to explore.

A second type of immersive technology, called 360 One™, from Kaidan and EyeSee360 Inc (www.Kaidan.com), makes creating the 360° panoramic image easier. Only a single camera shot is required so there is no stitching together of flat images. Using a special parabolic lens attachment, digital camera and software, this optical system captures a complete 360° panoramic image. The resulting image is a complete 360° horizontal panorama with a 100° vertical field-of-view (50° above and 50° below the horizon). 360° panoramas with 100° vertical field-of-view is sufficient to see all of a scene except the floor and ceiling.

A third approach, even more comprehensive than the 360° by 100° panorama, is the spherical 360° by 360° immersive image. In this virtual environment, students can have a realistic visit that immerses them in the photographed scene and allows them to move about in the entire space. They can navigate in any direction, up-down, left-right, close and distant, along either the vertical or the horizontal plane and anywhere in between. Therefore, on a virtual visit to the Capitol Rotunda students can see the ceiling, the floor, the architecture and all of the paintings on the walls. Although the images are mere stills, students move around freely inside visual space that seems identical to video. They are fully immersed in the environment.

Development and Use of 360° by 360° Images

For educators, 360° by 360° technology offers maximum field of view within a single immersive image. Many learning environments have important information above and below the typical horizon. Now the full scene can be documented and presented. These spatial arenas are easy to use and navigate. Using such images requires active involvement by the student in order to explore, find, and zoom into the important visual content. Because they are made up of two standard JPEG images, immersive images are low memory (50 to 400 kilobytes) and faster to serve from the Web or use in presentations. These 360° by 360° immersive images are relatively easy to create and have been photographed and assembled by educators for the classroom as well as professional photographers for commercial uses.

Several types of virtual reality software support the development of 360° by 360° still images, usually by overlapping flat stills seaming them together. A newer technology has been developed by Internet Pictures (www.ipix.com) which allows the user to create 360° by 360° still images by combining two 180° digital still photographs. They can be used alone or in combination with other digital media such as audio or video. With the same amount of training required to use the other virtual reality development programs, teachers and students can develop this type of content. They take the two 180° digital still photographs and seam them together to create the 360° by 360° immersive sphere using iPIX software.

Creating the 360° by 360° image involves first taking two 180° photographs of the exact halves of the scene that will become the immersive image. A 180° fisheye lens on a digital camera is used to capture each hemisphere. A tripod with a special rotator cuff is used to control the exact angle of rotation of the camera to facilitate photographing the two halves precisely. The user simply takes the first 180° image then rotates the camera exactly 180° around to capture the other half of the scene. Nikon has developed a 185° fisheye lens that allows the user a little (ten degree) overlap at the seams so that when the halves are assembled in the computer, adjustments can be made for the best fit at the seams. The second part of the process is downloading the two 180° images to the computer to bring the images together. At this point any imperfections need to be removed with image editing software such as PhotoShop, Photo Elements or Paintbrush. The final step consists of bringing the two hemispheres together in a 360° by 360° spherical immersive scene. iPIX Wizard software is used to align the edges of the two halves, seam them together and remove or compensate for the minor distortion that occurs in this type of spherical image. QuickTime VR and an iPIX plug-in support the showing of these images on Macintosh and PC Platforms. The resulting immersive image can be viewed in any direction by moving a cursor inside the image or using the navigation bar.

Curriculum Applications

When immersive images are used as part of a curriculum they generate interest and provide a simulated experience of "actual reality." Students are actively engaged researchers. We use teacher generated and professionally developed 360° immersive images. We assemble the lesson components, including text, images and links within a web page, or embedded in a slide show program such as *PowerPoint*. An inquiry-based approach to learning sets the context and provides the initiative. The lesson begins by asking a good guiding question such as: "What are threats to independence?" As part of the lesson, students travel to distant or inaccessible places and explore the situation as a 360° virtual scene. They achieve a new awareness for the actual events, the locations, the times, and how they fit together. Simultaneously, they gather relevant information for the development of their projects. Curriculum examples showing the use of these images in standards-aligned science and social studies lessons will be presented and disseminated on our web site at www.sfsu.edu/~teachers.

Preparing Teachers to use Modeling and Visualization in Science and Mathematics

Lisa Bievenue, NCSA, University of Illinois, US
Sharon Derry, University of Wisconsin - Madison, US
Marcia Linn, University of California - Berkeley, US
Mary Ellen Verona, Maryland Virtual High School, US

This panel will report on the Workshop to Integrate Computer-based Modeling and Scientific Visualization into K-12 Teacher Education Programs (October, 2000). The National Science Foundation and the Department of Education's Preparing Tomorrow's Teachers to Use Technology (PT3) program co-funded this national meeting of educational researchers, teacher educators, teachers, and scientists to research and develop sustainable strategies to integrate computational modeling and scientific visualization within science and math teacher preparation programs nationwide.

Relation to National Technology and Science Education Standards

Modeling and visualization tools support several areas of the NETS technology standards, especially the sections on technology research tools and technology problem-solving and decision-making tools. Students can use the tools presented in this workshop to process data and report results, and to solve problems and make informed decisions. These tools also support the science curriculum standards, including using technology for scientific inquiry, especially analyzing alternative explanations and models. The AAAS Benchmark science standards also indicate the need for computer-based modeling. The benchmark common themes emphasize connections between seemingly disparate science content. In using and creating computer models, student attention can be focused on similar structures and behavior. For example, a predator prey interaction model and a physical spring model share the oscillation structure. Disruption and resumption of equilibrium can be found in both biological and earth systems. Assimilating an understanding of such structure and behavior leads to acquisition of the schemas of science content which have been shown to distinguish experts from novices. (Chandler, P. & Sweller, J. 1991. Cognitive load theory and the format of instruction, Cognition and Instruction, 8, 293-332.)

Outline of Panel

The Panelists will report on the following goals of the workshop:

- defining the needs and uses of computer-based modeling, scientific visualization tools, and computational methods in science education, and identifying the major barriers to their integration into classroom practice;
- examining and developing strategies for overcoming known barriers to transfer of advanced technology into school environments, including schools of education;
- identifying promising methods of integration into teacher education programs, especially addressing pedagogic models (scaffolding, student inquiry, assessment), professional development opportunities for faculty and strategies for providing faculty with time necessary to restructure courses;
- identifying how national partners can begin to build an infrastructure of technology and knowledge transfer to support those methods of integration; and
- establishing collaborative research relationships among teacher educators, K-12 teachers, scientists, learning scientists, and computational scientists to learn how these tools and methods can best be integrated into teacher education programs.

Qualifications of Presenters

The panelists are co-chairs of the Workshop to Integrate Computer-based Modeling and Scientific Visualization into K-12 Teacher Education Programs.

Lisa Bievenue is the K-12 lead for the EOT-PACI (Education, Outreach, and Training Partnership for Advanced Computational Infrastructure) and Education Program Coordinator at NCSA (National Center for Supercomputing Applications). Her current research interests include systemic professional development programs to support the use of technology in the classroom, the development of technology tools to support constructivist learning, and web-based courses to support engaged and inquiry-based learning.

Sharon Derry is Professor of Educational Psychology at the University of Wisconsin-Madison. She graduated from the University of Illinois at Urbana-Champaign in 1982, receiving her PhD in Educational Psychology with specialties in both cognition and instruction and quantitative/evaluative methods. Derry is a team leader within the National Institute for Science Education and manages several curriculum and instructional technology projects that focus on individual and collaborative problem solving, critical thinking, literacy, and basic mathematics.

Marcia Linn is Professor of Education at UC Berkeley, Director of the campus-wide Instructional Technology Program, and a member of the AAAS Board. She co-directs the Visualization and Modeling theme team, leads the CILT postdoctoral program, and coordinates the involvement of Berkeley's Program in Education in Mathematics, Science, and Technology in the R&D and research training components of CILT. Her research interests include gender and science, the development of scientific understanding through a "scaffolded knowledge integration" framework for instruction and assessment, and innovative applications of Internet resources to improve science learning (KIE and WISE).

Mary Ellen Verona has been the project director of the Maryland Virtual High School (MVHS) since 1994, and is currently Principal Investigator of the MVHS CoreModels Project, funded by the NSF REPP program. She has taught science, mathematics and computer science on the k12 level for over fifteen years, most recently at the Montgomery Blair Mathematics, Science, and Computer Science Magnet Program. Currently ABD in the climate dynamics strand of the Computational Science and Informatics program at George Mason University, she has a bachelors degree in physics and masters degrees in computer science and mathematics education.

Consortium Building: The Northern Arizona University Teaching And Learning With Technology PT3 Project

Michael Blocher, PhD – NAU – USA – Michael.Blocher@nau.edu
Patty Horn, Ph.D. Arizona K-12 Center – USA – Patty.Horn@nau.edu
Sherry Markel, Ph.D. – NAU – USA – Sherry.Markel@nau.edu
Ann Batchelder, Ph.D. – NAU – USA – Ann.Batchelder@nau.edu
Greg Sherman, Ph.D. – NAU – USA Greg.Sherman@nau.edu

Abstract

Northern Arizona University's (NAU) PT3 Grant is a consortium of individuals from very unique organizations that provide specific expertise to handle the collaboration among all state colleges and universities, Arizona K-12 schools (AZ-K-12 Center), the Governor's Office, and the Arizona Department of Education. Building a consortium of this nature is, although extremely complex and challenging, tremendously important and rewarding in fulfilling the goals of the grant – especially in light of possible changing federal educational funding policies. Building and maintaining good working consortia is essential in the success of any project, but especially for PT3 projects. This paper describes the organizational structure and provides examples of how each party plays a pivotal role in the success of this PT3 endeavor.

PT3 Design

The NAU PT3 project is designed to support: a) the training of its education college faculty to model and teach the use of technology; b) the redesign of its teacher preparation curriculum to include technology integration; c) the redesign of its distance learning teacher preparation program for pre-service teachers in 34 remote sites to include on-site mentoring for integration of technology; d) the development of a culturally sensitive mentoring model for use with Arizona's minority students and teachers; and e) the development of a Technology Integration Best Practices Clearinghouse including electronic, print, video, and audio resources available to schools and colleges statewide. To do so, each component is led by a Principal Investigator with specialties in their specific area – Dr. P. Horn, director of The AZ-K12 Center provides organizational leadership, Dr. S. Markel, Associate Professor of Instructional Leadership provides leadership in the redesign of education methods curriculum, Dr. A. Batchelder, Associate Professor of Instructional Leadership will coordinate the design and implementation of a school-based technology integration mentoring model piloted with pre-service teachers on the Navajo Reservation, and Dr. J. M. Blocher, Assistant Professor of Educational Technology provides leadership for technology integration and faculty support throughout the project.

Roles

Although this PT3 project, like many others, is designed to provide faculty and cooperating teacher workshops, the primary focus for the NAU PT3 project is to provide support for and collaboration between education methods faculty in the redesign of the teacher preparation curriculum to include technology integration and thereby model and teach the use of technology. Faculty are supported in a variety of ways. Most importantly they are supported with the help of a technology liaison. The role of the technology liaison is to coordinate and communicate pedagogical needs of the individual faculty to the project instructional designer who will help in the re-design, development and implementation of technology-supported curriculum. Furthermore, the technology liaison will work closely with the faculty and the instructional designer in making suggestions and the development of online media and instructional systems that will support both campus-based and distance delivered courses. Together the technology

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liaison and instructional designer form a knowledgeable team that design and develop pedagogically sound technology integration solutions.

Probably the most unique organization and role is that of the AZ-K-12 Center because of its distinctive mission to improve the quality of K-12 teaching and learning in Arizona classrooms. On its inception, Governor Jane Dee Hull called for the creation of the Center and through the state of Arizona committed $2 Million to support training and re-tooling of teacher skills based on best practices. As part of their mission, the AZ-K12 Center provides a clearinghouse that fosters communication and shares knowledge and information throughout the state. However, one of the most unique roles the Center plays is to build consortia between state governing and funding entities and other Arizona universities in their efforts of preparing future teachers. In this pivotal role, Dr. Horn acts as a liaison between a variety of state decision makers. For example, Dr. Horn meets regularly with the state's law makers, including the Arizona State Superintendent of Schools, and has other collaborative projects with universities and colleges such as: Northern Arizona University, Arizona State University, Arizona State University West, Grand Canyon College, Central Arizona College, to mention a few.

Northern Arizona University also has a unique role in that its mission is to provide educational opportunities to rural and underserved populations within the state. For example, many of the students are located in vastly remote areas, and access to course work is often delivered to remote sites via Instructional TV courses, Web-based courses or even site based. This presents challenges for cooperating teachers trying to integrate technology where support and training can often be limited. To address these issues, an alliance has been established between Educational Technology and the Instructional Leadership to provide technology training and support along with mentor training and support for the cooperating teachers. Through both on-campus workshops and site-based visits, cooperating teachers receive mentor *and* technology training to be supported in their expansion of modeling technology integration for their student teachers. For example, Dr. Markel provides expertise and leadership with the methods faculty. Dr. Batchelder provides expertise and will provide training on building good mentors. Dr. Blocher provides expertise and leadership in the area of Educational Technology, support for faculty, and supervision for the additional technology support personnel – the technology liaison and instructional designer. All members are working closely together to design training and support materials for both the campus-based methods faculty and cooperating teachers of our students. With these two foci, the students of our pre-service teacher preparation program are provided good models of technology integration while taking course work as well as while they student teach.

Evaluation: Challenges in Measuring a Moving Target

Marcie J. Bober (Project Evaluator)
San Diego State University, Dept. of Educational Technology
United States
bober@mail.sdsu.edu
619.594.0587

(For additional information, contact the Project Director):
Bernard J. Dodge
San Diego State University, Dept. of Educational Technology
United States
bdodge@mail.sdsu.edu
619.594.7401

Abstract: Learning Through CyberApprenticeship (LTCA) is a PT3 *implementation* grant conceptualized as a forum for connecting preservice teachers with veterans in the field. Federal funds allowed for establishment of a system through which preservice teachers could work directly with technologically skilled teachers (TMTs) to create projects for immediate classroom use. But more interesting evaluatively is the metamorphosis of the course preservice teachers must complete to earn their Level 1 (preliminary) credential. Through comprehensive and well-structured evaluation – and our own willingness to change course as circumstances dictate – we have been able to capture students' pedagogical growth (rather than their "skill" with isolated features and functions), camaraderie among the instructional team, and attitudinal changes that portend how teachers may use technology to meet the many mandates for which they're increasingly held accountable.

Learning Through CyberApprenticeship (or LTCA) was conceptualized as a forum for connecting preservice teachers with veterans in the field. Federal funds allowed for establishment of a system through which preservice teachers could work directly with technologically skilled teachers (TMTs) in the field to create projects for immediate classroom use. The process itself is relative straightforward. Project ideas are generated at the start of each semester, during one or more colloquia to which TMTs and education faculty (methods instructors as well as disciplinary specialists) are invited. All projects adhere to multiple criteria sets, ensuring that student experiences are relatively equivalent and that grading or scoring is as equitable as possible.

Projects are showcased at the close of each semester and may include activities, lessons, or larger units. Exemplary projects become part of a online library (see, for example: http://edweb.sdsu.edu/ltca/spg01projects.htm) for electronic distribution … "tracked" via a sophisticated management system.

In point of fact, however, much of our effort has gone into ongoing revision of the one-semester course preservice teachers must complete prior to their earning a preliminary (or Level 1) California teaching credential (http://edweb.sdsu.edu/Courses/EDTEC470/). The State's position is that teachers must come to the classroom with basic technology proficiencies/competence.

EdTec 470 is taught by several instructors (both adjunct and tenured or tenure-track) and in several configurations. It's structured to be responsive to changes in State requirements … and to be flexibly presented. [In other words, modules do not have to be taught in a prescribed order; they're designed to stand alone.]

Our SITE 2001 session focused on the overarching "gaps" the project aims to remedy, and they're important to note once again:

- Placement and modeling
- Integration
- More ideas than time
- Breadth of experience
- Authenticity
- Practicing what we preach

These gaps clearly inform the project's several overarching outcomes:

- Design/use of an apprenticeship model
- Design of a management system
- Establishment of an online library of exemplary teaching materials
- Twice-yearly colloquia to open lines of communication
- Twice-year showcases to highlight accomplishments
- Refinement of a curricular system

But as the project reaches maturity, it's critical to share our lessons learned – many of them with broad applicability to other technology infusion efforts planned or in place.

The first centers on evaluation, and the many benefits of a comprehensive framework to guide ongoing data gathering and analysis. Our efforts are multifaceted and increasingly attend far more to pedagogical growth (and camaraderie among the instructional team) than to students' "skills" or "abilities" with isolated features and functions. Among our core data collection strategies are:

- Pre/post student surveys (deployed online; see, http://www.zoomerang.com/recipient/survey-intro.zgi?ID=5D8XYMQTQC6L&store=1)
- Limited class observation
- Review of extant data (websites, email/listserv exchanges)
- An instructor survey (see, http://www.zoomerang.com/recipient/survey.zgi?ID=V0T4EA1Q5X4G&store=1)
- Attendance at major project events

Our evaluation design (a hybrid undergirded by Stufflebeam's four-dimensional CIPP framework but supplemented by elements of the Concerns Based Adoption Model) attends to specific project goals as well as to the several GPRA indicators with which the project aligns. Our techniques are innovative – and an extension of evaluation efforts with which we've been associated in the past (Innovation Challenge Grants, Literacy Challenge Grants, Digital High School Initiative).

The second focuses on the challenges (posed as reflective questions) we … and likely all PT3 evaluators … face:

- Who does the project really serve?
- Who are our core stakeholders? Who are our core constituents?
- What are we trying to accomplish?
- Are we simply replacing "old" ways with "new" ones? Are we modeling the benefits of adaptability and flexibility?
- Are we focused on skills or competence? To what extent are we interested in pedagogical impact?
- What are the complexities of measuring long- v. short-term change?

Specific challenges facing evaluators include the following:

Challenges related to the proposals themselves. Program goals and outcomes that "wowed" reviewers just a short while ago were (perhaps) overly focused on isolated skills and proficiencies. But as evaluators, we feel considerable pressure to continue/follow through with our original designs – many of them structured to measure growth or change in such areas as: the *ability to identify and select* hardware features and software functions or the *amount* or *proportion* of time students spend using technology. The zeal to be faithful to evaluative tasks comes with a price, the most serious of which is missed opportunities to critically examine the real (and often subtle) innovations that spell real project success.

Terminology challenges. As evaluators with short- and long-term deliverables, we're constantly wrestling with definitional AND interpretive differences with such 'basic' words as pedagogy, competence, and technology.

Challenges that derive from orientation. Are evaluators thinking strategically when assessing the pedagogical implications (strengths, weaknesses, and impacts) of their projects, or is the view tactical only? *Do we really have a clear picture of educational reform?*

As important, are we as evaluators too process (rather than policy) oriented? *Do we really understand our mission?* Are evaluators overly willing to fall back on traditional evaluation "models" (frameworks, approaches, orientations) and study designs?

Implementation Strategies for PT3 Grant

Robert Bowe, National-Louis University, US
Daniel Ryan, National-Louis University, US

We are pleased to submit a proposal to SITE because of our continued commitment to the improvement of technology integration in teaching and learning, a goal of our PT3 Implementation Grant. We look forward to sharing the research and applications our grant has provided regarding graduate teacher education. In the 28 months that we have been working on this grant much has been learned and many assumptions have been challenged. This abstract describes our grant and the discourse we wish to generate around various activities and involved in overseeing the grant implementation process.

In the summer of 2000, National-Louis University was awarded a Preparing Tomorrow's Teachers to Use Technology (PT3) grant. Now that this multi-year grant has been running for almost a year with over 100 students in 5 cohort groups, reflections can be made on what decisions helped make this program start (OFF) successfully.

The PT3 program at NLU revolves around three areas. The first is a modified version of the Masters of Arts in Teaching (MAT) program that integrates technology directly into the regular coursework. A Technology Integration Specialist (TIS), working with the regular teacher, models for pre-service teachers how technology is integrated into courses. The second area focuses on developing the technical skills of the NLU faculty so that they can better demonstrate effective use of technology in Education. The third area focuses on developing a learning community online that allows pre-service teachers to tap into the skills and experiences of NLU faculty.

The MAT program has been a key component of NLU's National College of Education which trains over 500 new teachers a year. This makes it the second largest private teacher's college in United States. Since 1886, the National College of Education has been a leader in the field of teacher education and with the new PT3 grant, it continues to expand on the already established program. The Master of Arts in Teaching degree will lead to certification in the state of Illinois. It is designed for individuals with undergraduate degrees in fields other than education.

The key difference in the MAT program is the integration of technology, which is the prime focus of the PT3 grant program. NLU has kept the program relatively the same except that along with the faculty advisor working and in some cases, teaching the students, there is also a TIS who assists in technology integration which is a multi-layered role. The TIS is responsible for introducing students to the basic workings of the laptop computer given to each student at the start of the coursework. By interweaving computer basics into many of the required courses, students meet the requirements of yet another course. Another role of the TIS is to work with NLU instructors in designing lessons with the instructors that take advantage of the students' developing technology skills. The third role is to suggest improvements and communicate problems to the entire PT3 staff in order to utilize and take advantage of the grant's resources.

During the handling and exposure of the laptops by the students, certain issues arise that need to be identified and solved. This can take some time, especially when all the students have different experience levels. Through our extensive surveys, we were able to keep records on how much time students spent on content and how much was spent on technical issues. Our TIS was integral in expediting solutions to problems and seeing that future ones are avoided.

Another key difference with the MAT program is an additional faculty position called the Academic Technology Facilitator. This person's role is to oversee the proper functioning of equipment, such as the web site, recurring laptop problems, and purchases. This position also requires active participation in the second area of the grant, faculty development.

When modifying the MAT program to include technology, it was important to consider the needs of the faculty. Many had shown interest in including technology into their lessons but never had the resources to do so. A major part of the grant, therefore, was to provide 16 hours of technology workshops to over 100 faculty members in a three-year period. Having completed a third of this requirement, we have made constant changes, including better web site instruction and more detailed information about Personal Digital Assistants which really spur on active interest in technology. Handheld devices are excellent triggers for getting faculty interested in technology innovations as well.

During the faculty development workshops, one of the greatest outcomes simply is the discussions that are generated. By starting out with a discussion concerning some of the basics of what technology is, other topics spring up and create seemingly endless areas for conversation. These conversations include ideas for lessons that the teachers have wanted to develop, but were unclear on the logistics of how to proceed. In many cases, people were uncertain what software or hardware to use. In other cases, not realizing the amount of time needed to implement a project was another hindrance.

Eventually, after a comfort level is achieved with all participants, other topics are introduced. The focus now turns toward concepts that affect the higher education faculty member. Topics now include copyright and what rights the faculty member has concerning online material; online tools and what advantages and disadvantages they hold; the effects of Hypermedia and how it affects teaching and learning; and finally what are the advantages of building a community online.

This final topic brings us to a third area of NLU's PT3 grant. Through exposure to online tools, like WebCT, both students and faculty have a common bond even though they may be separated by hundreds of miles. Both groups are given access to a common online area that they have received training on. This online area provides them with communication tools such as e-mail, chat rooms, and discussion areas. It is through increased exposure and as our grant progresses, that we can create a rapport between the two groups that is beneficial to all. One of the biggest lessons we have learned, is that even though this community can serve both group's needs, without the leverage of making it a requirement in a specified course, busy students find it difficult fully utilize the online community. During our presentation, we will explain our latest approach to the online community and what new lessons have been learned from its implementation.

It is our intent to examine this implementation grant through the eyes of the staff and administration who see that all implement the process successfully. Since June of 2000 this grant has offered insights into prior assumptions, newfound discoveries and successes regarding the various ideologies inherent in the grant. During the one-hour session at SITE we would like to encourage discourse around several areas, including the realities of what challenges and successes arise out of the grant, what was achieved or not that was scheduled into the plan for the grant, and what are we learning through our reflections. For example, we initially thought that placing a course on-line would offer greater ease of access to many students located in geographically dispersed areas. Initially we found it difficult to get students connected to the Internet and to have confidence in their ability to utilize the on-line resources. Likewise we discovered that the choice of WebCT challenged our university faculty in ways we hadn't anticipated. The work to get the course into an on-line format was daunting for many. Yet there have been many successes, including the completion by all students of the on-line courses offered in the program and the ease in which our faculty now use WebCT.

We feel that a discussion of PT3 projects in vital within the framework of organizations such as SITE. The invaluable resources and ideas within the participant population guide PT3 projects towards new ways of integration and success in meeting project goals. Through a shared discourse around our implementation project we hope to both inform the conference participants who attend and to learn from each other.

UNT Technology Fellows: A Case Study of Participants in the PT3 Grant Program of the Department of Education

Kaye Bray
Computer Education and Cognitive Systems
University of North Texas
United States
bray@tac.coe.unt.edu

Linda McDonald
Coppell ISD
United States
lmcdonald@coppellisd.com

Charlotte Mooneyham
Frisco ISD
United States
MooneyhC@friscoisd.org

Abstract: This paper is a report on the findings of a case study (in-progress) of Technology Fellows at the University of North Texas. The purpose of the "Preparing Tomorrow's Teachers to use Technology" (PT3) grant program of the Department of Education is to make changes at the university level where the next generation of teachers is being trained. This study looks at how participating in the fellows program impacted individuals, school districts, and universities. Findings indicate that participating in the program has had a positive and far-reaching impact on the Technology Fellows and their schools.

Introduction

Computer technology is forever changing. According to Dyrli & Kinnaman (1995), computer technology greatly empowers teachers, affording the opportunity to make sweeping changes in education. However, technology needs to be used effectively. A popular theme in education today is planning for and integrating technology into the classroom. Teacher training is among the essential elements for technology planning (West, 1994). Access to computer technology as well as peer coaching is an important part in training for technology.

It is important for future teachers and faculty to experience technology hands-on. Training requires a focus on learning as well as a focus on technology, teaching with technology what would normally be taught without technology, as well as changing perceptions of what is important to teach (Boettcher, 1995).

The purpose of the "Preparing Tomorrow's Teachers to use Technology" (PT3) grant program is to make systemic changes at the university level where the next generation of teachers is being trained. The University of North Texas received three different PT3 grants, one of which was called Millennium II: Bridging the Digital Divide. A key component of that grant was capitalizing on the rich and rare resource available in North Texas: practicing K-12 educators who are already integrating technology into their classrooms. The Technology Integration Fellows program (a part of Millennium II) gathered 14 integration practitioners and encouraged them to pursue higher education degrees while sharing their expertise with current faculty and the next generation of teachers.

The Millennium II consortium proposed implementing seven preservice teacher initiatives in the North Texas area (see Table 1). Technology -infusion activities were designed to continue the expansion of services to meet educator preparation needs of the state and nation. The emphasis for this three-year project was "closing the digital divide," and the key areas of quantity, quality and equity were addressed in the preparation of technology competent and confident new teachers.

Increasing the quality and quantity of preservice technology integrating educators
Expanding technology-infusing methods courses and instructor modeling of technology
Providing technology enriched assignments and assessment for special education preservice teachers
Establishing technology enhanced academic content courses for preservice teachers
Establishing "fast track" credentialing for technology aides to be degreed teachers
Developing Internet-based quality resources for preservice teacher courses
Recruiting new millennium teacher educators from technology infusing classroom teachers to work as technology fellows in the project

Table 1: Major objectives of the Millennium II consortium

As the saying goes, from the New York islands to the Gulf Stream waters, the technology fellows gathered. Having studied in Indiana, Hawaii, Australia, Georgia, Illinois, and other states and countries, the Technology Fellows that came together brought unique experiences and backgrounds. Working in different states and countries with all age groups from three year olds to octogenarians, the Technology Fellows shared programs such as Flash and amazing equipment like Topocam while teaching web courses and utilizing the VTEL system. Standing on the shoulders of the giants who go before enable all to reach higher. From Dr. Dunn-Rankin and Dr. James Gallager, the master educators who helped to shape Dr. Tandra Taylor-Wood and Dr. Gerald Knezek, the link to educators who forge with other educators is powerfully affecting UNT and other universities, partner schools, and future teachers.

The Study

Technology Fellows were asked to respond to questions concerning applications and programs presented and worked with in class meetings, such as: Flash, Topocam, Creating Web Pages with HTML, Web Netiquette, Integrating the Internet using Email, Mailing Lists, Chat, Discussion Boards, Asynchronous Voice, Video Conferencing, The Classroom Performance System (response system for obtaining immediate feedback from students), Lightspan, Digital Video, & Blackboard. Their responses indicated the use of these programs and applications in their schools, the impact from their use, and possible future uses of technology as a result of being part of the Technology Fellows. Responses so far have been extremely encouraging.

PT3 has helped current faculty to integrate technology into existing courses. Modeling for a new generation of teachers has occurred in diverse departments from Art to Journalism. Each partner school implemented the grant uniquely to meet the needs in the different school districts. The Technology Fellows, working with UNT and independent school districts from San Antonio to Aubrey, integrated technology into teaching and learning. Sometimes sharing with one teacher or one student and sometimes sharing with entire staffs through training groups, the Technology Fellows utilized and implemented different technologies not for the sake of technology but to support curriculum, learning, and related tasks in increasingly efficient and meaningful ways. The strength of the PT3 grant and of the Technology Fellows is in the continuous and permanent network, stronger then wireless or wired. The human connection and experiences across geographical boundaries and varied experiences and linked to the giants who have gone before are intricately woven into tomorrow for the teachers and the learning that is yet to be.

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Carrots, Velvet Whips, and Propeller Beanies: Providing Incentives That Facilitate Institutional Change

Abbie Brown, Washington State University, USA, abbie_brown@wsu.edu

John Davis, University of Idaho, USA, jcdavis@uidaho.edu

Kathy Onarheim, Milwaukee Public Schools, USA, onarhckx@mail.milwaukee.k12.wi.us

Ian Quitadamo, Washington State University, USA, quitadamo@wsu.edu

Abstract: The directors of PT3 projects at Washington State University, University of Idaho and Milwaukee Public Schools articulate the participation incentives each of their programs offers teachers. The group also sent a request to PT3 project directors nationwide, asking for descriptions of incentives they were offering their program participants. The various enticements and restrictions used by PT3 projects to motivate faculty of K-12 schools and institutions of higher education are presented and discussed.

Introduction

At last year's (2001) SITE conference, PT3 director Tom Carroll observed that the United States Department of Education's Preparing Tomorrow's Teachers to use Technology (PT3) program had achieved a sufficient scale to drive change: enough programs exist nationally to impact the culture of teacher education. As stated in the welcome message on the PT3 Web site, "PT3 grants support innovative programs to develop technology-proficient educators who are well prepared to meet the needs of 21st century learners." This preparation includes exposure to K-12 teachers and university faculty members who model the behaviors of making good use of innovative technologies in their own professional practice, as well as adhering to new standards of educational technology use (e.g. ISTE's *National Educational Technology Standards* for students and teachers, 2000). This type of change is often not an easy one to manage, and members of the culture of teacher education must find significant motivation to do so (Perkins, 1985 in Surrey and Land, 2000). A key issue in the success of many PT3 projects is motivating faculty to embrace and experiment with innovative technologies.

The directors of PT3 projects at Washington State University (WSU), University of Idaho (UI) and Milwaukee Public Schools (MPS) have spent part of this past year engaged in discussion about participation incentives each of their programs offers teachers and university faculty and discussed the various strategies used to motivate their constituents to experiment with and adopt innovative educational technologies. The group also sent a request to PT3 project directors nationwide, asking for descriptions of incentives they were offering their program participants. The results of such an examination reveal what technology change agents around the country are doing to promote the adoption of innovative (primarily computer-based) technologies for teaching and learning.

Motivating Change

The Department of Education's PT3 officers work to achieve a change in the culture of education nationally; PT3 grant recipients do the same locally and regionally. As all PT3 participants seek ways to make these changes, questions about what motivates teachers and university faculty to adopt innovative technologies into their professional practice become important ones to answer. As a sufficient scale to drive change is achieved, it is critical that we examine what incentives work best to bring change about.

Factors that may affect an individual's adoption of an innovative practice include: the *appeal* of the innovation based on externally placed or internally generated pressures to adopt a new practice; the *perceived value* of the innovation based on whether a punishment or reward system is in place that offers incentives for adopting new practices; and *viability* of the innovation based the resources and/or restraints placed on adoption by the practitioner's work setting. Thus, a person may be successfully encouraged to adopt an innovation if he or she: feels the satisfaction of personal growth or a professional obligation to do so; gains increased prestige (status, promotion) by virtue of the fact that he or she is adopting new practices; or receives added resources such as money, goods, services and/or support that facilitates the adoption of an innovation.

The Milwaukee Public Schools (MPS) PT3 project offers the following incentives to facilitate the adoption of innovative technologies: Stipend based training; "Technology Thursdays for Teachers" and "Talking Teaching on Tuesdays" (in-service sessions); ISTE NETS Curriculum Materials; and access to K12 Teachers as mentors. Other incentives to participate in PT3-related activities include: paid expenses to NECC and the Wisconsin State Technology Conference for teams of IHE, K12 and pre-service teachers; Personal Digital Assistants (PDAs) for participation in training; digital cameras for submission of best practice standards-based instructional plans; door prizes for workshops and meetings; as well as invitations to participate in National Technology Advisory Board activities.

The University of Idaho (UI) PT3 project supports the adoption of innovative technologies among it's participants through: training stipends; week-long intensive workshops (in-service sessions) demonstrating integration of skills into the classroom; technical support with hardware and software; instructional support (creating/implementing ideas); Providing necessary software & hardware (on a limited basis). The state of Idaho has a mandatory performance assessment for teaching certification; a motivating factor for many UI project participants is their increased ability to demonstrate competence on the Idaho Technology Performance Assessment (ITPA).

Washington State University's (WSU) PT3 project offers incentives to facilitate the adoption of innovative technologies that include: funding for pre-service teachers and teacher-education faculty that is linked to the awardees' demonstration of knowledge of NETS•T and NETS•S; "Geek Speaks" – one-hour in-service sessions for faculty and staff; "Geek Week" – a week of workshops and discussion sessions designed to support the development of technology skills (Brown, 2001); technology assistance, hardware and software to support teaching and learning.

In June of 2001, the following message went out to the PT3 listserv, which consists of project directors and coordinators nationwide. The message included the following request:

> … we'd like to gather as much information as we can about what incentives different PT3 projects have been offering to faculty members in order to get them to participate in PT3-related activities. A brief reply to this message, offering a few words on what kinds of participation incentives you're providing would help us out immeasurably.

Twenty-three project directors and/or coordinators responded to the message with answers that ranged from a few sentences to lengthy descriptions of what individual projects were doing to motivate their constituents. A preliminary examination of the data using a simple coding scheme (essentially generating a list of topics by reading through the messages looking for common ideas) revealed eleven incentive types: Equipment (10); Support (9); Travel Funds (5); Release Time (4); Required Training (4); Voluntary Training Sessions (4); Social Support/Community Building (3); Food (2); Event Hosting (2); Competency Requirements (2); and Promotion & Tenure Documentation (1). These eleven incentive types echoed the activities of MPS, UI and WSU.

With examples from a total of 26 major institutions involved in the process of fostering the development of technology-proficient educators, it is possible to develop a preliminary classification system of the incentives currently used to facilitate change in this area. The most significant, binary distinction among the various incentives is between positively and negatively oriented incentives. Three of the authors have referred to these as "carrots" and "whips" in a presentation to PT3 directors (Brown, Davis and Onarheim, 2001). The carrots offer an enhancement (e.g. release time, funding); the whips offer the ability to maintain one's professional status without enhancement (e.g. competency requirements, promotion and tenure documentation). As one might suspect, the number of carrots is far greater than the number of whips. The "whips" are not harsh reprimands either, they are, for lack of a better term, "institutional rewards" – a means of facilitating technological proficiency in a way that is easily documented; for this reason, we recommend referring to them as "velvet whips" because, although they are not professional enhancements in terms of receiving something extra that others may not have, they are not intended to cause pain or take anything away from one's professional resources (this point might be argued in terms of denial of promotion, but the authors suggest the term "velvet whips" regardless of this argument).

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Carrots	Velvet Whips
Extra Funds	Certification Requirements
Equipment	Promotion Requirements
Technical Support	
Special Events	
Training Opportunities	
Release Time	

Table 1: Motivational Incentives Offered to Facilitate Technological Proficiency

Discussion and Recommendations

The findings and suggestions articulated here are preliminary and require a great deal more consideration before adopting them for practical (or even theoretical) purposes. However, the basic premise, based on the authors' experiences as directors of projects intended to promote the integration of innovative technologies into teaching and learning and the information provided by a significant number of other directors of similar projects, seems sound and reasonable. In order to promote change, organizations must offer incentives of some type. In the case of the PT3 projects, incentives range from outright rewards (carrots) to vague threats (velvet whips).

Mehlinger and Powers (2002) recommend nine steps for successful technology implementation. Their third step: "Provide Leadership for Technology" includes a recommendation to, "create incentives to influence the way faculty and staff use their energies" (p. 291). In creating these incentives, it is the authors' hope that the types of incentives described in this paper might serve as a guide.

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Sustainability:
How Can a Temporary Grant Have a Long-Term Impact?

Dolores Brzycki, D.A.
Assistant Professor and Project Manager
Preparing Tomorrow's Teachers to use Technology
Adult and Community Education
Indiana University of Pennsylvania
United States
dbrzycki@grove.iup.edu

Abstract:
Most grant applications seek proposals that make a serious effort to sustain the impact of the grant beyond the funding period. How is it possible to fulfill requirements for sustainability at budget-strapped institutions of higher learning? In writing the proposal and implementing a $1.7 million PT3 grant (Preparing Tomorrow's Teachers to use Technology) from the U.S. Department of Education, three public universities in Western Pennsylvania have tried to build longevity into the grant itself. Strategies include uses of matching funds, collaboration with permanent staff, types of training and support during the grant, development of instructional materials, using incentives to promote changes in syllabi, and placing grant offices and activities within permanent organizations. In addition, several institutional factors, outside pressures for change, and serendipitous events will also prolong the influence of the grant, enabling and motivating faculty to continue to use and explore new technology in teaching after the grant.

Problem Statement and Background

Most grant RFP's seek proposals that include a serious effort to sustain the impact of the grant beyond the life of the grant and details about how this will be accomplished. To take just one example, the application for Preparing Tomorrow's Teachers to use Technology (PT3) specifically states: "The consortium should have a strong capacity to sustain the program innovation after the grant ends." (U.S. Department of Education, 2000) How is it possible to fulfill such requirements for sustainability at budget-strapped institutions of higher learning?

"Preparing Teachers for the Digital Age: Implementing a Dynamic Model of Pedagogical Change" is a project funded by a $1.7 million PT3 grant from the U.S. Department of Education. The proposal was written by the ADEPTT Consortium (Advancing the Development of Educators in Pennsylvania through Technology Training), composed of three public universities in rural areas of Western Pennsylvania – Indiana, Clarion and Edinboro Universities of Pennsylvania. Our overall goal is to infuse technology into the pre-service teachers' core curriculum and several teacher education programs. Three of the major objectives are: 1) Instructional Technology will be moved from the periphery to the core of our curriculum. 2) Future teachers will apply and integrate Instructional Technology into the teaching/learning process. 3) Additional faculty, instructional designers, and technical support staff will assist with the transition, providing professional development opportunities and support for faculty. Technology infusion at our institutions will have a significant impact, for together we graduate some 1500 future teachers per year. These universities provide excellent faculty-student ratios but have limited support staff and budgets. Both faculty and non-managerial staff are unionized.

In writing the proposal and implementing the grant, we have made an effort to sustain the impact of PT3 well beyond the life of the grant. In other words, we have tried to build longevity into the grant itself. Our strategies include the uses we made of matching funds, collaboration with permanent IT staff and university administration, the types of training and support offered during the grant, the development of instructional materials, using incentives to promote changes in syllabi, and placing grant offices and grant activities within permanent structures in our own and other institutions. In addition, several institutional factors, outside pressures for change, and serendipitous events will also prolong the influence of the grant, empowering and motivating faculty to continue to use and explore new technology in teaching after the grant-funded personnel and incentives are gone.

Strategies

Uses of Matching Funds

Matching funds can be structured to extend the impact of the grant beyond its funding period. In many cases, we have taken advantage of changes the university or College of Education was already planning. For example, one of the goals we built into the grant – to enhance our technological infrastructure to support project initiatives – is helping to achieve a measure of permanence. Since PT3 implementation grants do not fund equipment and infrastructure, we are achieving this goal through university and college match. Upgrades to labs and computers were performed as promised (at Edinboro an entirely new technology center opened); by Year Two of the grant, all three campuses had completed their wiring programs; campus networks were expanded and extended to all faculty and students, and student and/or course directories were created or expanded; training in course authoring systems began or intensified; and faculty are involved in technology planning at multiple levels of their institutions. At IUP, web sites began to be migrated from the VMS server to NT servers that are user-friendlier, and the university adopted standard web editors; the majority of faculty switched to GUI email; there has been greater desktop and lab standardization and a university-wide 3-year replacement cycle for faculty computers; a university-wide student help desk and faculty help desk have been created. Infrastructure improvements are continuing in the final year of the grant, in part propelled by grant initiatives. For example, the IUP College of Education purchased a server dedicated to housing student electronic portfolios, which have been a focus of both college and grant activities, and is converting a faculty lab to a Portfolio Studio to assist both faculty and students with electronic portfolios and other technology projects. The PT3 grant monitored institutional improvements, modifying training and support for faculty as needed, pointing out changes that made it easier to use technology in teaching, and taking advantage of the improvements to promote the goals of the grant. Improvements in infrastructure and planning mechanisms will extend the impact of the grant beyond its formal conclusion by assuring the quality of the computing resources available to faculty and input from faculty that have begun to use technology in teaching.

Grant-funded personnel have been an undeniable factor in the success of the grant. They have made it possible to expand and customize faculty training specifically for teacher preparation faculty. They have co-taught classes, modeling to faculty how technology can be taught and integrated directly in their courses, rather than in isolation. They have also taught workshops, developed instructional materials, and provided individual consultation and support.

In the area of personnel, however, the universities also committed match. University and college commitments to create or revise permanent technology support positions guarantee that, even when grant personnel are gone, the support available to faculty will still be better than it was before the grant. Both Clarion and Edinboro added instructional designers to their staff with the intention of switching them to university funding when PT3 ends. The IUP College of Education upgraded a technical support position to that of Assistant Dean of Technology, adding faculty training duties. This individual will pick up some of the work now done by grant-funded faculty and student workers. As mentioned above, the College is also redefining the mission of its small Incubator lab. Originally intended for one-on-one help and project development for College of Education faculty, the lab began to permit teacher preparation faculty from other IUP colleges to use it as well. The lab experienced declining utilization, however, as more equipment (e.g., printers, scanners) became available in individual faculty and department offices. So it will now be renamed the "Portfolio Studio" and give both faculty and students support in developing electronic portfolios. On the university level, IUP added an academic user services coordinator. She began a university wide faculty training program modeled on workshops originally offered by the ADEPTT grant, which concluded in 2001, and implemented a university faculty help desk.

Collaboration

PT3 has collaborated with permanent IT staff and committees on training, services and planning. By working together, we avoid duplication and provide more services than we could separately. For example, PT3 cosponsored many workshops with the Assistant Dean of Technology in the College. In addition, two PT3 faculty sit on the College of Education's Technology Committee, a technology planning body, and one sits on ACPAC, the Academic Computing Policy Advisory Committee of the university; they help shape policy, and the permanent faculty member that sits on both committees will have continued influence after the grant. PT3 staff and the Assistant Dean approached the university technology services about sharing storage of electronic portfolios in their first stage of development. Since portfolios are initially created in a technology course required for admission to teacher preparation, instructors can make use of the new, university-wide course directories at this early stage. Taking advantage of a university service reduces by more than 250 per semester the number of students for whom the college must manage network security and makes the long-term management of portfolios more feasible. Collaboration keeps regular IT staff informed about uses of technology in teaching, gives them a role in achieving the goals of the grant, and keeps PT3 abreast of impending changes. The grant also provided some professional development for regular IT staff, with similar effects. Since our ability to add staff is extremely limited, it is essential that existing employees understand and buy into the implementation of grant goals both during and after the grant.

But prospects are not entirely rosy for continuing infrastructure and personnel improvements after the grant. As noted in the introduction, we belong to the State System of Higher Education, which provides limited operating budgets and a strict cap on personnel FTE. This is one reason why the grant has had such a big impact on our universities – it has supplemented meager support resources. The budget situation in the state of Pennsylvania declined with the economy in the year 2001, especially since September 11. SSHE universities have been advised to expect little new funding in the next fiscal year. Pennsylvania State University (though not a member of the state owned State System of Higher Education, PSU is state affiliated) was actually obliged to *return* some of its state funding for the current fiscal year. So the amount of technology improvements at our institutions can be expected to decrease in the immediate future. In Year 3, for example, IUP honored the three-year replacement cycle but reduced the amount of money made available for each replacement computer. (Some colleges and faculty were able to supplement that amount from other sources in order to get precisely the kind of computer they desired, however.) When a recently hired instructional designer decided to leave Clarion, the university was unable to complete its search for a replacement before a hiring freeze was imposed.

Types of Training and Support

Training now offered by the grant will not continue, but we structured our training in ways that, we hope, will prolong its impact. For example, by co-teaching classes, PT3 personnel not only provided training for faculty and their students but also modeled how faculty might introduce the technology in their courses. During the final semesters of the grant, we are weaning faculty from our support by having them assume increasing responsibility for technology-enhanced lessons. Another example is our cosponsoring training with regular IT staff, which will help shape the training they offer after the grant. In addition, the grant produced materials, templates, videotapes of workshops, and workshop outlines that faculty and IT staff can continue to use for as long as they are relevant. Final editions are being posted on the web, and the workshop videotapes can be borrowed from a departmental library. Production of a CD on creating electronic portfolios is getting under way, which will support new or diffident faculty and can even be distributed to students after PT3 trainers are gone. Taking a cue from Indiana University and Purdue University at Indianapolis, we are publishing a collection of technology success stories both to document grant accomplishments and to model what faculty can do. Finally, the grant co-directors encouraged faculty that wished to present on grant results to do so at conferences which publish proceedings so that they will live on after the grant.

Incentives: Carrots and Sticks

The grant provided incentives for faculty to modify course syllabi to reflect their increasing use of technology, and at the start of Year 3, more than 80 modifications to syllabi had been submitted. Most of the incentives will disappear after the grant, but we do not expect faculty to remove the technology from their syllabi. Since they were in control of the changes, most chose technologies that were relevant to their courses and that were within their abilities. Changes in course syllabi ensure that our support will have a greater impact than will mere attendance at workshops. The ideal would be to change the official department syllabus or course designation, but at some institutions the approval process itself can take years. In our consortium only Edinboro, which had already started the process, designated special "T courses" or technology enhanced courses that will remain on the books for a long time to come. Otherwise, we relied upon providing incentives and help in revising individual faculty syllabi. It has been important to attach the incentives to the specific outcomes that we promised in the grant. Hence, we offer incentives not only for attending workshops but also for submitting syllabi revised to incorporate technology, for team projects that accomplish the same, and for minigrants to support technology use in courses. Many faculty members used their stipends to purchase software and peripheral devices that further supported the integration of technology in teaching. With revised syllabi and the technology needed to implement them in their hands, faculty will be more likely to continue to teach with technology and teach their students to do the same.

Although grant incentives have been successful, they are not the only motivation for increasing the use of technology in teaching. All three universities have either just completed or are preparing for NCATE review (National Council for the Accreditation of Teacher Education). The number of faculty participating in PT3 workshops or requesting class assistance surged when the IUP College of Education, beginning preparation for NCATE review, mandated that students start an electronic portfolio for admission into teacher education programs and complete it for graduation. Suddenly the technology needed to create portfolios became relevant and urgent to both faculty and students. Although NCATE does not require that portfolios be electronic, the College has implemented it in this way because, in a large teacher education program, electronic portfolios are the easiest to archive and make available for review. This external pressure from NCATE will continue, and so we can count on continued measures to implement electronic portfolios in all teacher preparation courses.

To facilitate technology infusion in general, and electronic portfolio development in particular, the IUP College of Education has moved its traditional technology course to the freshman level and is requiring completion prior to admission to teacher education. This move will ensure that students will arrive in teacher preparation courses better prepared in technology. Faculty can spend less time teaching technology and more time guiding students toward appropriate documentation for their portfolios and toward applications of technology to teaching. Thus, the learning curve for faculty can be reduced even while technology infusion is increased.

Some faculty members who gained an interest in technology through PT3 are likely to continue simply because they are so enthusiastic and have even assumed new technology roles. For example, one faculty member collaborated with us on a PT3 workshop and publication and became involved in a second PT3 grant. Another has started to serve on a technology committee within a professional organization in her discipline. A third changed the textbook she is writing to incorporate technology in it – this will have a lasting impact.

Placement of Grant Activities – The Case of Teaching Circles

Teaching circles are another strategy to accomplish the PT3 goal of providing professional support. They have been implemented in different ways at the three member campuses, but one thing they all have in common is a chance of continuing beyond the end of the grant. Some of the teaching circles consist of small reflective practice groups on technology; these circles will continue after the grant wherever the members truly become peer mentors and develop ongoing collegial relationships (Hutchings, 1996).

Where grant programs are located can make a critical difference in their impact and longevity. At IUP, the teaching circle model has been blended into a preexisting program of the local intermediate unit called Academic Alliances. In this program, K12 teachers and faculty are invited to an early evening program and opportunity to share experiences over supper. With PT3 help, a new Teaching with Technology Alliance was created, and preservice students were invited to join faculty and teachers. With attendance ranging from 25 to 78, this Alliance is likely to receive continued support from the intermediate unit after the grant. It can be expected to continue because it has been successful, because it is housed in a permanent organization, and because a partial funding mechanism independent of the grant is already in place. (Our experience with previous grants suggests that the placement of the entire grant both physically and within the organizational structure in a permanent office or organization increases and prolongs its impact. For example, grant money that helps fuel the work of an ongoing technology or instructional design center is likely to have a more permanent effect.)

Conclusion

This paper has demonstrated how grant activities, incentives, organization, and collaborative relationships with other parts of our institutions can be fashioned in order to prolong the effect of the grant. Nonetheless, resources will be lost when the grant ends. Some grant RFP's frown on the argument that their grant will be sustained by securing additional grants. But at many institutions of higher education, an entrepreneurial and collaborative spirit is in fact essential to keep funds flowing for innovation and change. Budgets are tight and becoming tighter. Grant agencies and donors should consider the capacity to attract additional funds and implement new, related programs a real plus. Our consortium was able to leverage its initial $500,000 ADEPTT grant from Bell Atlantic and Microsoft into a $1.7 million PT3 grant, a $234,000 TLCF grant (Technology Literacy Challenge Fund) from PDE (Pennsylvania Department of Education) to United School District (IUP was the sub-recipient), a $100,000 PDE grant to Clarion University, and a $50,000 CAPE grant (Community of Agile Partners in Education) to the consortium. In so doing, IUP has come to recognize the need to make administrative changes that increase our capacity to facilitate grant writing and implementation, contracts, and fund raising. Such changes will make it possible to embark on more projects of national importance that create a lasting impact.

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Collaborating for Change – Michigan's Consortium for Outstanding Achievement in Teaching with Technology (COATT)

Larry Burton, Department of Teaching & Learning
Andrews University
United States
burton@andrews.edu

Ellen Hoffman, Department of Teacher Education
Eastern Michigan University
United States
ehoffman@online.emich.edu

Jon Margerum-Leys, Department of Teacher Education
Eastern Michigan University
United States
jmargeru@online.emich.edu

Reuben Rubio, School of Education
Spring Arbor University
United States
rarubio@arbor.edu

Nancy Copeland, Merit Network, Inc.
United States
ncope@merit.edu

Abstract: Michigan's Consortium for Outstanding Achievement in Teaching with Technology (COATT) was formed in 1999. From an initial membership of 10 higher education institutions, the consortium has grown to include 16 private and public teacher education institutions and 9 K-12 organizations. COATT was awarded a PT3 catalyst grant in 2001. This paper presents details of the COATT PT3 activities. COATT's PT3 activities include providing leadership for the revision of the state's existing technology standards for entry-level teachers, extending those standards to in-service teachers and administrators, and the delivery of intensive technology training workshops. A full paper that includes more detail may be found at http://www.coatt.org/conferences/site2002/fullpaper.pdf.

In 1999, United States Senator Carl Levin, recognizing an opportunity for Michigan to improve its preparation of new teachers to use technology, spearheaded the creation of a new organization of teacher education and K-12 institutions (McManus, Rubio, Lenze, Charles & Hoffman, 2001). This organization, the Consortium for Outstanding Achievement in Teaching with Technology (COATT), has taken a leadership role in encouraging student teachers to reflect upon and continuously improve their use of technology in education. By setting a high standard, establishing a means of consistently assessing and recognizing accomplishment of the standard, and rewarding outstanding achievement, COATT has both unified the efforts of educational institutions and motivated pre-service and in-service teachers across the state to move in new directions in their classroom practice.

In July 2001, COATT was awarded a grant from the United States Department of Education's PT3 (Preparing Tomorrow's Teachers to Use Technology) initiative. The grant, Developing an Ecology for Preparing Tomorrow's Teachers to Use Technology, is administered by Spring Arbor University with substantive subcontracts at Merit Network, Michigan State University, and Eastern Michigan University. Funds from this grant will allow the organization to reach out to more pre-service teachers, increasing the scale of our activities. The added resources will also allow us to better support portfolio creation through summer workshops, enhanced infrastructure, and increased on-line resources.

COATT's PT3 Activities

Setting Standards

Pre-service technology integration standards

As part of the PT3 grant, COATT is leading an effort to update the state's technology standard for pre-service teachers to bring an earlier version into alignment with the ISTE National Technology Standards for Teachers (International Society for Technology in Education, 2000). In October 2001 COATT, in cooperation with the Michigan Department of Education, established a committee to draft a revision of the state's technology standard, known as the Seventh Standard. The draft of the revised standard has been developed and may be viewed as Table 1 at http://www.coatt.org/conferences/site2002/table1.pdf. The Michigan Department of Education hopes to present these revisions to the State Board of Education for formal review in spring 2002. The committee working on the revised standard includes COATT member representatives, educators and administrators from K-12 including representatives from the two major teacher unions, and a facilitator from the Michigan Department of Education.

In reviewing the earlier Seventh Standard, the committee found that the first committee had been ahead of its time, as the original Seventh Standard was more like the 2000 ISTE NETS-T than the 1997 ISTE version. While Michigan's standard could be continued with some minor modifications, the new committee determined that a rewrite to bring wording in closer alignment with the national standard had advantages for both educators and students. For teacher candidates, similar wording makes it very clear how the state standard is similar to the national standard. The new standard also makes it easier to relate statewide initiatives to national ones, including the ability to readily adopt and modify curricular materials and assessments developed elsewhere. Additional implementation efforts through dissemination of best practices and incentives such as the MCOATT awards will continue in conjunction to encourage excellence in programs and outcomes.

Technology Training Workshops

Student teaching is a critical period in the training of teacher candidates, yet it is often the time when candidates find themselves looking to reduce risk in order to "survive", and are thus in the greatest need of an environment of technological entrepreneurship. The goal of the COATT Technology Training Workshops will be to help teacher preparation institutions partner with school districts to improve the potential for successful use of technology during the student teaching experience. Teams comprised of a student teacher, cooperating teacher, university supervisor or field instructor, and K-12 building technologist will form a "design community" to assist the student teacher in creating effective technology-infused lessons to be implemented during student teaching. The design team and community becomes a support system for the student throughout the design process and student teaching. The workshops will have both face-to-face and online components, extending over a yearlong training cycle.

A pervasive project objective is to build capacity in schools in low-income districts to provide technology-rich student teaching experiences. Low-income districts are defined as those with higher than 60% participation in the Federal School Lunch program. Over the three years of program activities, 30%, 40%, and 50% of the participating school districts will be low-income.

Summer Intensive Workshop

Face-to-Face Design Community. The training begins with a five-day summer intensive workshop that will include both training and design activities. Design teams work together to help the teacher candidate develop lesson and unit plans that make exemplary use of technology to achieve learning goals. Each COATT member institution is invited to select at least one design team to become part of the first face-to-face cohort of participants to pilot the initial training cycle. These groups will grow in size during the second and third years to four sets of 20 groups each year. As Consortium members assemble teams, their first priority will be to target technologically underserved schools, such that a significant number of student teaching classrooms will come from these schools. The first workshop will begin in the summer of 2002.

Teams will develop learning activities that focus on strengthening standards-based practice by engaging members in authentic, problem-based activities aligned to Michigan curriculum and technology standards. Video case scenarios of effective teaching with technology will be incorporated as a basis for study and discussion. The workshop will conclude with presentations by the teacher candidates of a proposal and a thoughtful and workable draft set of lesson plans. This is a unique opportunity for pre-service teachers to enhance their teaching skill, and cooperating teachers to more effectively mentor student teachers by developing a collegial, collaborative relationship prior to their teaching placement.

Subsequent to the live component of the workshop, there will be online follow-up sessions, where the design community will gather to mark progress and continue the creative process. The online follow-up will last for a total of 30 hours per individual in a design group, and will conclude with the viewing of web pages that describe a final set of lesson plans.

Online Design Community. Beginning in the fall of 2002, monthly online sessions will be held for 250 teacher candidate/cooperating teacher teams (at least 500 people in all), with additional participation from the K-12 technologists or the faculty supervisors. This training will move the group members from more basic to more advanced understanding. The teams will participate in 10 monthly sessions consisting of two hours each. The curriculum will parallel that of the face-to-face workshop, but will also address any need for development of basic technology skills that is needed to be more inclusive of cooperating teachers districts that are technologically underserved.

Implementation and Beyond. The design team cohort groups will continue to meet on a monthly basis during the academic year, when the various teacher candidates undertake their student teaching. An important feature of their online gatherings will be to support the teacher candidates as they implement their teaching, and allow those who teach later to learn from those who go first. The teacher candidates will then be encouraged to submit an MCOATT portfolio for either the spring or summer round of awards, whichever is appropriate. In addition to meeting the requirements of the application, they will be asked to thoughtfully reflect upon and assess their experience as part of the design community. One of our key concerns is sustainability of our efforts, and to that end we are linking up with different State stakeholders to diffuse those efforts as broadly as possible.

Conclusion

The Consortium for Outstanding Achievement in Teaching with Technology (COATT) is, in its present form, the result of several years of intense work and close collaboration between entities that in the past have not had the opportunity to work closely together. Through organizational support from member institutions and United States Senator Carl Levin, COATT has created a means by which to encourage student teachers and practicing teachers in Michigan to integrate educational technology into their teaching practice in ways that reflect current thinking on best practices. With the increased capacity made possible by this Federal PT3 grant, COATT will support a larger number of pre-service teachers and the in-service teachers with whom they work.

As COATT moves into the future, we feel strongly that we have set a productive direction based on a solid standards-based foundation, working collaboratively to create a vision that will sustain us through growth and evolution yet to come.

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Professors' Reflections on Changes Implemented After Technology Professional Development Sessions

Rebecca Callaway
Louisiana Tech University
becky@latech.edu

Kathryn I. Matthew
Louisiana Tech University
kim@latech.edu

Catherine Letendre
Louisiana Tech University
catherin@woodard.latech.edu

Abstract: The purpose of this research project was to determine the impact of technology professional development on teacher preparation faculty in colleges of education, arts, sciences, and humanities at five universities in north Louisiana. Participants included 10 randomly selected university professors who attended 6 days of technology professional development. A 10 question structured interview was used for data collection. Interview transcripts were analyzed using case analysis and cross-interview analysis. Attending the technology professional development sessions provided professors with ideas, motivation, and the support needed to incorporate technology into their classroom curriculum.

Technology is a pervasive component of modern life. In order to prepare students to live in this highly technical society, they need opportunities to use technology as they explore and learn content area curriculum. To assure that students have these opportunities their teachers must be competent technology users who provide students with technology-rich meaningful learning environments. One way to assure that teachers model effective technology use is by providing them with technology-rich learning environments complete with technology proficient professors in their teacher preparation programs. Teacher preparation faculty in the colleges of arts, sciences, and humanities, many who do not recognize themselves as preparing future teachers, must model the integration of technology and curriculum (Beichner, 1993; White, 1994).

Dusick's (1998) literature review indicated that faculty members' use of technology depended on these factors: 1) administrative support, 2) computer availability, 3) resources, 4) support staff, and 5) training in the use of computers. Thompson, Schmidt, and Hadjiyianni (1995) in a three year study examining the infusion of technology into a teacher preparation program identified these essential factors for success: 1) easy access to technology; 2) allowing faculty to become personally comfortable with technology before using it for instructional purposes; 3) having technology integration as a department goal; 4) receiving strong support from the administration; 5) inviting participation in the program; and 6) one-on-one mentoring for faculty.

Faculty Development

Technology professional development is key in moving faculty toward successfully modeling the integration of technology in the preservice classroom. The professional development must incorporate technological and pedagogical components (Bullock & Schomberg, 2000) focusing on how to use technology to improve teaching and learning (Cottrell, 1999). Effective technology staff development requires, among other things, immersion in learning over extended periods of time, active involvement, a community of learners, a focus on the learners' needs, and time for reflection (McKenzie, 1991). A learning environment based on adult learning theories with proper sequence and structure facilitates communication and learning (Mandefrot, 2001). The workshop facilitators must take into consideration the concerns and feelings of the participants (Linnell, 1994). They must provide a friendly, comfortable, relaxed setting in which the professional development is viewed by the participants as an opportunity and not as a threat (Mandefrot). Workshop participants need the opportunity to meet and collaborate with others in ways to stimulate their thinking while building on their professional development experiences (Franke, Carpenter, Levi & Fennema, 2001). Learning to use technology and to infuse it into the curriculum in meaningful ways requires ongoing support from a connected community of learners who use technology. A community of learners provides not only the resources and technical support required to use technology but also the confidence to teach with technology (Ginns, McRobbie, & Stein, 1999; Hruskocy et al., 2000).

Technology Integration in the Classroom

Miller (1995) sees the current technological revolution as an opportunity to make profound changes in teaching that directly effect students' learning. In order for this to occur, faculty members must reflect on their teaching, master their anxieties, and learn to use technology in order to incorporate it into their teaching. Additionally, three conditions must be met for faculty to integrate technology into their teaching: they must believe that technology is more effective than what they are now using, they must believe that technology will not be disruptive, and they must believe that they have the technical skills and resources to achieve their goals (Zhao & Cziko, 2001). Infusing technology in the classroom requires that professors combine experiences with technology with the curriculum they are teaching. This requires faculty to re-examine what they teach and to change how they teach (Miller, Martineau, & Clark, 2000). Faculty who do not integrate technology in their teaching may find themselves overlooked and left behind as other faculty members revitalize their curriculum and the way it is taught (Baldwin, 1998).

Technology integration by faculty is neither spontaneous nor easy; it takes time and effort. Hord, Rutherford, Huling-Austin, and Hall (1987) developed the Levels of Use (LoU) to measure behaviors associated with the use of an innovation. These seven levels include: 1) non-use, 2) orientation, 3) preparation, 4) mechanical, 5) routine, 6) refinement, and 7) integration. Conversations, informal interviews, and observations can be used to assess levels of use to determine the impact of an innovation on the participants.

Barriers to Technology Integration

Barriers to technology integration include organizational ones and individual resistance to using technology (Miller, Martineau, & Clark, 2000). Many universities do not recognize faculty member's use of technology for tenure and promotion decisions, hence, faculty members forego learning to use and integrate technology as they focus on research and publications which are considered in such decisions (Baldwin, 1998). Some faculty hope to reach emerithood before they are forced to change (Miller, 1995). Teacher preparation faculty members do not infuse technology in their classes in part because they lack professional development opportunities, proper equipment, administrative support, and technical support.

Methodology

Participants and Setting

The United States Department of Education's Preparing Tomorrow's Teachers to Use Technology (PT3) program has provided funding for grants to assist teacher preparation faculty as they learn to integrate technology into their teaching. One of these grants is the Technology in Higher Education | Quality Education for Students and Teachers (T.H.E.|QUEST) which provides intensive technology professional development for teacher preparation faculty at universities in Louisiana. Faculty teams from the universities work together as they develop methods of integrating technology into their curriculum. The purpose of this research project was to determine the impact of T.H.E.|QUEST technology professional development sessions on teacher preparation faculty in colleges of education, arts, sciences, and humanities at five universities in north Louisiana.

Sessions extended over 6 days for 7 hours a day totaling 42 hours and were attended by a total of 49 teacher preparation faculty. The professional development sessions provided extended opportunities for participants to work together as they experimented with a variety of hardware and software and discovered ways to use technology to enhance teaching. These sessions were held in T.HE.|QUEST technology lab housed in the College of Education. For the purpose of this study 2 participants were randomly selected from each of the 6 professional development sessions held over the last 2 years for a total of 12 participants. Two participants were unavailable during the time the interviews were conducted, but participants from all sessions were included in the sample. Participants had been teaching at the university level from 3 to 33 years.

Data Collection

One way to determine the impact of technology professional development on teacher preparation faculty is to conduct structured interviews. Hence, ten interview questions were designed to help assess participants' levels of technology use, whether any changes were made in their teaching as a result of the professional development sessions, how they integrated technology in their teaching, whether they required their students to use technology, and whether they had encountered any barriers when integrating technology in their teaching. The researchers designed the questions, which were then reviewed and revised by a professor knowledgeable of the professional development sessions, but not directly involved in them. The interview questions were pilot tested on one of the session participants who was not among those randomly selected to participate in the study. The structured interviews were conducted in faculty members' offices over a period of three weeks by one of the workshop facilitators. Interviews lasted from 35 to 45 minutes and were conducted at the faculty members' convenience. The interviews were audio taped and transcribed by the researchers.

Data Analysis

When using structured interviews case analysis and cross-interview analysis are both appropriate (Patton, 1999). The transcripts were initially coded for case analysis, which provided vignettes of individual participants from which various patterns, categories, and themes emerged. The participants' responses were then grouped by questions and analyzed. This provided a clearer means of organizing the data and establishing linkages between the interviewees' comments. Initial coding and analysis was conducted independently by each of the researchers, providing triangulation (Patton). Researchers then compared and discussed their coding.

Effective professional development requires that the workshop facilitators establish rapport with the participants in a relaxed, comfortable environment conducive to establishing collaborative relationships among the participants (Mandefrot, 2001). The rapport that is established may prevent some participants from responding to interview questions in a forthright manner. Additionally, some teacher preparation faculty may be reluctant to disclose their limited use of technology. These factors may limit the generalizability of these findings.

Discussion and Interpretations

Interview transcripts were examined to determine if participants had made any changes in their teaching that could be attributed to attending the technology professional development sessions, to find examples of the integration of technology in their teaching, to establish whether or not they required their students to use technology, and to explore any barriers they encountered when using technology.

Changes in Teaching

After attending the sessions faculty members commented that they incorporated more technology in their teaching. During the sessions they discovered ways to integrate a variety of hardware and software in their teaching. The sessions provided them extended opportunities to experiment with software and discover ways to adapt it to their curriculum. Participants reported that they had written grants and purchased additional hardware and software to use in their teaching. Some reported that the sessions had stimulated them to think about additional ways to use technology and had motivated them to use more technology. Others talked about the changes they had made in their teaching in order to effectively incorporate technology (Miller, Martineau, & Clark, 2000). Participants commented on the importance of modeling the integration of technology in their classes (Beichner, 1993; White, 1994). One change mentioned was that in order to integrate technology they had discovered that they needed to stop talking and give students control of their own learning. One participant commented, " *I have to learn to talk less. ... we get very comfortable in talking rather than letting students explore and come to their own conclusions.*"

No Changes in Teaching

A few participants reported that they had made no changes in their teaching since attending the technology professional development sessions. However, these participants reported that they had several ideas for using technology in their teaching and then elaborated on ways they could use technology. These faculty members reported using limited amounts of technology in their teaching. For example, two reported having some course materials posted in Blackboard. They did not, however, require their students to access the course materials. Some of these faculty members saw the benefits of technology, but lacked confidence in their ability to effectively use technology. One faculty member did not believe that using technology would be more effective than what was presently being done and believed that using technology would be disruptive (Zhao & Cziko, 2001).

Students' Use of Technology

Faculty members who reported that they had not made changes in their teaching after attending the technology sessions also stated that they made allowances for students if they did not have access to technology or feel comfortable using technology. Some professors reported providing one-on-one assistance to students to assure that they could successfully complete assignments requiring them to use technology. Other professors simply required students to use technology to complete assignments and assumed the students either had the requisite skills or would acquire them in time to finish the assignment. One professor reported putting *PowerPoint* presentations on the web prior to class meetings and that even though it was not required, most students printed out the presentations and brought them to class to use as an outline while taking notes. Faculty members reported that students completed a variety of projects using different software packages, such as *Microsoft Office, Inspiration, Netscape Composer, HyperStudio, iMovie, KidPix,* and *Blackboard*.

Barriers to Using Technology

Barriers to using technology included lack of hardware and software and limited access to the hardware and the software that was available. Several participants noted the lack of technical support available on their campuses. Technology proficient professors reported being overwhelmed by requests to provide support for other faculty members, which often interfered with their own work. Several reported their biggest barrier was the lack of time to learn to use the available technology and to discover ways to integrate technology in their teaching. Some professors reported that not only was administrative support lacking, the administration impeded their efforts to acquire and use technology in their teaching (Dusick, 1998; Thompson, Schmidt, & Hadjiyianni, 1995).

Levels of Technology Use

Interviews with the participants and conversations and observations during professional development sessions were used to determine their Levels of Use (Hord, Rutherford, Huling-Austin, & Hall, 1987). Three participants were at the preparation level; they articulated definite plans for implementing what they learned in the sessions. One participant was at the mechanical level and was in the process of reorganizing her curriculum to make better use of technology. Three participants were at the routine level indicating that they were making few or no changes in their established pattern of use. Three participants were determined to be at the integration level as they actively worked to coordinate the use of technology with other professors. Participants' comments on changes or lack of changes in their teaching reflected their levels of technology use. For example, participants who had not made changes in their teaching required only limited use of technology from their students and were at the preparation level of use. Overall attending the technology sessions had a positive impact on professors who were above the preparation level of use.

Conclusions

The technology professional development sessions provided participants with time to explore new technologies in a relaxed, comfortable working environment and to collaborate with their peers as they developed ways to integrate technology into their classrooms. This opportunity for extended exploration and collaboration provided participants with the motivation and stimulation to further refine and develop their technology expertise. Results of this research indicate that the technology professional development sessions enhanced professors' use of technology in their teaching to varying degrees depending on their Level of Use.

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Designing Web-Based Modules to Assist Teachers with Teaching Mathematics to Minority Students

By

Carlous Caple, Ed.D.
North Carolina A&T State University

Abstract

Many teachers are faced with the dilemma of how to effectively bridge the gap in teaching minority students. Specifically, teachers are burdened with the content area of mathematics and communicating its concepts effectively.

A number of factors attribute to why minority students may have difficulty learning mathematic concepts. One factor would be that minority students might process information differently from their counterparts. Minority students tend to be concrete cognitive learners and thinkers, where they typically recall information, as opposed to the more analytical/linear learner and thinker, who has a greater ability to problem-solve. Another factor would be the absence of a technological presence either in the classroom and/or at home. The latter is a concern that has been addressed as a part of educational reform.

The design of a web-based mathematics module was developed to address the needs of teachers, and to bridge the gap with minority students and the learning of mathematical concepts. The module was developed to aid teachers in approaching the teaching of math to minority students in an uncommon way. Mathematic concepts focused upon the standards established by the National Council of Teachers of Mathematics. However, the instruction within each module was different from the standard way of teaching mathematics. Each mathematic concept focused upon integrating previously learned concepts such as addition, subtraction, multiplication, and division with new ways of approaching problem-solving skills. The web-based module allowed the learner to approach learning math concepts at his or her own pace. Also, the modules contained feedback during instruction, remedial instruction, and embedded testing to allow the learner to see where their problem areas exist. The teacher was also an integral part of the process. The goal of the web-based module was to aid in the teacher's classroom delivery of mathematics instruction. Further, the goal of the web-based module was to improve instruction, and change the way that minority students process information. The module was established to aid in smaller classes, where students can interact more closely with teachers, enhance learning, for the benefit of increased time on task. Also, the development of learning activities that takes less time

to master, and recontextualization, which often results in rapid learning, and allows more time for mastery of additional material.

The following recommendations were made after piloting the web-based mathematics module. The first recommendation was to update the module to effectively reach students who use English as a second language. The second recommendation was to duplicate the module for use with the National Science Standards. The third and final recommendation was to introduce the module to in-service and pre-service teachers to further bridge the gap with instruction for minority students.

Student Teaching Technology Sites:
Creating Opportunities for Developing Technology-Using Educators

Nancy Casey
School of Education
St. Bonaventure University
St. Bonaventure, NY 14778
716-375-2141
ncasey@sbu.edu

Patrick Casey
School of Education
St. Bonaventure University
St. Bonaventure, NY 14778
716-375-2141
pcasey@sbu.edu

Abstract: Student teaching is the capstone experience in teacher education programs. Schools and departments of education try to place student teachers in classrooms where cooperating teachers model excellent practice and encourage student teachers to develop as innovative young educators. A dilemma arises when colleges try to help student teachers develop skill using technology. There simply are not enough P-12 classrooms where teachers provide good technology-using models. Moreover, for many reasons many cooperating teachers are reluctant to allow student teachers to use new technologies. This paper will present a solution for ensuring that preservice teacher candidates will have rich opportunities to use technology during their student teaching placements. We will describe the process of developing *Student Teaching Technology Sites* (STTS) and will report on the first semester of implementation.

At the end of September, just a month into student teaching, we were already hearing the rumblings. Cooperating teachers from several of the schools with whom we have long partnered were awed. "Wow! They can do that?" "Can you teach me?" "What will I do when you leave?" Student teachers were heard complaining: "We need more equipment." "We HAVE to have another digital camera." "Where can I get another copy of *Timeliner*?" "You should see the great presentations my fourth graders did!" "This is a great web site to help your kids do research!" The conversations were about *teaching*, but were peppered with comments and questions involving *technology*.

The School of Education at St. Bonaventure University was the recipient of a PT^3 grant in the fall of 1999. PT^3@SBU is a focusing on helping preservice teacher educators become excellent teachers. We are working primarily with elementary education majors as they learn about teaching and about learning but we are infusing all of our courses with technology experiences, exposing preservice teachers to situations where they are learning in technology-supported environments and helping them to design similar learning experiences for children. The foundational beliefs of our project are three:

- Excellent teachers are those who understand how children learn and who know how to plan for and support that learning.
- Technology in education is not important in and of itself; it should support and enhance learning and teaching.
- Learning how to use technology appropriately in the educational setting can only be successful as an integral aspect of learning how to teach in general. We do not teach technology. We teach about children; we teach about teaching; we teach about learning. We help our candidates focus on effective ways of helping children learn.

During the past two years, as we have been working with preservice teachers, we have been helping them use technology as a regular part of their repertoire and we scaffold their experiences as they began to work with children in learning environments enhanced by technology. The preservice teachers who were sophomores in 1999 – when the PT3 grant was received are now at the end of their undergraduate program, and ready for their capstone experience: a semester of full-time student teaching. These preservice teachers are the "products" of the curriculum and philosophical changes that have been fundamental to the work supported by PT^3. The SBU School of Education faced a dilemma: during the past two years, we had implemented significant curriculum changes focusing on requiring our students to use technology for their own work and in their internships. As we looked at placing them for student teaching, we were concerned about how to ensure that they would be in classrooms where the cooperating P-12 teachers would welcome and encourage the use of technology. We were confident that our candidates *could* begin to use technology appropriately, but we had to find adequate placements.

The Challenges of Student Teaching: An Administrative View

Student teaching is the capstone experience, the time when candidates finally get to do what they have been learning about. Every program that prepares teachers wants to provide top-notch classroom placements for student teachers, but the challenges can be many. For Schools of Education located in rural areas, one of the most pressing is location. In rural areas, public schools are few and far between. They are often small, offering limited numbers of classrooms with tenured teachers willing and able to act as cooperating teachers. It is imperative that schools close to campus not be overwhelmed, and so in order to provide every student teacher with appropriate placements, candidates often have to travel considerable distances from the University campus – often requiring a 60 to 90 minute commute for the student teachers.

It should be the goal of placement offices to find classrooms with quality teachers "having some combination of the following attributes: pedagogical knowledge, subject area content knowledge, skills and attitudes necessary for effective teaching, strong understanding of human growth and child development, effective communication skills, strong sense of ethics, and capacity for renewal and ongoing learning" (Cobb, Darling-Hammond, & Murangi, 1995). The reality is that this is not always possible. When there are large numbers of student teachers, there is a limit to how "choosy" the placement office can be, and so student teachers are often assigned to classrooms where they will have adequate experiences, but in placements that may be less than ideal.

Another challenge is providing adequate supervision for student teachers, especially in rural areas. Supervisors often have responsibility for a number of student teachers in different schools – often at some distance from each other. Supervisors, consequently, have little freedom to spend extended time with student teachers and rarely can provide the just-in-time supervision that may help a student teacher succeed.

Enter technology – a factor that exacerbates the student teacher placement dilemma. One challenge of preparing technology-using new teachers is that there are currently not enough classrooms where quality, technology-using teachers can model appropriate use of technology to support teaching and learning. The ideal situation would be to place student teachers in classrooms where they are encouraged (or even required) to teach using technology. The CEO forum argues that, "Wherever possible, student teaching and practicum experiences should be chosen for opportunities that will expose teacher candidates to: best practices in technology integration, a range of technology resources, and the design and delivery of instruction that incorporates technology as a learning and problem-solving tool" (CEO Forum, p. 10). As much as we would like to follow this advice, in many areas, it is still not possible. P-12 teachers who can expose their student teachers to high-quality technology integration remain rare.

The Challenges of Student Teaching: The Student Teacher's View

Preservice teacher candidates see student teaching as the ultimate experience. Their expectations are high; their anxiety even higher. Student teachers want to prove themselves; they want to try all they have learned about. They want to launch their careers. However, they are generally realistic enough to recognize that there are serious challenges facing them:

- being welcomed into a classroom that is not theirs, with children who have already established allegiances to "the teacher;"

- having the freedom to try things that they have learned about, but that may be new to their cooperating teachers;
- working within an existing learning environment, with resources selected by others;
- and, in the case of technology, being allowed to try to use tools unfamiliar to their cooperating teachers – who often can provide little support and less guidance.

We send our student teachers out with an understanding that they are guests in their host school, and that while they should try to implement as many innovative learning experiences for the children with whom they will work, the student teachers must also cede ultimate decision making about the learning environment to the classroom teacher – the one ultimately responsible for the children's learning. For example, while student teachers have been encouraged to use technology, it has been difficult to put into place requirements for the use of technology in environments where technology has rarely been used – and in schools where resources (both hardware and software) may be unavailable.

Meeting the Challenges: Our PT^3 Response

During the first two years of our grant, the faculty redesigned curriculum, assignments and field experiences for preservice teachers. We created a wide range of opportunities for helping our teacher candidates *learn about* technology, gain experience *using* technology, and begin to *develop learning experiences* and lessons enhanced by technology. Our candidates complete a year-long internship, during which their courses and field experiences are infused with technology. During those internships, many candidates became enthusiastic users of technology, and developed a number of technology-enhanced learning experiences for the students in their internship classes. We wanted to find a way to ensure that they would have opportunities to continue growing and to demonstrate their technology competence during student teaching. Our solution was to invite a number of local elementary schools to become *Student Teaching Technology Sites (STTS)*.

Our idea of an STTS is quite simple and straightforward. We approached a small number of school administrators and asked them if they would like to participate in a program that would help increase technology integration in their classrooms. We assured them that if they participated, we would assign to their schools only student teachers who were ready, willing and becoming able to use technology in their teaching. STTS student teachers would be expected to work with their cooperating teachers to develop technology-enhanced lessons and learning experiences. They would be expected to use technology regularly during their student teaching placement. They would be expected to provide some "backdoor in-service" for their cooperating teachers, helping them learn to use new technologies appropriate for their classrooms.

We approached a number of schools geographically close to our campus. We wanted our STTS schools to be close to campus for three reasons:

1. this would provide incentive for student teachers to apply for placement in those schools;
2. it would allow us to go to the schools more often, providing in-service to the student teachers and the cooperating teachers,
3. student teachers would be able to get back to campus to access technology support before offices closed.

In addition, a number of the schools closest to our campus were reluctant in recent years to host student teachers, and we hoped that the technology emphasis would be incentive for them to become involved again in our program.

We let the administrators know that through the PT^3 project, the University would provide all STTS schools with access to:

- a mobile media cart – equipped with a high-end, internet ready laptop computer and a projector, a scanner, a color printer, a zip drive, an electronic microscope and a digital camera;
- licensed copies of a selection of software, to be selected in conjunction with the PT^3 staff;
- training for faculty in the use of the media cart, software and Internet;
- availability of a graduate assistant for "just-in-time" support and troubleshooting;
- a student teacher supervisor who would spend at least one full day per week at the STTS.

We asked the STTS schools to provide:

- two half days of release time for a core group of teachers for training;
- time at two faculty meetings (or at an inservice day) for training for the full faculty;
- commitment to provide seven student teaching placements each semester;
- commitment from the cooperating teachers to allow – and, in fact encourage – the student teachers to use technology in a variety of ways.

Semester 1: STTS Success

Four local elementary schools enthusiastically signed up to become STTS sites. The administrators were enthusiastic and the teachers – although perhaps a bit more cautious – were willing to take on this new challenge. And, although this was something that we put into place rather quickly (and long after student teaching applications had been processed), more than 15% of our student teachers applied for placements in STTS schools. We configured the media carts, made sure that each student teacher knew how and where to get support, and kept in regular contact with them.

One graduate assistant took on the task of sending an email stream with suggestions for using different types of software. There were regular visits to the STTS schools. What we observed was that the student teachers saw this as an opportunity, a challenge and a reward. From the start, they were serious about their commitment.

The student teachers used technology as a teaching aid, but they also let children use a variety of tools. This is one of the most positive results: technology was not just in the teachers' hands. They reported using an amazing array of technology applications – from using *PowerPoint* to play a *Jeopardy*-like game to helping 6th graders learn to take notes, having 3d graders do research on mammals using the Internet and then creating a presentation, using *Inspiration* for starting the writing process, using *Kidspiration* to help kindergarteners learn to categorize.

As exciting as the student teachers' reports of their own successes were the reports the student teachers gave of the cooperating teachers' reactions. We heard innumerable stories like these:

> "When I was teaching one day, I heard my teacher start giggling. She was at a computer in the back of the room playing with PowerPoint – and she was having such fun. I taught her the day before how to use sound. I think it was a mistake! I kept hearing strange noises and then she'd laugh!"
>
> "I was in third grade. One day, all of the other third grade teachers came in to watch what I was doing. It was crazy having them all watch *me*!"
>
> "Everyone fights over the media cart. Even the teachers who don't have student teachers are using it!"

And in one STTS school, two student teachers were asked to plan and run an in-service day for the primary grade teachers teaching them to use the media cart and illustrating the kinds of technology-enhanced lessons they taught.

Looking Ahead

At the end of the semester, we asked the STTS student teachers for feedback. What should we do to improve this undertaking? Their responses came quickly. Some were not surprising:

- put another media cart in each school;
- give each school a second digital camera;
- add a video camera to the media cart;
- have software that was on loan only to STTS student teachers.

A few suggestions were so simple that we would never have predicted them:

- provide floppy disks – most of the STTS schools had used computers so infrequently with classes of children that there were not disks available for children to use;

- make sure that the Internet cables were really long – it was generally hard to position the media cart so that the cable reached the outlet *and* the projector was near a screen!
- find some way around the problems with the Internet filtering software (student teachers would prepare lessons when on campus – where there are no filters; when they got to their schools, what they thought were great Internet sites were often blocked).

A Promising Model

We believe that we have addressed one of the main criticisms voiced in the 1995 Office of Technology Assessment (OTA) report that "most technology instruction...is teaching about technology...not teaching with technology across the curriculum" (OTA, 1995, p. 165). We have simply required our students to use technology. It's not talked *about* a lot, it is just part and parcel of the everyday life in their education courses. They have to use a wide range of technology tools for their own work; if they are to be successful in their internships, they have to use technology as they teach and they have to involve children in the use of technology. As a result, we are beginning to see new teachers use technology as an everyday, non-intrusive tool. These young teachers have begun to internalize technology as a tool – it is not *new*, it is not *unusual*, it is just *there*…something to be used to support learning.

For a long time now we have been involved in helping practicing teachers become familiar with technology – from learning to use new tools themselves to learning about curriculum applications. During in-service workshops, graduate courses and other such sessions, teachers have argued that it is much harder to teach using technology. They do not usually deny the potential that new tools may have, but they invariably point out that it makes their day-to-day teaching harder. And so perhaps the biggest surprise of all came when we asked our STTS student teachers to reflect on how using technology had affected their teaching. "Is it harder to teach this way? Does it make your planning harder? Does it make the day more difficult?" *"Of course not,"* replied one student teacher. And the others all agreed. *"I can't imagine how hard teaching would be if I didn't have technology tools."*

Perhaps the tide has begun to change.

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Letting Technology Support Learning: Preservice Teachers Design Technology-Enhanced Learning Experiences

Patrick Casey
School of Education
St. Bonaventure University
St. Bonaventure, NY 14778
716-375-2141
pcasey@sbu.edu

Nancy Casey
School of Education
St. Bonaventure University
St. Bonaventure, NY 14778
716-375-2141
ncasey@sbu.edu

Abstract: St. Bonaventure University was a 1999 recipient of a PT3 grant, and we have used the funds to support major changes in our curriculum. Specifically, we now require our preservice teachers to design and implement technology enhanced learning experiences for the students they work with during their internship year and during student teaching. This paper explains the process involved in curriculum change, and explores the success and problems we have encountered. It focuses on the kinds of technology-enhanced experiences our preservice teachers have designed and implemented. Project descriptions and sample lessons are discussed.

Introduction

Elementary teacher education at St Bonaventure University is based on a professional school model that places our undergraduates in local elementary schools for large blocks of time during their teacher preparation program. We believe that preservice teachers learn the art of teaching best through guided practice under the watchful supervision of both university and school-based faculty. Taking example from the medical and legal professions, the professions development school puts teacher interns in actual classrooms where they put the theory learned in university classrooms into practice with children. As we complete the fourth year of this field-based program, we are seeing that, indeed, our new graduates are better prepared to take on the job of teaching in classrooms of their own. This change is evident in our student teachers and in reports from student-teaching supervisors and from cooperating teachers. They report on more mature, confident and proactive student teachers. We are getting reports from school officials who have hired recent graduates and again the report is of confident and proactive new teachers. The implementation of this new program was difficult and required complete curriculum revision; the results, however, show that the effort was well worth it.

The core of our program is a two-semester internship (locally referred to as "Field Block 1 "and "Field Block 2"), during which a cohort of 15 to 20 preservice teachers and two university professors spend two days a week in a PDS site. During those days, students take a 9-credit hour block of theory and pedagogy courses and spend at least half of each day working in an elementary classroom – observing, planning, and teaching. While the interns are in the elementary classrooms, the university professors provide just-in-time supervision, helping the interns with the challenges they face as they learn to teach. This just-in-time approach to preservice supervision is proving to be very effective in all circumstances, but is especially crucial as we require that the interns become technology-using new educators.

Setting the Stage

Two years ago, when we were awarded a PT3 grant, it allowed us to act on what we knew was missing from our newly designed PDS-based program: proficiency in the use of technology. Our curriculum was designed to help our preservice candidates achieve the necessary competence to meet the INTASC standards. The PT3 initiative allowed us to again revise our curriculum, this time adding new experiences that would enable candidates to achieve the competence required by the ISTE standards for classroom teachers.

The redefined program goal was to help preservice teachers develop into excellent new teachers who would use technology as a standard part of their repertoire. For that to happen, they must be able to experiment with a variety of technology-enhanced teaching situations during their field experiences. They must participate in a learning environment where they and their students are using technology in a variety of ways to enhance the teaching and learning process. This might be easy if the classroom teachers with whom they would work during their field experiences were modeling such use for them, and if they could see lessons and activities that incorporated a range of technologies. However, in most cases that just was not happening. During their preservice field experiences, teacher education candidates typically have few role models in the public schools who use technology effectively to support children's learning.

The PT3 grant gave us impetus to examine our program and identify an appropriate sequence of technology learning experiences for the preservice teachers with whom we worked. We began by requiring our students to become technology users themselves – users of basic technology tools for their own productivity. We then identified hardware and software appropriate for classroom use, and the PT3 grant provided the means to acquire those tools. At the same time, because our program was already field based, we were able to develop technology-rich experiences for our preservice teachers that they could then try out in real classrooms.

The PDS sites – our PT3 partners – have evolved into ideal laboratories where our preservice teachers can learn about technology. The schools were all in the very beginning stages of using technology, and there were few resources available for our students to use. We equipped each PDS with a media cart configured with a laptop, projector, printer, scanner, zip drive, and digital microscope. We also provided a digital still camera and a video camera. After one year, these media carts were getting such heavy use that we have now outfitted a second, "minor" cart – with laptop and projector – for each school and a second digital camera. On each laptop, we have installed a number of software packages appropriate to the courses the preservice teachers are taking (for example, they study language arts and social studies methods in Field Block 1 and science and math methods in Field Block 2). We also provided copies of a number of software programs that could be used on the increasingly available classroom computers.

Teaching as They Are Taught...and as They Are Taught to Teach

We want our interns to be teachers who will take advantage of new technology to make their practice as efficient and effective as possible. If we believe that teachers teach as they were taught, then we might be resigned to fighting the battle to change educational practice generation after generation. Most of today's preservice teachers did not use technology when they were in elementary school – and did not see their teachers using it. We are convinced that we can create a sea change by combining the PDS approach to preservice education with an overt effort to model the use of technology in preservice courses. Our interns witness technology being used in instruction on an almost daily basis in their university classroom at the PDS.

During the Field Block semesters, university faculty model a variety of approaches to using technology in the classroom. For example, in the course on Developmental Reading, a professor might use *Inspiration* to model the use of character webs as a method to help children develop reading comprehension skills. During a science methods course, professors and candidates together might use a digital microscope to examine fruit and vegetable peels. During a Social Studies methods class, candidates use *National Inspirer* to enhance their own learning about US geography and resources, and then plan how best to use software of that genre as they study elements of cooperative learning.

As they take their methods courses where the professors model technology integration, during each of the two internship semesters the students are required to plan and implement a technology-enhanced learning experience for children. Each intern is assigned to a classroom for the whole semester, so as part of getting to know the curriculum, they are required to plan a project that is integrated with what the children are learning – finding a way to support and enhance children's learning by using technology. The project cannot be an "add-on" activity. The second requirement is that the *children must be the users of the technology*. Simply presenting a lesson where the teacher uses *PowerPoint* or *Inspiration* will not suffice.

Putting It into Practice

This is all not quite as easy as it sounds. It might be easier if we were teaching our methods courses in a traditional mode, where preservice students were in campus-based classes, carrying out peer-teaching lessons and designing activities and units that never really got tested in classrooms with children. But we were requiring interns in actual elementary school classrooms to negotiate with teachers so that they could use technology as they learned to teach. Most classroom teachers, if they are using technology at all, use it to support their own work, and have not ventured into designing learning experiences where children are using technology. Teachers in our partner schools *do* use email and word processing, and they are increasingly using digital cameras and printing out pictures for projects and bulletin boards. But they *do not* use technology as a regular tool to support and enhance teaching and children's learning. The children in many of our partner schools use *Accelerated Reader* and in some schools they are using courseware such as *SuccessMaker*. In most cases, however, children are working alone when using these applications. The teacher is rarely involved. More importantly, teachers rarely plan learning experiences where children use technology to construct knowledge in creative ways. If technology is used, it is used to enhance teaching rather than by students to create learning. Rarely do teachers and children use technology together to explore as they learn.

Curriculum-based Technology Projects

Among the many decisions we faced as we implemented this new approach was one of timing. Should we phase in new requirements or should we jump in, sometimes requiring our preservice students to do things with less than optimal preparation? We opted for the latter – believing that it was important for all of our candidates to get as much experience as we could give them before they graduated. Consequently, projects developed modestly in the first two semesters. During that time, interns with limited previous exposure to the use of technology in the classroom struggled with their own understanding of technology and its place in the teaching-learning dynamic. They were struggling with their vision of technology as tool for production and as tool for teaching and learning. They struggled with the decisions surrounding the scaffolding of children's use of new tools. These struggles were all colored by their own experience as learners and by their very limited experiences as teachers. As a result, most of the early projects might be considered "simple" applications of technology:

- Children created class yearbooks with digital pictures short stories about each other. These were printed using color printers and bound.
- Children used *Inspiration* to create character maps about the main characters in the novels they were reading.
- Kindergarteners used *Kidspiration* to create an "All About Me" bulletin board.
- Fourth graders created book-tape packages of popular stories and presented them to the school library.
- Third graders used *Timeliner* to create biographies – from the point of view of the year 2020.
- Fifth graders followed up the study of U.S. natural resources with a rousing game of *National Inspirer*.
- Fourth graders wrote letters to the editor of the local paper about Veterans' Day using a word processor.

Over the past year, the interns have been arriving in Field Block with a richer background – having completed the newly designed core courses in our program, now enriched with technology. The projects they design are showing more sophistication in terms of technology application and in terms of curriculum integrations. We believe that the latter is due to the fact that because they have more understanding of technology they can spend more time thinking about curriculum and less about technology. Typical projects now include:

- Children working in cooperative groups while studying Native Americans, with one writing the tribe's history using *Storybook Maker*, another creating a timeline, a third creating a map of the tribe's location and a fourth using *Community Construction Kit* to develop a scale model of the tribe's village.
- Fifth graders developing a retrospective timeline of their journey through elementary school, to use at their "moving up ceremony."
- Third graders interviewing each other, videotaping the video and then creating an interactive online yearbook using *HyperStudio*.
- Second graders using the Intel microscope to examine plants as part of a unit on plant growth.
- Fourth graders acting as roving photographers, capturing the daily life of their school with a digital camera and creating a hallway display – changed daily – illustrating the things that they think are important in their school.
- Third graders producing a *HyperStudio* stack for parents' night that chronicles a day in their classroom. This presentation presents recorded sound interviews with teachers and students, digital photos, scanned images of student work, and digitized video.

Lessons Learned

If it can go wrong it will. Some days we think **that** should be the primary lesson we teach our preservice teachers -- because when novices are using technology, inevitably things do go wrong. One of our goals is to get the focus away from the technology and on to the curriculum. In so doing, however, we run the risk of treating the technical aspect of using technology too lightly. What have we learned? A lot. We have learned (for the millionth time) that you can never assume that novices will test things out. We have learned that plugging in equipment is not intuitive. Here are a few lessons:

- Teach interns to always test all equipment before the children arrive in school. Then test it again.
- Test access to Internet sites in the classroom where you will be teaching (not from home, not from the teacher's work room). Most schools use filtering programs; many have different levels of filtering set at different locations in the building.
- Don't just test the hardware and software. Test locations! Make sure that you can locate the project close enough to the screen so that the image size is reasonable. Make sure your cables and electric cords are long enough.
- Test the actual program, application or presentation using the computer you will use during the lesson. A presentation prepared on a high-powered computer in the university lab may not run very effectively on a less powerful computer in the school!
- Plug in the equipment. Laptops run on battery, but nothing else does. After moving the media cart, plug it in and reboot the laptop (the zip drive will not be recognized if it is not powered at bootup).
- Try out the software. Use i extensively. Know how it works – you have to anticipate the questions children will ask and they things they will try to do.
- Know how to end the program. (Quitting is not always easy!)

Does It Work?

To help preservice teachers develop proficiency in the use of technology for teaching and learning, it was not sufficient to add course requirements to our program. Rather, we had to seek ways that required our interns to use technology in their professional practice. Those of us who work with new technologies know that proficiency with new tools is not gained solely from reading about their use or by hearing others talk about the new tools. Therefore, simply adding a course in technology for teachers was not sufficient; we knew we had to add technology-enhanced experiences for our students. Real proficiency is gained when we begin to actually use the new tools for our own projects. Initially we added assignments at each level that required the active use of technology during fieldwork. We require candidates to do software reviews, to produce *HyperStudio* stacks, to use such programs as *Inspiration* and *Timeliner* during their teaching, to use digital photography and video for assignments, to use the Internet as part of lesson delivery, to submit assignments via email, and finally to develop an electronic portfolio during their internship and student-teaching semesters. All of these assignments have produced a growing expertise among our preservice teachers as users of technology for personal and professional work.

Comfort, however, often leads to complacency; when we found that the majority of our interns were comfortable with one set of new tools, we knew it was time to once again push the level of understanding by demanding more complex use of technology during their internship semesters. We wanted to move from the understanding of technology for teaching and learning at the knowledge and application levels of thinking to the higher levels of understanding required of those who analyze learning environments and then design new learning experiences. This would require interns to synthesize knowledge of learners, learning environments, and technology. The complex dynamism created as new teachers push their level of understanding on several dimensions at once is indeed a rich learning environment for both new teachers and the students with whom they are working. Just as these new teachers were feeling comfortable with their understanding of classrooms and the children in these classrooms, they were being pushed into disequilibrium by the requirement that they carry out a technology project that required them to involve children in the actual use of the technology. Even in times when children commonly interact with technology in their homes via computer games, DVD players and such, it is still not common to permit these same children to move into the world of technology in the classroom. As our interns began implementing newly designed projects that introduced children to new software and hardware, a wave of change has begun in our professional development schools. This change has gone beyond the interns and their students to their cooperating teachers, the teachers in classrooms nearby and to the administration of the schools in which they work.

The Clinical Faculty – the P-12 teachers with whom our interns work – are now suggesting new technology projects for the interns to take on. Many are trying some technology integration on their own – and are asking interns for help. The interns who are working with fourth graders this year have noticed that the many of children do not need to learn how to use the digital camera, for example, because the they learned from the interns who were in their classrooms last year. Children in the classrooms in our PDS sites have been exposed to a wide variety of hardware and software tools – and they are beginning to produce amazing products. Older children have produced book-tape packages for children in earlier grades; others have used video to produce school newscasts including local weather reports, producing town plans that include actual pictures of local business and buildings and eventually printing large-scale maps of their local communities. One multi-age first-second grade class adopted Engine Company #1 in New York City and produced a video and a book to send the firefighters. In every case, preservice interns have planned and developed these activities, have tied these activities to local and state standards and local curriculum, and have helped children create amazing products. The interns were learning to teach using technology and children were learning to read, write, compute or problem solve in technology enhanced learning environments.

This is appropriate use of technology in preservice education: mediating the learning of elementary students, preservice teacher candidates, elementary teachers, and college faculty, all at different but appropriate levels, creating true learning communities.

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"You purchased the software, now what?" Plan, Implement, Evaluate and Reflect on Software Usage in the Classroom.

Val Christensen, Valley City State University, US
Patricia Gegelman, Valley City State University, US
Linda Holcomb, Valley City State University, US

Valley City State University (VCSU) is a small, liberal arts campus in North Dakota. In 1996, the university became the second notebook campus in the nation. All students and faculty are issued a notebook computer and many of the classrooms on campus are networked for the use of computers and Internet connections. This technology literate campus provides an environment conducive to incorporating software programs into the teacher education methods courses. In addition, the University was awarded a PT3 grant further enabling the preparation of technology-proficient teachers.

This PT3 grant (Preparing Tomorrow's Teachers to use Technology) was awarded during the 2000-2001 school year in order to train inservice and preservice teachers to use technology in their classrooms. Three goals of the grant are that preservice teachers will: 1) meet NETS and NCATE standards 2) be provided with technology experience in the K-6 classroom and 3) be able to use technology to help their future students improve learning by developing complex reasoning and problem solving skills.

Collaborative workshops are held to train in-service teachers in a variety of software programs and give ideas for their use in the classroom. Participants include VCSU's Education Department faculty, in-service teachers from grant partner schools and technical support from a statewide Center for teacher training. This Center provides statewide training and consultation for teachers at all levels.

University courses provide students with an opportunity to utilize a variety of software programs and ideas for classroom use through various field experiences. Under the supervision of a University faculty member, the preservice teacher and the K-6 teacher participate in collaborative technology projects designed to develop higher order thinking skills in children. These projects reflect current best practices and VCSU's Teacher Education model incorporating planning, implementing and evaluating. The software program is implemented into the methods courses followed by classroom application. Three specific software programs used are "*Choices, Choices*", "*Kid Pix Deluxe 3*" and "*Storybook Weaver*".

Elementary Science Methods provides an opportunity for preservice teachers to view a variety of materials. One of the commercial products previewed is the CD-Rom simulation "*Choices, Choices – Kids & the Environment*" and its' accompanying handbook. *Choices, Choices* is based on an award winning series called *Decisions, Decisions* available from Tom Snyder Productions. Implementing the simulation aids the development of critical thinking skills through application, prediction, weighing options, and evaluation. Preservice teachers collaboratively develop a scoring rubric for reviewing all materials. Upon completion of the rubric the preservice teacher reflects on the application of the materials in an elementary classroom and considers the National Science Education Standards, inquiry, learner needs, planning and implementing. Knowing about various materials is useful, but knowing does not insure doing. Implementation is promoted through a tutorial developed to assist the preservice teacher in planning for the implementation of *Choices, Choices – Kids & the Environment*. The tutorial incorporates activities to prepare the teacher for the simulation, as well as possible activities to use with the K-6 student during the simulation. Templates for planning and student project scoring rubrics are also included in the tutorial to aid in evaluation. The preservice teacher acts as a bridge and provides assistance to the inservice teacher as they collaborate in delivering the Science based information.

In the field of Early Childhood Education, using computers in the classroom allows children the opportunity to gain experiences with technology as well as support the curriculum in a meaningful way. A challenge to the early childhood professional is finding software that promotes computer literacy without inhibiting creativity. Teachers seek materials that are developmentally appropriate and stimulate the young child's ability to use higher order thinking skills of organizing, summarizing and responding. A software program that is frequently cited as meeting the above criteria is *Kid Pix (*available from The Learning Company), which has been part of early childhood programs since its release in 1991. The teaching possibilities are numerous and varied. *Kid Pix* helps the young child build self-confidence and cultivate their natural creativity. At Valley City State University, preservice teachers are introduced to the software in methods courses and allowed opportunities in field experiences to work with multi-age children in a variety of classroom settings from kindergarten to fourth grade. With the introduction to the tools of *Kid Pix*, children and preservice teachers can create an array of projects that fit all areas of the curriculum. Preservice teachers act as mentors for the children in designing unique finished projects from original illustrated books to slide show presentations. *Kid Pix Deluxe 3* is the newest edition of the software program. Valley City State University education students have access to this latest edition of software and work closely with inservice teachers in selecting projects, which would cultivate children's natural creativity and reach their creative potential. Preservice teachers, inservice teachers and university instructors collaborate on ways that the projects children create will be evaluated.

Valley City State University provides a number of opportunities for students to learn about teaching Language Arts. In Methods and Materials of Language Arts II students are provided with experiences to view and use the software program *Storybook Weaver Deluxe*, also available from The Learning Company. This software program allows students to be actively involved in the writing process. It includes a simplified word processing program and a variety of graphic features that make illustrating stories fun and easy. *Storybook Weaver Deluxe* can be used to provide an introduction to writing for some and an opportunity to express one self in an enriched environment for others. Preservice teachers view the software and brainstorm ways that this program can be implemented into the elementary classroom. They also evaluate how this software can be used with the Standards for Language Arts. Preservice teachers that are working in a field experience can use the software with elementary students, come back to the methods class to discuss how it was implemented and reflect on methods for improvement. The goal is for the preservice teacher to generate ideas for implementation of the software and leave the cooperating teacher with the ability to continue using these ideas in the future.

As a notebook campus, Valley City State University produces teachers who are technologically proficient. This alone, however, does not ensure that teachers are able to successfully implement these technology skills into a classroom setting. The methods courses and software mentioned allow the preservice teacher to make decisions for planning and to use reflective problem solving skills while implementing these projects in a classroom setting. The collaborative efforts provided in the PT3 grant workshops ensure that evaluation and revisions take place in a supervised setting. All participants addressing reflection and evaluation assist in improving utilization of software. The end product is a learner-centered environment where K-6 students and preservice teachers, as well as inservice teachers learn by doing.

Exploring Digital Equity Using Digital Video Case Methodology

Nancy Clemens, Arizona State University, US
Debra Stirling, Arizona State University, US
Paul Skiera, Arizona State University, US

A major challenge faced by teacher education faculty is the infusion of technology and creating the highest quality learning environment possible. The use of digital video case methodology is a viable instructional approach to meet the learning needs of tomorrow's teachers. Inspired by the dedication to bridge the digital divide and provide high quality learning opportunities to preservice teachers, the National Educational Technology Standards (NETS) Digital Video Library (DVL) incorporated a digital equity expert commentary feature into its collection. A PT3 consortium led by Arizona State University is developing the NETS DVL. The online DVL shows video of teachers and teacher education faculty using technology in the classroom. The collection of digital video lessons are based on the NETS for Students: *Connecting Curriculum and Technology* (2000) and the forthcoming NETS for Teachers: *Preparing Teachers to Use Technology*. Carefully developed to address the NETS for students and teachers, the DVL lessons represent technology as an integrated component to reform-based curricula. PT3 community and digital equity leaders will provide expert commentary.

This presentation describes and demonstrates the possibilities of meeting the learning needs of preservice teachers by framing the infusion of technology into curriculum and instructional practices with a digital equity perspective. Members of the NETS DVL team will demonstrate and discuss the lesson commentary engine created to develop the collection of NETS-based lesson activities and demonstrate its use as a tool for digital video case-based instruction.

Two Perspectives on NETS as a Framework for Change in PT3

Catherine Collier
Warner Graduate School of Education
University of Rochester
United States
catherine.collier@rochester.edu

Dorothy M. Burke
Division of Education
Notre Dame College
United States
dburke@notredame.edu

Abstract: Through the program Preparing Tomorrow's Teachers to Use Technology (PT3), teacher educators increase their understanding of the effectiveness of instructional technology and how best to prepare new teachers to be accomplished users of technology. This paper discusses two PT3 grantees' approaches to professional development, where each implementation uses the National Education Technology Standards (NETS) in different ways. The purpose of the discussion it to point out the role of NETS in guiding a PT3 implementation to conform to a set of nationally recognized standards, without constraining the teacher preparation program unduly or compromising its existing standards of excellence.

Introduction

The program Preparing Tomorrow's Teachers to Use Technology (PT3) is consistent with the belief that effective use of technology for teaching and learning should be an integral part of teacher preparation programs. Understanding the uses of various instructional technologies and their potential to transform teaching and learning requires modeling by teacher educators and guided practice by preservice teachers in classroom settings. The difficulty is that many teacher educators and mentor teachers have little or no understanding of the power of instructional technology and are themselves only novice users of technology for professional tasks. Professional development for integrating technology in the curriculum may begin with developing new skills, but much more is needed than offering inservice workshops and classes on how to manipulate a particular software application to produce a result (OTA 1994; LeBaron & Collier 2001). How can teacher education faculty acquire the expertise to prepare preservice teachers to use technology effectively; how can they insure that mentor teachers in their professional development schools are modeling technology effectively; and how can they assess their students' use of technology unless they know what "effective use of technology" looks like? PT3 provides funds and support to address that dilemma. The support includes a comprehensive, timely, and thoughtful set of standards for demonstrating effective use of technology in professional practice and in the classroom.

For those providing professional development to teacher educators and K-12 partners, the National Educational Technology Standards (NETS) represent a graphical organizer that summarizes the technological skills, tools and techniques deemed valuable in teaching and learning. NETS are the result of an ISTE initiative funded by the United States Department of Education's PT3 grant program, developed with contributions from Apple, Milken Exchange on Education Technology and a consortium of distinguished NETS and PT3 partners and contributors (ISTE 2000). Supplementary materials, including exemplary lesson plans, templates, and teaching strategies, are also available in materials like *NETS-S/Connecting Curriculum and Technology* (ISTE 2000). Significant acceptance of the NETS across the country is helping teacher preparation programs to focus their instructional technology efforts on those technologies and their uses that will most benefit the K-12 teachers as they integrate technology into their curricula.

Each PT3 grantee fosters a partnership between teacher education faculty and K-12 teachers and, in that context, decides how those standards can best be implemented. As a result of the partnership and its associated professional development, K-12 teachers come to understand what technologies can help their students improve their critical thinking and problem solving skills and best prepare them for the workplace and for lifelong learning; at the same time, teacher educators increase their understanding of the effectiveness of instructional technology and how best to prepare new teachers to be accomplished users of technology. This paper discusses two PT3 grantees' approaches to professional development, where each implementation uses the NETS standards in very different ways. The purpose of the discussion it to point out the role of NETS in guiding an implementation to conform to a set of nationally recognized standards, without constraining the teacher preparation program unduly or compromising its existing standards of excellence.

Two Experiences with Implementation

The discussion focuses on two implementations of PT3 with the intention of showing how NETS can facilitate very different approaches to technology infusion in pre-service education. The first example is Notre Dame College in Manchester, NH, in its second year of a PT3 grant. The second is the Warner Graduate School of Education and Human Development at the University of Rochester, which is in its first year of implementation.

Notre Dame College in Manchester, New Hampshire, was invited by the New Hampshire State Department of Education (NHDoE) to participate in the three-year PT3 grant the state was awarded in the Fall of 2000. The timing was fortuitous, as Notre Dame had received a federal grant the year before that provided laptop computers to all faculty throughout the school. The Division of Education faculty were eager to begin serious investigations into how to use their new computers and how to apply them to their teaching. Partnered with Apple Corporation on the grant, the NHDoE supported the PT3 emphasis on the use of NETS as a guiding force. Notre Dame responded by revising their existing courses in instructional technology in line with the standards, and delivering professional development for faculty that also aligned with those standards. Faculty began modeling the use of technology in their instruction in existing education courses, and discussions are underway to revise the preservice teaching preparation program more fully into alignment with the NETS.

The University of Rochester's Warner Graduate School of Education and Human Development applied for and was awarded a PT3 implementation grant in 2001. The Warner School's approach to technology infusion is different from Notre Dame's. In developing its PT3 proposal, the Warner School wanted to shape its PT3 implementation in line with its role as a research school of education. The Warner School, which had no existing courses in instructional technology, regarded technology infusion as a systemic reform effort. The Warner School's instructional techniques emphasize inquiry and critical questioning, an excellent match for technology application (Jonassen 1999; Grabe 2000). In the Warner School implementation, each faculty member prepared an individual professional development plan for technology that addressed professional and research use of technology, integration in methods classes, and development of demonstration sites in area school where preservice teachers can observe exemplary application of instructional technology. Teacher education faculty committed to partnering with technology-using teachers in area schools to develop subject-specific courses on teaching and learning with technology. Warner School teacher education faculty benefited most from NETS as a framework that represents the "big picture" of technology and that articulates the national performance standards against which its preservice teachers and preservice program would be assessed.

Notre Dame College's Use of NETS for PT3

When addressing increased use of computer technologies in the schools, Notre Dame College in Manchester, New Hampshire believes it is important to put their use into a context that brings understanding as to why those particular technologies are supporting education. The invitation by the New Hampshire State Department of Education (NHDoE) for Notre Dame to participate in the three-year statewide PT3 grant aligned with the readiness by the Division of Education faculty to begin serious investigations into how to use their new computers and how to apply them to their teaching. During the first year of the PT3 grant, five integration meetings with the faculty and K-12 partners were conducted by the NHDoE personnel and an Apple Corporation consultant, all of whom supported the PT3 emphasis on the use of NETS as a guiding force. Additionally, an introduction to Apple's Evolution of Thought and Practice model (Sandholtz Ringstaff & Dwyer 1997) brought an appreciation that all participants were at different stages in their understanding of technology use for instruction. Faculty also saw that with each new technology addressed, the cycles of Entry Level, Adoption Level, Adaptation Level and Appropriation Level would be repeated. This reduced apprehension as colleagues recognized they were at the higher levels with some technologies and even the 'experts' were at entry levels with other technologies.

Participation in the PT3 grant by Notre Dame faculty was higher than most colleges statewide. Professional development meetings were hosted on campus once a month on Wednesdays, a day the faculty were already required to be on campus for late afternoon college meetings. All but one faculty member from the division were actively engaged in the grant; one member was on sabbatical.

Technology experience varied greatly across the twelve Notre Dame participants. Two had extensive backgrounds; two knew only word processing and electronic mail. To facilitate professional development, weekly sessions were offered. The instructor for the Technology Applications for Educators courses, who also served as the PT3 project liaison, offered two-hour work sessions for the faculty each week on Wednesday mornings. The initial technology stressed was Microsoft PowerPoint® and Inspiration®. The instructor also reviewed the remaining applications within Microsoft Office®, introduced faculty to Blackboard® and HTML, and provided consulting on any effort faculty members were engaged in with technology.

Attendance at professional development sessions the first year was strong. By the beginning of the second year of PT3 participation, the attention shifted from skills development to implementation. Faculty continued to increase their technology use, attending professional development workshops when they could, and engaged more actively in exploring changes within the preservice program to better equip the preservice teachers to use technology in their teaching.

Notre Dame consciously organized and delivered professional development for faculty that aligned with NETS-T and NETS-S. As a result, faculty became aware of the standards as they began modeling the use of technology in their instruction in existing education courses. At the same time, the Technology Applications for Educators courses, required of all preservice teachers, were reorganized around NETS, giving preservice students a thorough introduction to the standards. By year two, faculty began discussing the revision of the preservice teaching preparation courses more fully into alignment with NETS. The expectation is that syllabi will identify what technology modeling and student use will be taking place in each course, and all NETS standards will be addressed throughout the preservice preparation program.

Several ingredients contributed to success in the Notre Dame PT3 implementation:

- faculty ready to address technology integration
- common time available for workshops and discussions
- equipment and software available to each participant
- professional development opportunities in relevant tools and uses
- continual support from a technology-savvy individual working with faculty and encouraging new direction
- significant support from the division dean
- the PT3 grant to serve as catalyst and rallying point.

As with the University of Rochester implementation below, the PT3 grant itself brought focus and a sense of deadline, and the NETS documents provided the structure and criteria for assessment necessary for good course development.

University of Rochester's Use of NETS for PT3

The University of Rochester's Warner Graduate School of Education and Human Development applied for a PT3 grant in 2001. The school felt compelled to infuse technology in all of its departments—Teaching and Curriculum, Educational Leadership, and Counseling and Human Development. Technology infusion represented systemic change for the school, driven by several external forces that demanded technology integration. These included New York State recertification of teacher preparation programs, NCATE accreditation, and CACREP accreditation.

A PT3 Implementation Grant was awarded in July 2001, and a doctoral-level instructional technology specialist was hired to facilitate the school's efforts with technology. A series of professional development offerings were planned, and relevant documents and resources were assembled, including copies of NETS-T and NETS-S for Teaching and Curriculum (ISTE 2000), the draft TSSA standards for Educational Leadership (ISTE 2001), and technology standards for Counseling and Human Development (CACREP 2001). At an all-day institute in September, faculty from the three departments viewed and discussed a variety of approaches to teaching and learning with technology. One structured discussion asked small, cross-department groups to focus on their respective technology standards, guided by the question, "What is a technology savvy educator by

Warner standards?" Faculty recognized the importance of technology skill mastery and embraced the use of technology to promote high-order thinking and a sense of professional community. They also insisted that professional preparation include grappling with the digital divide (PT3 2001), a serious concern in the high-needs Rochester City School District. Throughout the discussion, faculty referred to the standards for their own department and for the other departments, noting and reconciling differences. Faculty acknowledged that their respective programs would be assessed against the standards and agreed to incorporate the standards in their courses.

As a next step, each faculty member worked with the instructional technology specialist to develop a realistic, challenging technology plan, in which they committed to integrating technology in their courses, their research, and their professional/administrative role. Teaching and Curriculum faculty who taught methods classes also agreed to revise courses and develop new courses that highlighted the use of technology in content area teaching and learning. They further agreed to partner with technology-using educators in area schools to develop demonstration sites for preservice teachers to observe best practice with technology. "Best practice" was defined in terms of NETS and instructional innovation, in keeping with the Warner School's emphasis on excellence in teaching.

It is expected that as new courses and course modules are rolled out, students will assess their knowledge and performance against the standards, cast a critical eye on technology implementation in schools, and reflect on teaching practices that incorporate technology.

Conclusion

NETS provides a framework for assessing preservice teachers and teacher preparation programs with regard to technology knowledge and integration. Each preservice program is free to use the standards in a manner consistent with its own emphasis. Notre Dame explicitly uses NETS-S and NETS-T in its course descriptions and syllabi. The University of Rochester uses NETS to guide student assessment and program development, while emphasizing innovative teaching, critical questioning, and social justice. In our experience, the standards provide a framework for technology infusion in complex, rigorous teacher preparation programs without constraining or compromising the excellence of the programs.

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BRIDGING THE GAPS: USING TECHNOLOGY AND OTHER GRANTS TO HELP ENGLISH LEARNERS SUCCEED

Debra Lee Cook Hirai, Advanced Educational Studies, Bilingual and Multicultural Education, California State University, Bakersfield, USA, *dhirai@csub.edu*

Irene Borrego, Elementary/Secondary Education, California State University, Bakersfield, USA, iborrego@csub.edu

The California student population has recently become ethnic majority. For this reason, immediate steps need to be taken to improve delivery of instruction to EL's (English Learners). Now, if you take three parts ELDPI, two parts PROJECT TNT (a PT3 project which is partnered with StarTEC), one part PROJECT EXCEL, and one part PROYECTO ALIANZA, you have an incredibly effective staff development component (or recipe) to assist teachers who work with English learners and to ensure the success of those learners.

This article will discuss all four grants, their components, intended objectives, and how, in collaboration with one another, they provided teachers with instructional strategies, assessment strategies and technology to use in the classroom. The product of this collaboration effort assisted teachers to implement strategies which have effectively impacted the success of the English Learner. The "best practices" video clips, which are the culminating activity for this collaboration effort, are the most advanced form of professional development in the field at this time.

THE GRANTS:

ELDPI:

ELDPI (English Language Development Professional Institute) is a California state funded project from the University of California President's office, with collaboration from the California State University at Bakersfield (CSUB) and the Kern County Superintendent of Schools Office (KCSOS), along with various school districts. This Institute is held for one full week during the summer, along with five follow-up sessions during the school year. The purpose of this Institute is to educate teachers, administrators, and paraprofessionals in ELD (English Language Development) and SDAIE (Specially Designed Academic Instruction In English) instructional strategies, along with assessment techniques and instruments, and implementation of the California State English Language Development Standards (ELD standards) in their classrooms. Participants are given an overview of the ELD standards, an overview of assessment techniques (in the ELD, Math, Science and Social Studies subject areas), and then many sessions on instructional strategies which they can use, all specific to grade levels 4-12 (4-6, 6-8, 9-12) and content areas, including ELD.

After the annual summer Institute week, follow-up sessions for the ELDPI include home to school partnerships, more strategies and a heavy emphasis on using technology; in particular, participants create personal electronic portfolios and reflect on the effectiveness of the instructional strategies used in their portfolios. The application of strategies learned, (electronic portfolios), is a crucial part of the staff development process, as school teams implement their instructional improvement plan (designed at the Summer Institute) and reflect on how well they are delivering instruction to English Learners (EL's), and how their students are performing in the class. The most effective electronic portfolios ("best practices" videos) are posted on the CSUB TNT website (http://wwwprojecttnt.com). By the end of the school year, participants have often reported a remarkable increase in student performance and in their ability to improve delivery of instruction to EL's.

Two of the project directors, Drs. Borrego and Hirai, from CSUB (California State University, Bakersfield), along with Javier Arreygui (an ALIANZA student), worked this past summer to encode some of the best practices displayed during the week-long Institute (2001). This includes video clips from keynote speakers, as well as teachers and consultants teaching effective instructional strategies to use with the EL student. These video clips can be viewed on the Project TNT (PT3) website, (see above), Learning Circle 3, "OLLE" (Online Language Learner Educators).

PROJECT TNT:

Project TNT (Teaching With New Technologies) is funded by the US Department of Education and it emphasizes "Creating a Technology-Friendly Culture in Today's Schools." StarTEC, Staff Teacher and Restructured Technology Education Consortium), another grant funded by the US Department of Education, is partnered with Project TNT and purchased training and equipment for TNT. Project TNT concentrates on developing "best practices" video cases which will showcase teachers using effective instructional strategies with EL students and with students in other content areas. Many of those teachers are participants of the ELDPI Institute. This project provides the equipment (cameras, lights, microphones and most importantly, "ibook" laptop computers with video editing equipment) which is used by participants to create and edit these videos. Also important to note is that Proyecto Alianza, a grant funded by the Kellog Foundation to assist certificated teachers from other countries (primarily Spanish speaking) obtain their California Teaching Credential, also collaborates with Project TNT.

PROJECT EXCEL:

Project EXCEL (Excellence in Curriculum for English Learners) is a partnership with the Kern High School District to assist in training high school teachers and CSUB faculty to work effectively with EL students. This project is funded by Title VII from the US Department of Education. Their first presentation involved Norm Gold and a discussion of Prop 227 mandates. Project EXCEL has not only provided many high school teachers with the ELDPI training, but also has paid to have many of the sessions videotaped, in addition to purchasing textbooks for them—Teacher's Handbook, Contextualized Language Instruction by Judith L Shrum and Eileen W. Glisan.

THE RECIPE:

ELDPI provided the basic professional development for the participants. PROYECTO ALIANZA worked with ELDPI in offering the opportunity for teachers from other countries to also receive this training. Project EXCEL provided the videotaping, offered opportunities for high school teachers and CSUB instructors to participate in the Institute, in addition to purchasing textbooks. Dr. Borrego and Dr. Hirai worked with Project TNT and Javier Arreygui, to encode the video from the Summer Institute (2001). They are continuing to work on encoding individual teacher "best practice videos", which all Institute participants are expected to produce by the end of the 2001-2002 school year.

The end product is an ongoing and ever increasing supply of teacher "best practice" videos which are organized according to ELD, SDAIE, Multicultural instructional strategies on our website, with open access to all teachers. The ELD, and SDAIE strategies are grouped according to grade levels. The Multicultural strategies are grouped according to content area (Math, Science, Social Studies and other core subjects). These video clips are an average of 2 to 5 minutes long and they focus on ELD, SDAIE or multicultural strategies. Each "best practice" will also include a reflection piece, done either by the participant, a college professor, or other well-known experts in the field.

This is the newest and most readily accessible form of "peer coaching" available. Peer coaching is very time consuming and requires reliance on release time and knowing that the showcased lesson will be effective, with no undue interruptions or discipline problems. With the best practices video clips, teachers can view them in the comfort of their own home, or at the school site with input and reflections from other teachers. If a teacher needs to teach a particular skill, for example, reading comprehension, grades K-2, for ELD, they can "click' on ELD strategies, K-2 Reading, on the project TNT website and view numerous strategies demonstrated by consultants and/or teachers in the classroom. This is the most innovative, state of the art, type of professional development available for teachers.

EQUIPMENT NEEDS:

We began to test the editing process, by encoding video clips from the last ELDPI summer Institute, using all the technological equipment Project TNT had to offer. It became immediately apparent that we needed additional resources to complete our small project! What were we going to do for our 180 participants who were required to produce these "best practices" video?

First we needed lights and digital cameras (with firewires), cordless microphones, and "ibooks" (laptop computers produced by Apple) with firewire ports and loaded with "Quicktime" software for editing video. Then we discovered we needed headphones for the computers, a quiet place to videotape and edit, more hard drive space, a mouse for every computer we were using, a CD rom burner, lots of video tapes and a server big enough to hold all the videos!

In addition, we needed time—lots of it! And we needed training. Learning the program is not that difficult, but it does take time and dedication. We needed training in the editing process and in learning the fine art of videotaping.

Those hurtles overcome, we needed to think about how we would accommodate 80+ teachers and their equipment needs to videotape, edit and reflect on their lessons, in addition to providing time to train them in the videotaping and editing process. During each of the follow-up sessions for ELDPI, our Institute and Project TNT collaborated on providing the training. Each session contained a one and a half hour block of time for training on the portable "ibook" lab which was purchased through TNT. We discovered then that we did not have enough cameras to work with all the "ibooks" and videos the participants brought with them. With the help of Project Excel and the School of Education, we had barely enough cameras for the second session. The third session contained more time (two hours) for editing, more cameras and more "ibooks" (loaned to us by the Apple Corporation). By the end of the second session, participants were exceedingly excited about producing their "best practices" videos and extremely comfortable with using the "Quicktime" software for editing. We all witnessed the production of some very powerful electronic portfolios!

CONCLUSION:

Another project, SLICK (Second Language Institute for the County of Kern) has since joined us and will be encoding their videos and posting them to our website, also. The success of ELDPI is evident in the excitement created by the networking of teachers' creative SDAIE and ELD instructional strategies, and the expertise generated by the participants as they learn to use the "imovie" equipment and software. This year we had different teams return to the Institute from the same schools as last year, and this summer we will hold two separate Institutes to accommodate the growing number of teachers, paraprofessionals, administrators, directors and other district and school personnel who desire this training.

Developing and Integrating Internet-2 video content into Teacher Education Programs

Steven Coombs
School of Education
Sonoma State University
California State University
United States
steven.coombs@sonoma.edu

James Fouché
School of Education
Sonoma State University
California State University
United States
James.fouche@sonoma.edu

Abstract

Sonoma State University (SSU) is part of the California State University (CSU) system and has recently been awarded a substantial PT3 Federal catalyst grant over period 2001-2004 for project **'Light Bridge'**. The Light Bridge project aims to develop video content resources for California's Internet-2 network, the next and most powerful generation of today's Internet. The project is both piloting and establishing revolutionary practices in preparing pre-service teachers to be adept and sophisticated in using technology in the classroom.

Overview of the Light Bridge project

The Light Bridge is a PT3 Catalyst project that aims toprovide video content for California's Internet-2 Broadband network. The project aims to pilot and establish revolutionary practices in preparing pre-service teachers to be adept and sophisticated in using technology in the classroom. The specific goals of the project are to:

1) Strengthen teacher education programs through the development of rich video content offered via the next generation of the Internet Broadband network;
2) Establish a student teacher support and supervision system that assures high quality support and assistance at a distance; and,
3) Disseminate teacher education video content, online resources, and student teacher support and supervision system.

Specific examples of Light Bridge activities include developing and maintaining rich visual teacher education content; piloting the use of video conferencing for teaching, supervision, and mentoring of pre-service teachers; and, capturing the classroom performance of pre-service teachers for analysis and criticism by mentor teachers and university supervisors over the network. While the Light Bridge project will initially be implemented at the Sonoma State University (SSU) campus (serving pre-service teachers and rural and low-income schools to which they are assigned), it will quickly be expanded to include pre-service teachers at California State University campuses all over the state. This represents a cohort of over 25,000 pre-service teachers per year. Light Bridge has the potential to revolutionize teacher preparation methodology nationally through SSU's connections with nationwide teacher education reform organizations, such as the Renaissance Group and the National Network for Education Renewal.

This paper seeks to explore the pedagogical protocols of using video-based technology as an instructional medium for teacher training. We will consider the cautions of introducing video-based Internet instructional IT media raised by Maddux (1998) and identify pros and cons between using video-based media compared to face-to-face learning environments. Consequently, we will be expanding upon the issues recently raised by Sipusic *et al.*, (1999) in their research report for SUN Microsystems "Virtual collaborative learning: A comparison between 'Face-to-Face' Tutored Video Instruction (TVI) and Distributed Tutored Video Instruction (DTVI)." They reported findings indicating:

1. Most importantly, our research shows that video-mediated communication can in fact support both the content and relational components of discourse that are necessary for effective collaborative learning. The collaborative learning effect is fully intact with DTVI, opening the door to the widespread use of more effective distance learning models than the lecture-based model currently being used.
2. Furthermore, we have demonstrated that video-mediated collaboration can generate high levels of user satisfaction. While the DTVI students reported enjoying their experience slightly less than the TVI students, they reported enjoying it much more than a typical classroom lecture.

3. With DTVI generating higher academic performance and more enjoyment than classroom lecture, distance learning no longer need be considered a poor cousin to face-to-face instruction (*page* 45).

This PT3 catalyst project is also exploring how the use of video-technology pedagogical resources can be integrated into reforming the instructional design of higher education teacher education programs. A principle aim is to implement the joint Educational Technology teaching standards set by both the 'International Society for Technology in Education' (ISTE) and the 'National Council for the Accreditation of Teacher Education' (NCATE). Both ISTE and NCATE have jointly accredited National Educational Technology Standards for Teachers (NETS-T), which are aimed at reforming current practice within teacher preparation courses through the provision of a common set of performance indicators that levers Ed Tech integration. The Light Bridge project has adopted these ISTE Ed Tech teaching standards, as well as the Californian Standards for the Teaching Profession (CSTP), and has integrated them into several funded project areas that involve the following six curriculum development teams within SSU:

1. Classroom management;
2. Reading Language Arts and Second Language Acquisition;
3. Mathematics and Science;
4. Physical Education;
5. Video Case Studies; and,
6. Videoconferencing/Student Teaching

This PT3 catalyst project espouses Stenhouse's (1975) notion of achieving best practice curriculum development and reform of practice, through adopting his "teacher as experimenter" approach. Thus, we are funding reforms of *authentic* faculty programs and courses that require the key educational research and development tasks: video content development; course integration; and, obtaining feedback (task review) according to Elliot's (1991) action research reflection-upon-practice recursive cycle. We will be disseminating our first year pedagogical 'findings' of these research 'tasks' to this conference and will also be seeking to hold a video festival of exemplary video-clips that have been compiled from content sources developed by our project teams.

Conclusion

Light Bridge is an innovative Internet2-based development of video content for university teacher preparation programs. It relies upon the cooperation of a broad array of both public and private sector partners: school districts; county offices of education; universities; credential programs such as 'CalStateTEACH'; CENIC (Corporation for Education Network Initiatives in California)/DCP (Digital California Project); and, corporate partners such as Cisco Systems and Apple, Inc.

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Useful Websites:

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Developing and Integrating Internet-2 video content into Teacher Education Programs - Video Festival Demonstration

Steven Coombs
School of Education
Sonoma State University
California State University
United States
steven.coombs@sonoma.edu

James Fouché
School of Education
Sonoma State University
California State University
United States
James.fouche@sonoma.edu

Abstract

Sonoma State University (SSU) is part of the California State University (CSU) system and has received a PT3 Federal catalyst grant over the period 2001-2004 for project **'Light Bridge'**. The Light Bridge project aims to develop video content resources for California's Internet-2 network, the next and most powerful generation of today's Internet. The project is both piloting and establishing revolutionary practices in preparing pre-service teachers to be adept and sophisticated in using technology in the classroom.

Video Festival proposal for the Light Bridge project

The Light Bridge is a PT3 Catalyst project that aims to produce exemplary video content material for integration and experimentation into teacher preparation programs across the California State University system.

We aim to show a compendium of videoclip content material as exhibits that capture the classroom performance of pre-service teachers for analysis and criticism by mentor teachers and university supervisors. The following developmental curriculum areas are being 'captured':

1) Classroom management;
2) Reading Language Arts and Second Language Acquisition;
3) Mathematics and Science;
4) Physical Education;
5) Video Case Studies; and,
6) Videoconferencing/Student Teaching

Any video content that has been placed on an Internet-2 server and can be connected via a broadband Internet connection at the conference venue could also be demonstrated as part of the 1 hour video festival demonstration session. We will produce an instructional handout for the delegates summarizing the project. This festival proposal represents the practical component to our proposed full paper on the topic, which has also been submitted to SITE 2002.

Useful Light Bridge Project Website References:

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Faculty Development and the Process of Change

Corenna C. Cummings
Lisa Mehlig
Deborah Kalkman
College of Education
Northern Illinois University

The *Partnership to Infuse Technology into the Teacher Education Curriculum*, a PT3 Implementation grant awarded in 2001, focuses on the simultaneous professional development of teacher education faculty and in-service teachers so that they will model meaningful implementation of technology and engage pre-service teachers in its use in university courses and clinical experiences. The primary goals of the project are that faculty and P-12 teachers will model the effective integration of technology for teaching and learning, and subsequently, graduates of the teacher education program will meet or exceed technology standards for first year teachers. The university's Colleges of Education and Liberal Arts and Sciences, the university's Faculty Development and Instructional Design Center, four school districts, two community colleges, and one business have partnered in this effort. The project components include: Integrating Technology in the Curriculum (ITC) course for faculty, the Engaging with Technology (EWT) on-line course for teachers, technology-rich clinical placements for pre-service teachers, technical support for pre-service teachers, a faculty/teacher exchange within ITC and EWT, the Summer Institute, and the establishment of a virtual learning community through the WebForum.

In fall term of each year of the grant, new faculty in the College of Education take the formal 16 week course, Integrating Technology in the Curriculum (ITC) while they are paired with teachers from the four partner districts taking the formal 16 week on-line course, Engaging with Technology (EWT). In spring term, continuing faculty in the university and community colleges take ITC and are paired with district teachers taking EWT. In both semesters, pre-service teachers in both third and fourth professional semesters, are paired, for their clinical experiences, with district teachers either taking or having completed EWT. Thus, active triads of faculty, teachers, and pre-service students are engaged in independent and collaborative efforts to effectively integrate technology into teaching at multiple levels.

Our most critical and fundamental component is ITC and, we have more experience with this component than any other. The ITC course was first delivered in fall 1999 as a mandatory course for new faculty hired by the College of Education. The College of Education has fully supported the delivery of the ITC course during the fall term of each of three years. In 1999, nine faculty completed the course, which met 3 hours per week for 16 weeks. New faculty were reassigned from teaching one course to take ITC. The original objectives were first, to rapidly improve the instructional skills of faculty in effectively integrating technology in their courses, and second, to facilitate the development of a cohort of faculty who were encouraged to work collaboratively in instruction and research using technology. The ITC course was again delivered in Fall 2000 under similar guidelines to 13 new faculty. During that term, new faculty in other colleges at NIU who taught preservice teachers were invited to attend. In Fall 2001, the 16-week, for-credit, ITC course is mandatory for 19 new COE faculty. Faculty were again reassigned from teaching a course to enroll in the course. The content of the course includes topics such as engaged learning with technology, ISTE and NCATE standards for technology, awareness of the technology available for instruction and research throughout the university, information tools, network tools, PC system maintenance, presentation tools, interactive multimedia (digital cameras and camcorders, working with graphics, etc.), distance education, BlackBoard, WebBoard, e-portfolios, assessment by and for technology, copyright and ethical issues, instructional video, and funding sources on-line.

During the spring term of each of the three years of the PT3 grant, 2002 to 2004, the ITC course will be offered to faculty in the partner colleges including College of Liberal Arts and Sciences, the College of Education, and the two community colleges on a competitive basis. Instead of providing a course reassignment, the faculty will be offered a stipend. Over the last two years, many senior faculty have requested the ITC course be offered to them. We anticipate more applications than we have room for in the course.

For the purpose of this paper, our research questions of interest are as follows:

(a) Does the ITC course, as currently configured, provide the framework for faculty to adopt the use of technology throughout their work as faculty, and particularly in their teaching?

(b) In the language of Rogers' Diffusion of Innovations (1995), who are the innovators, early adopters, early majority, late majority, and laggards with respect to adoption of technology?

(c) Using Roger's Model of the Innovation-Decision Process, can we determine the effect of the ITC course on the stages of the innovation-decision process: Knowledge: awareness of the innovation; Persuasion: attitude formation of the potential adopter; Decision: symbolic adoption; Implementation: trial or behavioral adoption of the innovation; and, Confirmation: seeking of reinforcement.

(d) Further, are modifications to the course structure needed to facilitate the adoption of change by the growing number of faculty who have completed the course so that we can observe movement toward the goals: modeling effective technology use in classroom, revising courses to include technology integration, requiring students to use technology in coursework, using new assessment models incorporating e-portfolios, and aligning curriculum with state and NCATE standards and our conceptual framework?

(e) Which faculty are most successful in moving toward the intermediate objectives as directed by the Logic Model based evaluation (McLaughlin and Jordan, 1999)?

Data that have been or will be collected, prior to March 2002, relevant to the project evaluation and decision-making in regard to the ITC course include:

1. Cohort studies of the classes of '99, '00, and '01 through focus group interviews, individual interviews and document reviews of syllabi and course materials, and, a survey of current skills and technology integration and needs for more training, information, and interaction with the technology and grant staff.
2. Pre and post measures of the '01 class of technology integration skills and use, and attitudes toward change in their teaching
3. Survey of undergraduate College of Education pre-service teachers on skills and attitudes related to their technology use, technology use by their instructors, and course requirements using technology; first conducted in Spring 2000 and to be repeated in January 2002.
4. Applications from faculty to take the spring '02 ITC course that will include statements of current competence, interests, needs, and plans for use.
5. Technology survey and needs assessment of regular continuing faculty in the partner university and community colleges

The Logic Model (McLaughlin and Jordan, 1999) "describes the logical linkages among program resources, activities, outputs, customers reached, and short, intermediate and longer term outcomes." This model provides the underlying framework for the project evaluation and therefore guides the collection of data for decision-making purposes. Underlying the evaluation of the grant activities is the Rogers' (1995) Diffusion of Innovations Model. The innovation-decision process is "the process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision" (Rogers, 1995, p. 163). Within this framework, the data will be examined to answer the research questions noted above. The presentation at the SITE conference of this analysis of the ITC course would focus primarily on the issues of faculty development and change.

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Integrating Technology Use in the Interning Experience

Marcia Cushall, Frostburg State University, US

The use of technology in the classroom can empower both teachers and students. However, its effectiveness in instruction depends on how teachers and teacher candidates use technology in their classrooms (Maddux, Johnson, & Willis, 2001). Teacher preparation programs should prepare candidates to integrate technology appropriately and effectively throughout the curriculum. This preparation must be achieved through instruction, field experiences, clinical practice, and assessments (NCATE 2000 Unit Standards). Assessment of candidates' use of technology in the classroom is an important component part of their field experiences.

The assessment of the candidate's performance should include assessment of the planning for appropriate use of technology, delivery of instruction, active involvement of the students in the use of technology and reflection about the process and the student learning. Performance assessments that include these elements have been developed by the Maryland Technology Consortium. The consortium evolved from a University System of Maryland (USM) task force convened in 1998 to define Maryland Teacher Technology Outcomes and performance assessment tasks for beginning teachers.

The task force consisted of K-12 teachers and coordinators, higher education faculty, Maryland State Department of Education (MSDE) personnel, and personnel from the Maryland Higher Education Commission (MHEC). During spring and fall of 1999, the draft outcomes developed by this task force were distributed to schools and professional organizations for feedback.

During this same time, the task force lead by MSDE applied for and received a PT3 Catalyst Grant to continue its work. The task force membership was then expanded to create the Maryland Technology Consortium. The consortium included the original task force members, representatives from additional institutions of higher education and additional local schools, more representatives from MHEC and MSDE, and representatives from the Human Resources Research Organization and from the Regional Technology in Education Consortium. The goals for the Maryland PT3 Catalyst Grant are 1.) curriculum redesign, 2.) development of performance assessments, and 3.) candidate development of electronic portfolios.

Supported by funding from the grant, the outcomes were revised and draft performance assessment tasks were developed for three of the seven outcomes. The revised outcomes address the following seven areas: 1.)information access, evaluation, processing, and application, 2.) technology communication, 3.) legal, social, and ethical issues, 4.) assessment for administration and instruction, 5.) technology integration, 6.) adaptive and assistive technology, and 7.) professional growth. In development of the performance assessment tasks, each task was to include the technology outcome, the technology indicators, the knowledge and skills needed to perform the task, a task summary, the scoring tool and criteria for evaluation, benchmarks, instructor notes, and curriculum connections.

In fall, 2000, the three performance tasks were piloted on several campuses and work began on the remaining four outcomes. In fall 2001 the outcomes became standards and the performance assessments were disseminated for full scale implementation of the standards and assessments within Maryland higher education. Standard V addresses integration of technology into the curriculum and instruction. Two performance assessments were developed for this standard and it is expected that these assessments will be completed during a candidate's interning experience. The first assessment addresses the use of technology in the delivery of instruction; the second addresses student use of technology to support problem solving, communication and collaboration. Both assessments include evaluation of the planning for instruction, the delivery of the instruction, and reflections about the instruction.

The use of technology in the classroom can empower both teachers and students. However, its effectiveness in instruction depends on how teachers and teacher candidates use technology in their classrooms. Assessment of candidates' use of technology in the classroom is an important component part of their field experiences. Performance assessments that include field-based components have been developed by Maryland Technology Consortium. The consortium evolved from a University System of Maryland (USM) task force convened in 1998 to define Maryland Teacher Technology Outcomes and performance assessment tasks for beginning teachers. To continue its work after the draft outcomes were developed, the task force applied for and received a PT3 Catalyst grant. Supported by the grant, performance assessments were developed. One of the standards (formerly outcomes) addresses integration of technology into the curriculum and instruction. Two performance assessments were developed for this standard and it is expected that these assessments will be completed during a candidate's interning experience. These field-based assessments will be shared and discussed. Participants will be encouraged to offer feedback on the content and form of the assessments.

PT3: Preservice Teacher Education - How to integrate technology into teaching successfully using Intel's Teach to the Future

Shirley Davis, New Mexico State University, US
Susan Brown, New Mexico State University, US

New Mexico State University (NMSU) adopted a unique program to enhance their pre-service teachers program to integrate technology into teaching. This program meets the NCATE technology competency requirements and dovetails with what NMSU has been doing in the College of Education to integrate technology into teaching. Pre-service teachers are learning content knowledge about science, math, or early childhood education as well as the use of technological tools and how they enhance learning environments. Furthermore, these students are becoming technology savvy, more confident and better problem solvers in meeting the needs of the students of the 21st century or the digital generation.

Introducing the "Intel Teach to the Future Pre-Service Program":

> "Intel® Teach to the Future Pre-Service Program was designed to address the challenges that future teachers will face in effectively applying computer technology to enhance student learning. At the completion of the Intel Teach to the Future curriculum, pre-service teachers will have created a well-documented Unit Portfolio that engages students and helps them attain state and national standards.
>
> The planning process begins with pre-service teachers determining what the K-12 student should be able to understand and achieve by the end of the unit. Next, pre-service teachers make decisions about what sort of evidence they would accept to prove that their students have developed this level of understanding and skill development. Throughout the Intel Teach to the Future curriculum, technology is used as a tool for K-12 students to create products that demonstrate their understanding and skills. As part of the Unit Portfolio, pre-service teachers create sample student products along with assessment tools to be examples and models for their future students. Once pre-service teachers have clearly outlined the desired results and created sample projects that demonstrate acceptable evidence of understanding, they then plan instructional activities and create teacher productivity products to support their unit."
>
> http://www.intel.com/education/teach/preservice.htm

We believe that the power of technology cannot be tapped unless it is grounded in new models of teaching and learning based on a student centered, project based curriculum, increased opportunities for active, hands-on learning, and respect for multicultural diversity. The goal of the "Teach to the Future" Program is to help pre-service teachers expand the boundaries of their creativity and the creativity of their students beyond the walls of the classroom. The modules provided by Intel are dedicated to actively engaging the pre-service teachers so that they construct knowledge through actions and interactions within their environment. The skills that the students learn are not isolated, but are integral parts of the classroom environment. With the help of the Intel modules, the NMSU team is helping the pre-service teachers become comfortable with the technological tools and become knowledgeable in using these technological tools to enrich the learning of *all* students in their future classrooms.

We tailor Intel's "Teach to the Future" program to dovetail with NCATE technology competency requirements. Pre-service teachers will take a technology survey at the beginning of the semester with questions coming from NCATE technology competency requirements. Students will create "technology badges" using MS Excel to see where their strengths and weaknesses are. The technology badge will provide the instructor a blueprint in tailoring students' learning to meet the NCATE requirements. Students build "electronic portfolios" as they progress through the "Teach to the Future" program. At the end of the program students take the technology survey again and create a post "technology badge" to show progress. They will also have a collection of resources in their "electronic portfolio" to help them when go into the classrooms to teach.

Intel program allows instructors to select various modules for their students in the following classes: Language Arts and Social Studies, Methods of Teaching Elementary Science, Early Children Science and Math Methods, Integrating Technology into Teaching. All of them are required courses for Teacher Education Program (TEP) at NMSU. The modules include the following: copyright issues, creating unit lessons plans, locating resources for unit portfolios, creating student multimedia presentations, creating student publications, creating unit support materials, creating student web sites, teacher support materials, developing plans for implementation and showcasing unit portfolios.

The structure for implementing the Intel program is for pre-service students to take EDUC 368: Integrating Technology into Teaching (a pre-requisite course) before entering the TEP. Students taking this course cover 8-10 modules listed above. When these students enter the methods courses during TEP, they will already have the basic foundation of computer technology to allow the instructors to go right into content areas using the skills the students have learned.

The New Mexico State University College of Education is dedicated to the highest standards in our teacher preparation courses. These pre-service teachers will be shaping the future by teaching the students of the future. It is imperative that we keep up-to-date and using technology as the avenue to open wider the world of learning, the Intel modules will be a welcome addition to our curriculum. Dr. Brown, and Ms. Davis compose a team of faculty leaders who will guide others in this implementation of technology modules.

Sustainability of a PT3 Program: A Case Study

John M. Decman
School of Education
University of Houston-Clear Lake
United States
decman@cl.uh.edu

Lawrence T. Kajs
School of Education
University of Houston-Clear Lake
United States
kajs@cl.uh.edu

Abstract: A key issue in educational change is the ability to sustain change related to educational innovation. Although vast numbers of educational innovations have been introduced into schools over the past 20 years, few have succeeded in effecting affective, behavioral, and cognitive student gains (Hord & Hall, 1986; Morris, 1997; Rubin, 1983). In 2000, the University of Houston-Clear Lake, in collaboration with eight school districts, DePaul University, and corporate sponsors received a three-year, one million dollar grant from the U.S. Department of Education to infuse technology into teacher preparation. Since programs tend not to be continued after federal funds terminate (McLaughlin and Berman, 1977), researchers with the UHCL collaborative studied factors related to the sustainability of innovations after grant's end. This paper will discuss the factors that influence the successful sustainability of innovations in an educational environment and apply these factors to the UHCL PT3 program, using a case study format.

Introduction

A key aid in initiating school change, especially in the areas related to technology, is the acquisition and use of grants from both public and private sources. Essential in this process is the realization that grants function as temporary catalysts for meaningful change. Many of the attributes associated with sustaining educational programs or innovations need to be in place prior to and during implementation of the grant in order to sustain the program or innovation after grant funding ends. Researchers at the University of Houston-Clear Lake identified attributes that relate to the successful institutionalization and sustainability of educational innovations and incorporated findings into practices related to the Preparing Tomorrow's Teachers to Use Technology (PT3) grant.

Overview of Sustainability

The concept of "sustainability" of any educational innovation is relative new to research and is equally as imprecise. Wormsley (1990) illustrated the ambiguity of the "sustainability" concept through a series of unanswered questions. Sustainability of a grant's innovative process often collapses at the end of the funding period due to local causes including failure to continue financial support, lack of skilled manpower, and lack of interest (Wormsley, 1990). Consequently, decision-makers must be aware of these factors to ensure sustainability for the long-term success of innovations. Without sustainability, any innovation is likely to fail Curry (1992). While the use of the term "sustainability" is relatively new to research, Vaughn, Klingner and Hughes (2000) define sustainability as the extent to which it is reasonable to assume that educators will continue practices over time. This process, then, can be described as organizational change.

Miles' (1983) work illustrated two cogent points about the process of organizational change. First, he pointed out that the majority of work on change stresses the "front end" of the process of change, or the adoption of the innovation. Second, he concluded that a helpful method of viewing the sustainability of change efforts is through a process of providing supports and overcoming obstacles. In addition to the support and obstacle approach, there is a general flow of the activities associated with sustainability that begins with the organization and flows through the users of the innovation to the innovation itself.

Bell (1983) approached the concept of sustainability by discussing the interaction between the innovation and organization, and four categories of factors. These factors, when applied to the context of an innovation, provide a method of assessing the likelihood of the sustainability of the innovation. The factors are those related to the (1) nature of an innovation, (2) nature of the organization, (3) external environment and needs of the external environment, and (4) granting agency. Researchers at UHCL used Miles' (1983) and Bell's (1983) approaches to guide the case study about the UHCL PT3 program. The following case study incorporates issues related to sustainability of educational innovations and discusses the implications of the findings.

Case Study

A key feature in providing organizational support to the innovation is the willingness of the organizational leadership to function proactively at three levels: (1) providing appropriate funding, and (2) supporting the innovation mandated use and rewarding of employees who contribute to the innovation, and (3) providing for staff development activities. The collaborative addressed these features through infrastructure and personnel. Leadership acquired a cold-fusion server for grant project's use and supported professional development among faculty and staff, and helped implement the PT3 program objectives in the teacher preparation program.

A second area of influence on sustainability relates to the ability of the organization to support the users of the innovation through the change process. Particular emphases include activities related to user commitment and staff turnover. Through the grant, leaders provided resources, including release time, to assist users in implementing project objectives and in researching specific facets of the innovation. Additionally, the School of Education, through its own funds, invested in both hardware and personnel to assist in the creation and maintenance of a comprehensive website. The issue of staff turnover, in this particular case, was considerably more difficult to address as the concept of "soft money" could adversely impacted the continued employment of grant personnel.

A final key to sustainability lies in the quality of the innovation. In this area, the collaborative focused on two primary areas: (1) the mission of the School of Education, and (2) the requirements of the granting agency. Through this effort, the innovation became a comprehensive tool for the education of teacher candidates and the improvement of Pre-K to 12th grade education. Ongoing assessments have also been incorporated into the grant cycle and have been a stimulus to adapt professional development activities and to improve the content of the website. According to Stiggins (2001), two conditions underpin assessment success: (1) clear and appropriate achievement targets, and (2) an assessment-literate faculty. Consequently, educational leaders need to understand the issues, e.g., personnel, organizational environment, involved in the change process, particularly when attempting to sustain educational innovations.

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“Ready To Teach”
A Design Team Collaboration

Marjorie Dennis, University of Massachusetts Lowell
Project Coordinator, Graduate School of Education
Marjorie_Dennis@uml.edu

Dr. Patricia Fontaine, University of Massachusetts Lowell
Design Team Facilitator, Graduate School of Education
Patricia_Fontaine@uml.edu

John Wren, University of Massachusetts Lowell
Project Technology Assistant, Graduate School of Education
John_Wren@uml.edu

“Ready to Teach”, a Preparing Tomorrow’s Teachers to Use Technology project, provides training and support for higher education faculty who will model technology use in their classrooms. University faculty, K-12 cooperating teachers, and preservice teachers work together to fully integrate technology into classwork and curriculum.

In an effort to further the PT 3 initiative at the University of Massachusetts Lowell’s Graduate School of Education, we created six design teams. Each team consists of cooperating teachers from local public schools, preservice teachers in the Graduate Program of Teaching and faculty from the Graduate School of Education as well as the division of Arts and Sciences. During the first year of our Implementation grant, we supported these teams in a successful collaboration that cut across grade levels, elementary through graduate school. The ultimate outcome from each team was a curriculum unit infused with technology that can be taught in the region’s elementary schools. In addition, preservice, inservice and university faculty were exposed to the uses of multimedia equipment, software and other resources in order to become technology-proficient curriculum integrators.

Our poster presentation will highlight a successful collaboration among a second grade team from a local elementary school, an elementary social studies class of preservice students and their faculty advisor, and a university arts and sciences faculty member who is a specialist in Native American history and culture. The second grade team consisted of four classroom teachers, one special education teacher and the building technology specialist who is a certified teacher. The curriculum unit that is taught at this level is Native Americans in the Merrimack Valley.

We will present a poster of work that was produced as well as demonstrate on two laptops the lesson implementation at the school site and the projects completed by the preservice students. This work will exhibit the participants’ use of multimedia, Internet research and web design skills. Our presentation will walk the viewer through the entire design team process culminating in these finished products.

We consider year one to be a pilot year for the use of this design team format. We will share lessons learned that will make the process even stronger in the following years of the “Ready to Teach “ project. We have found that successful collaboration can occur among the constituents, that products can be disseminated across school districts, and that technology skills learned by students and faculty can be easily incorporated into university classes as models of teaching and learning.

Evaluating Web-based Environments for Teacher Professional Development on Technology Integration

Sara Dexter
sdexter@umn.edu

Christine Greenhow

Eric Riedel

Center for Applied Research and Educational Improvement (CAREI),
University of Minnesota
U.S.A

Abstract: Quality teacher professional development (TPD) for technology integration is especially needed. Online delivery methods offer much promise for anytime, anywhere teacher learning. Evaluation tools and methods can help designers of technology integration TPD sites meet their goals of providing quality learning opportunities for teachers. We developed and implemented a plan to evaluate issues of quality and quantity in web-based TPD sites. We present these methods and illustrate their application to a technology integration TPD site called Ed-U-Tech.

Introduction

Teacher professional development should support teachers' construction of new knowledge as well as connect with what teachers do everyday (Corcoran, Shields, & Zucker, 1998; Joyce & Showers, 1995; Loucks-Horsely, Hewson, Love & Stiles, 1998; Sparks & Hirsh, 1997). Quality professional development for technology integration is of special importance since as of last year, only 20% of our nation's teachers reported feeling well prepared to integrate *any* educational technology into classroom instruction (NCES, 2000). And new standards for teachers emphasize the importance of professional growth in technology integration competencies (ISTE, 2000; NCATE, 1997).

Many for-profit, school district, and higher education entities are looking to Web-based, technology-focused teacher professional development (TPD) sites to support teachers' expanding their pedagogical repertoire regarding integrating and implementing networked technologies (Goldman, 2001; Schlager & Schank, 1999). Although participating in networked communities, collaborating with peers and exchanging resources might facilitate teachers' development, most educators have not availed themselves of the Internet in these ways. According to Becker's national survey of Internet use by teachers (1999), web browsing and email were the Internet capabilities most often utilized by teachers and students.

For those seeking to offer Web-based learning environments to teachers, it is key they learn: What website characteristics are associated with a quality online learning environment? Which aspects of the site most engage teachers? Which teachers are drawn in to the site? We developed an evaluation plan to help us answer these issues of quality and quantity in web-based TPD sites. We will present these methods and instruments in this paper and illustrate their application to a technology integration TPD site called Ed-U-Tech.

Measuring the Quality of Teacher Professional Development Sites

Web-based teacher professional development sites are most likely to be effective when they are designed and utilized in ways consistent with the research on how people learn. In *How People Learn: Brain, Mind,* *Experience, and School*, Bransford, Brown, and Cocking (1999) base the following key dimensions of effective learning environments upon current educational and cognitive neuroscience research.

Knowledge-centered environments focus on developing knowledge of the discipline and of teaching and learning. In a web-based environment, this might translate into digital content-area curriculum that is up-to-date, authentic, accessible and generative, and contains hyper-linked resource areas.

Community-centered environments evolve a community of practice among teachers where members develop common goals and collaboratively work toward achieving them. In a web-based environment, this could be expressed as Internet-based conferencing environments that assist communication over distances, or a repository of artifacts of each teacher's practice.

Assessment-centered environments support teachers' testing of ideas by promoting ongoing reflection and feedback on practice. Effective websites might include a design that use Internet-based networking to promote ongoing reflection and feedback on practice in a manner that is sustainable, wide reaching and affordable.

Learner-centered environments center on teachers as learners, building on their strengths, interests and needs. One of the most promising and under-appreciated qualities of new information technologies is their interactive capacity. This has special significance for judging the extent to which professional development websites provide learner-centered environments or otherwise are able to utilize users' input to support their learning. Users can customize the site according to their preferences and level of knowledge as pedagogical designers.

The above conceptual framework was further developed and operationalized as a checklist of the desirable features of web-based environments for teacher professional development (see Table 1).

Measuring Quantitative Aspects of Teacher Professional Development Sites

In learning about the effectiveness of the website as a dynamic learning environment for teachers' professional development, evaluators need to look carefully at its *quantity of reach*, or the number and frequency of users and how well this profile matches the intended audience.

To measure the reach, or "the who," of a site, it should be backed by visitor traffic analysis software. Several commercial packages are available; we selected *WebTrends* for its good features-to-cost ratio. This traffic analysis package provides both summary and detailed statistics on visitor demographics, the site resources accessed, activity statistics (including visitor behavior in time increments), technical statistics (including server and client errors), as well as data on referrers (links) sending visitors to the site and analysis of keywords used in site searches.

These data allows site designers to: gauge the reliability of the website; triage which content areas to develop further, which areas to focus on less, and how to arrange content most effectively; decide how to optimize the architecture of the website based on where visitors are entering; determine which external links are most effective; and determine, to some degree, visitors' satisfaction with their visits.

Evaluation Methods Applied to a Technology Integration TPD Website

We used qualitative and quantitative methods to help us answer questions concerning the Ed-U-Tech site's quality (http://www.education.umn.edu/edutech), and the quantity of its users. Ed-U-Tech is a website that is designed to serve as a learning environment for teachers both during their licensure program at the University of Minnesota and after graduation. A PT3 implementation grant to the University of Minnesota provided the resources to develop the site. The authors of this paper represent, respectively, the PT3 project's director, coordinator, and two evaluators. We sought to evaluate the project's website to improve its functionality as a TPD environment. The results from our analysis are briefly summarized below.

A visual review and content analysis using a checklist of quality online learning environment characteristics allowed us to evaluate the Ed-U-Tech site in terms of how it mapped to knowledge-, assessment-, community-, and learner-centered standards(see Table 1).

Possible Features of Knowledge-centered Online Learning Environment	***Ed-U-tech Site's Knowledge-centered Features***
☐ Hyper-linked resource area (e.g. links to content area standards, current research on Methods and Learning Theory, etc.) ☐ Digital content-area curriculum that is up-to-date, authentic, accessible and generative.	1. Hyper-linked Resource areas grouped according to content areas with links to content area standards, lesson plans, clearinghouse sites, professional associations, professional journals, professional development and/or college of education courses) 2. Resources in each content area provide links to reviewed sites and digital curriculum that is up-to-date, generative, and cutting edge.
☐ Electronic networking forums to support knowledge sharing (e.g. web-based libraries of: videos of teachers and accompanying descriptions exchanged, reviewed, annotated, and linked to additional resources; lesson plans; journal entries; student work)	3. A series of interactive online case-based scenarios (IMMEX) with opportunity to practice curriculum design in content area and see exemplars 4. A Discussion area where users can post a relevant article and start or join discussion threads focused around the integration of technology in education
☐ Interactive curriculum design tools with electronic prompts to scaffold thinking ☐ Electronic notebooks encourage reflection in design process ☐ Interactive survey instruments that encourage reflection on pedagogy	5. Online Request forms ask educator's to contribute their content area knowledge to the resource base. 6. Introduces conceptual framework for thinking about technology integration (eTIPS) 7. Interactive forms ask users to reflect on eTIP principles and share their thinking
Possible Features of Community-centered Online Learning Environment	***Ed-U-tech Site's Community-centered Features***
☐ Internet-based conferencing environments that assist communication over distances • synchronous mechanisms (e.g. via "chat" rooms, multi-user virtual environments or asynchronous email, bulletin boards, threaded discussion forums) • Asynchronous mechanisms (e.g. email, bulletin boards, etc.) which allow anytime-anywhere communication and archiving of discussions to assist the development of a group understanding over time. ☐ Coherent human infrastructure (i.e. human facilitators who moderate online conferencing environments). ☐ Repository of artifacts of each teacher's practice (e.g. examples of students' work, collaboratively designed lesson plans, electronic records of previous online discussions, URLs to relevant information, etc). that can be quickly retrieved, distributed, organized, and stored within the online community	1. Electronic archives record discussion group history and provide a record of evolving ideas. 2. Threaded discussion forums provide anytime-anywhere access to fellow educators 3. Electronic newsletter organizes community happenings and disseminates new information 4. Discussions are moderated by an experienced educator and technology coordinator 5. Opportunity to share knowledge of subject area by posting to Resource area
Possible Features of Assessment-centered Online Learning Environment	***Ed-U-tech Site's Assessment-centered Features***
☐ Tools for or that encourage self-assessment, reflection, metacognition, feedback.	1. From the website, users can link to Ed-U-Tech-created online case-based scenarios designed to enhance their ability to make good instructional decisions about technology. They receive

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	summative feedback on their performance, but the software does not provide formative feedback, such as electronic prompts, during performance.
☐ Tools for or that encourage peer exchange, constructive critique, networking.	2. The site contains a web-based discussion area, but it is not moderated, and receives little traffic and use.
Possible Features of Learner-centered Online Learning Environment	***Ed-U-tech Site's Learner-centered Features***
☐ Data in graphical, text-based, and multimedia forms, acknowledging diverse learning styles	1. The Ed-U-tech website adequately presents information in graphical, text-based, and multimedia forms, acknowledging diverse learning styles.
☐ Searchable online database through which users can search the site by a topic of interest to support teachers in important aspects of their daily work and let teachers easily and quickly find what is of interest to them	2. The site does contain a search engine through which users can search just that site by a topic of interest.
☐ Customization according to user's preferences and knowledge as pedagogical designer (i.e. through web-based tools such as search engines, databases, conversation tools, simulations, visualizations, learning environments, initiate discussion strands, import objects, attach files, store work, download software, post notes to published work, or add sound and video to the online workspace).	3. The site does not allow for any customizable forms or features or personal work space for users. However, users may search the site and initiate discussion in an online forum. They are also invited to submit comments and URLs of sites to add to each learning area's resources section.

Table 1: Characteristics of quality teacher professional development Web sites derived from *How People Learn* framework (Bransford, et. al., 1999) and applied to the Ed-U-Tech web site.

The *WebTrends* software was useful in addressing the question: Which aspects of the site engages users? Eighty percent of the most viewed pages on the site are comprised of the standards-defined curricular areas (i.e. Read, View and Listen, Write and Speak, Mathematical Concepts and Applications, Inquiry and Research, Arts and Literature, etc. About half of the visits are used to look at just one, two or three pages, while only nine percent of the visits are used to look at 10 or more pages. The mean visit is 17.05 minutes long, but the median visit is much shorter, 3.77 minutes. That 76 percent of the visit last less than one minute and that the median is so far below the mean visit length, suggests a small number of core users.

The Ed-U-Tech website's newsletter subscription feature helps us to learn which teachers are drawn in to the site. Of the 146 subscribers to the newsletter, about half indicated they worked at a K-12 school, half of these at a high school. Of the 72 subscribers who indicated their interest in one of twelve content areas listed on the site, the "Read, View, and Listen section for Language Arts attracted the most attention (21%).

The *WebTrends* software further informs our examination of the *reach* of the site. During a recent quarter (from April 1 through June 20, 2001), there were 5,613 visits to the Ed-U-Tech website. This represents an average of 61 visits per day during, with each visitor viewing an average of nearly 7 pages. Of the 5,613 visits, 1,836 were unique visitors. Where the country of origin was known, 96 percent of the visits were from the United States. Sixty-eight percent (1,254) visited just once; 32 percent (582) accounted for the remaining 4,359 visits.)

Summary

The Ed-U-Tech website is strongest on its knowledge-centered characteristics, featuring technology resources specific to over a dozen different content areas. The site links to online cases that prompt users to make decisions about the use of technology to support their pedagogy. These offer some unique assessment capabilities. However, they are not immediately available, requiring registration and log in at a separate web-site. The site has strong capabilities to support community, through "telementor"-hosted asynchronous discussion; this feature has been used effectively in the past, but is currently under-utilized. Finally, the site offers little customization capability, reflecting weak learner-centered design.

Conclusion

Evaluation methods such as a visual review with a checklist and web traffic analysis software are cost effective, in that they can be employed remotely or automatically. This paper illustrates the use of these evaluation methods in a case study of a technology integration TPD site. But such tools do not necessarily reveal the complete picture on what engages teachers and encourages them to return for additional learning. Further development or tools are needed, as are additional examples of their application. Interview or survey data could help to provide this information that would help designers of technology integration TPD websites meet their goals of providing quality learning opportunities for teachers anytime and anywhere.

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Science Made for Teachers

Jan Downing, Eastern Kentucky University, US

As a result of this grant and the efforts of the faculty, preservice teachers at Eastern Kentucky University receive college science courses designed specifically with the needs of elementary and middle school teachers in mind. What is unique about the program is that arts and sciences faculty who have been trained in the area of state standards, and current, appropriate teachings strategies teaches the courses.

Most faculty involved with the project received one three hour course release time to work on the project. The team met regularly and consisted of a faculty member in science education, special education, physics, chemistry, biology, earth science, an elementary education undergraduate student and a classroom teacher within the district. The education faculty served as consultants; sharing education standards set by the Kentucky Department of Education, appropriate teaching strategies, and technologies that assist teachers in the classroom.

The project has opened communication between the College of Education and the College of Arts and Sciences. Professors from both colleges work side by side in an effort to understand and meet the needs of future teachers of Kentucky. Currently data is being collected to analyze the effectiveness of the new program.

This session will share ideas for others interested in improving science courses for preservice elementary and middle school teachers.

Preparing Tomorrow's Teachers to Use Technology (PT3): Applying the Technology Integration Model for School Success (TIMSS)

Trudy L. Driskell
School of Education
University of Houston-Clear Lake
United States
Driskell@cl.uh.edu

Abstract: The University of Houston-Clear Lake (UHCL) in partnership with eight school districts in the Houston, Texas area, called the UHCL Collaborative, has developed a successful, field-based teacher preparation program. The UHCL Collaborative in collaboration with DePaul University and corporate sponsors received a three-year PT3 (Preparing Tomorrow's Teachers to Use Technology) Implementation Grant from the United States Department of Education. The grant's purpose was to design a model to prepare teacher candidates to be proficient in developing and delivering classroom lessons that integrate technology within the curriculum. The organizational development of this PT3 grant incorporated components of the Technology Integration Model for School Success (TIMSS) described by Driskell (2001). This paper will describe the development of these components within the grant's operations.

Introduction

In 2000, the University of Houston-Clear Lake (UHCL) in partnership with eight regional and urban school districts in the Houston metropolitan area, DePaul University, and corporate sponsors, Microsoft, Apple, Inspiration, and Tom Snyder Productions received a three-year Preparing Tomorrow's Teachers to Use Technology (PT3) implementation grant from the United States Department of Education. The focus of the grant was to prepare teacher candidates to become proficient in developing and delivering classroom lessons that effectively incorporate technology in the learning process so that all students (Pre-kindergarten to 12th grade) use technology in demonstrating mastery of lesson plan objectives. The program's specialty is that the lesson plan format has both the teacher and the classroom students using technology in the learning process. The grant's organizational development incorporated the components of the Technology Integration Model for School Success (TIMSS) as outlined by Driskell (2001). The TIMSS consists of four major components: (1) administrative support for technology initiatives; (2) foundations of understanding for campus teachers; (3) modeling and coaching for campus teachers; and (4) on-site campus technology support. This short paper will describe the development of the four components within the grant's operations.

Administrative Support for Technology Initiatives

Administrative support is the first component for successful technology integration in classroom pedagogy. The UHCL PT3 grant proposal requested partnership with school administrators who recognized the necessity of technology in pedagogy, communicated the need for technology on their campuses, and, when possible, modeled technology use. Many of the campus administrators participated in the PT3 grant training sessions, which added understanding of and support for the grant. Grant support from university administrators was crucial, especially for implementation and sustainability of the grant's objectives. Administrative support of technology in education is highlighted by the ISTE (International Standards of Technology Education) technology standards for school administrators (http://cnets.iste.org/tssa/view_standards.html). These standards require that superintendents, district curriculum specialist, and principals, among others, promote a school culture that encourages technology use in innovative ways. "Having a school climate that encourages the use of technology resources in innovative ways" is necessary to breakdown the barriers that prevent technology integration in today's classrooms (U. S. Congress, Office of Technology Assessment, 1995, p. 162).

Foundations of Understanding for Campus Teachers

The second component for successful integration of technology in classroom instruction is the preparation of teachers. Typically, the teacher is faced with the lack of time to learn and experiment with technology (Strommen & Lincoln, 1992). While professional development may mean in-services training that usually last one day, this one-shot strategy is not effective (Benton Report, 1997). The UHCL PT3 grant (http://pt3.cl.uh.edu) provided to preservice teachers, mentor-teachers, and university faculty three days of hands-on technology training, addressing the use of relevant software for student learning and the integration of this technology within the classroom curriculum (i.e., lesson plans). Moreover, grant participants were provided ongoing support in developing and delivering lessons plans.

Modeling and Coaching for Campus Teachers

Classroom teachers need modeling and coaching, especially from mentor-teachers, to successfully integrate technology within the curriculum. A vital part of the UHCL PT3 Grant was to provide to mentor-teachers and university faculty, who are supervising preservice teachers, the three-days of technology training. Together, preservice teachers, mentor-teachers, and university faculty worked together as a team to develop and delivery technology integrated lesson plans, addressing specific grade level needs. Working on these lesson plans provided opportunities to discuss how people learn: actively, constructively, collaboratively, contextually and in a multisensory manner (Hunter, 1993).

On-Site Campus Technology Support

The fourth component for successful integration of technology in classroom curriculum is providing on-site technology support. While school districts have technology support personnel for classroom teachers, they may not have been prepared in professional development specifically focusing on technology integration of curriculum in lesson planning. The UHCL PT3 grant provided training and a website (http://pt3.cl.uh.edu) as a source of support. Many campus administrators, serving as instructional leaders, attended the PT3 grant training sessions to gain additional understanding on the use of technology in classroom lessons. Moreover, school district technology trainers participated in delivering the UHCL PT3 training sessions on technology integration. Campus and school district technology personnel, as well as technology-proficient mentor-teachers, need to coach and guide teachers in using technology software tools, and in successfully developing and delivering technology integrated lessons.

Conclusion

The Technology Integration Model for School Success (TIMSS) as outlined by (Driskell (2001) provides four key components for the successful development of classroom pedagogy that integrates technology within the curriculum. The UHCL PT3 grant operations incorporated TIMSS in assisting teachers to be successful in preparing classroom students (Pre-kindergarten to 12th grade) to use technology in their lifelong learning.

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Technology Support in a School-University Partnership

Judith Duffield, University of Colorado at Denver, US
Geraldine (Geri) DiPalma, University of Colorado at Denver, US

This proposal describes a comprehensive effort to improve the Initial/Professional Teacher Education (IPTE) program in order to produce quality educators who will have the tools they need to meet the needs of their students. While technology is just one of those tools, it is one of the most powerful tools and has the capacity to positively influence of the entire schooling experience. This project uses a combination of technology experts at the university and partner school levels and leadership academies to infuse technology into course syllabi, teaching activities and assignments for the programs teacher candidates.

The vision for the IPTE program with regard to technology is that our teacher candidates emerge with the skills, knowledge, and dispositions to enable them to use technology appropriately in every aspect of their teaching career. The goal of this PT3 project is to transform the IPTE program into one where teacher candidates are immersed in technology best practices, both at the university and in their clinical experiences.

The Initial/Professional Teacher Education program (IPTE) serves students seeking initial licensure in general and special education and advanced licensure in special education. Students are admitted to the program in the fall or spring and are assigned to a professional development school (PDS). They follow the school's schedule, returning when the teachers do in August or January. Their time in the PDS is divided into four internships. Elementary teacher candidates usually stay at one school for all four internships, while secondary teacher candidates have at least one internship in a middle school and another in a high school. The first three internships are for two days a week and the final internship is for four days a week. While in the first three internships, teacher candidates are enrolled in courses two days a week or evenings. Coursework takes place on the university campus and in the professional development schools. Individual student progress toward meeting the state licensure standards is measured by performance-based assessments that rely heavily on performance in the PDSs.

Once the teacher candidates complete their internships, they are eligible to apply for a teaching license, assuming all state standards and program expectations have been met. After the teacher candidates are licensed, they may choose a specialty, either a state endorsement or a School of Education certificate, and continue in the master's program. *Program governance*. The IPTE program is lead by two councils. The Partner Principals Council consists of the sixteen PDS principals and two UCD faculty members who are responsible for communicating between the two councils. The IPTE Council consists of the sixteen site coordinators and site professors, and other IPTE course instructors. Each group meets at least monthly to make program and policy decisions. The IPTE Council is responsible for admitting students to the program and placing them in schools. Each PDS has its own leadership team, comprised of the principal, site coordinator, site professor, and four teachers, which is responsible for ensuring that the goals of the partnership and the school are met.

Initial/Professional Teacher Education Faculty
The members of the IPTE program faculty are defined as all those university and professional development school professionals who supervise the learning experiences of the teacher candidates. Site coordinators are K-12 teachers who have been released from their classrooms to work fulltime for the partnership. They supervise teacher candidates and coordinate professional development for the school. Site professors are university professors who spend at least one day a week at the PDS. Clinical teachers are K-12 teachers in professional development schools who supervise a teacher candidate in their classroom for any of the four internships.

The professional development school faculty serve as site coordinators, clinical teachers, and course instructors. The university faculty, serve as course instructors and site professors, and include instructors from two divisions in the School of Education and instructors from the College of Liberal Arts and Sciences. Faculty members often fill more than one role.

The Teacher Candidates

The School of Education only serves graduate students. A few of our students come to the university directly from an undergraduate institution, but most have had other careers, from homemaker to lawyer to business owner. All students are placed in professional development schools for four internships over a period of a year and go through the program as a cohort. After licensure, a majority of these students are employed in the metro area where the university is located, but others are employed throughout the state and in many other states.

Professional Development Schools

Sixteen professional development schools (PDSs) are located in six districts in the metro area, which ranges from inner city urban to industrial to rural. Their students represent a diverse population with many languages, ethnic groups and socioeconomic groups, but an overwhelming majority of the K-12 students are from low socioeconomic families.

The PT3 Grant Activities

The project consists of a team of support personnel. Site Techs are partner school teachers who spend the equivalent of one day a week working with the school, teachers, and teacher candidates to move the school forward on their use of technology. University Techs are mentors hired to work with faculty on revising their courses to infuse more technology, build their technology skills, and to work with teacher candidates on their technology skills. All of the Techs meet once a month to share successes and challenges and develop strategies for meeting those challenges. This Technology Council has the responsibility of planning and leading the semester's leadership academy based on the need of those they work with and shares a parallel role with the IPTE and Partner Principals' Councils.

The purpose of this short paper is to share the progress that we are making in the first year of this grant and discuss the successes and challenges we are encountering and how we are addressing those challenges.

Need for the Project

To determine the need for and the design of this project, data was collected from all partners in the IPTE program. Members of the IPTE Council were asked to describe the technology vision they wanted for their schools and classes and what it would take to get them there. Those working in PDSs were asked about the technology available in their school and the skill level of their teachers. Teacher candidates and course instructors were asked to fill out the Technology Prerequisite Skills Checklist. Course instructors and site professors were asked to complete a survey based on the Colorado Teacher Licensure Technology Standard 7 and report how able they were to meet the standard and to teach others to meet the standard. In addition, experiences from the current program redesign efforts to integrate technology across the IPTE program were a part of the data collected. The grant committee met to analyze the data and determine possible solutions. The resulting proposal was taken to the IPTE Council and Partner Principals Council for their approval. The needs described below and the proposal described in the project design are a result of this process.

Technology in IPTE

Since the first program redesign in 1994, infusing technology throughout the curriculum has been a stated goal. No separate technology course has been part of the course of study, though students were offered a technology course as an elective in the post-licensure portion of their program. While progress has been made, the IPTE program has yet to fully integrate technology across all courses and internships.

When we started, few of the instructors possessed the skills necessary to make this integrated curriculum a reality. During the first year, the courses included one or two guest lectures on technology. The second year, an instructor with technology expertise joined the elementary team and added lessons and assignments that required the teacher candidates to use technology. In the third year of the program, an instructor with technology expertise was hired to teach one section of one of the two general secondary methods courses. At this time, the program faculty also identified places in the entire curriculum where technology and other skills could be integrated, beyond the methods courses. During the fourth year of the program, all students were required to use the email system sponsored by the School of Education.

Beginning in January, 2000, all students entering the Initial/Professional Teacher Education (IPTE) program are required to have 24 hour access to a computer and mo dem. This past fall, we began distributing a technology prerequisite skills checklist to all applicants. The checklist contains basic technology skills that will be required of all teacher candidates when they enter the program, along with suggestions of opportunities available to the applicant for mastering these skills. Beginning in 2001, all teacher preparation programs in the state of Colorado will be required to verify that their candidates for teacher licensure have met eight new standards. Standard 7 requires that the teacher is skilled in technology and is knowledgeable about using technology to support instruction and enhance student learning, and has five supporting elements: (a) apply technology to the delivery of standards-based instruction, (b) use technology to increase student achievement, (c) utilize technology to manage and communicate information, (d) apply technology to data-driven assessments of learning, and (e) instruct students in basic technology skills (see: http://www.state.co.us/cche_dir/agenda/marivb2.html).

UCD Faculty Technology Use. The faculty have gradually increased their personal use of technology. They were asked to fill out the same Technology Prerequisite Skills Checklist completed by all program applicants. Fewer than half reported that they would be unable to complete any of the individual skills described. The range on each of the skills was from 0 to 42%, with 15 of the 38 skills being met by all of the faculty. Only one or two faculty could not complete an additional eleven skills. The areas most in need for training were in digital camera use, creating and using spreadsheets, and setting their VCR clock.

Despite these personal skills, most faculty members lack the support and vision for how to apply that knowledge in the courses they teach. During program redesign meetings, it was common for a faculty member to state that they did not have to worry about technology because it didn't fit into their course. This is not the case. In a survey of those teaching IPTE courses and serving as site professors, no one felt that they were well enough prepared in the state technology standard elements to be able to teach all of them to our teacher candidates. While all but three of the nineteen surveyed had some idea of what the standard elements addressed, only three felt fully prepared to teach any of the standard elements.

We are making improvements. Up until last fall, university classroom technology was inconvenient at best. Now, with the addition of two upgraded computer labs and one technology rich classroom in the School of Education, and the number of technology-equipped classrooms on campus, using technology while teaching is less of an ordeal. Most faculty members have required some form of electronic communication as part of their classes, advising, and professional interactions. Based on a previous and very successful faculty technology mentoring project, an internally funded grant is being used this semester to proved assistance to course teaching teams to include at least one technology-based activity or assignment. Most of the faculty are at the point where a program like the one proposed here will be welcomed and effective, even without the current pressure to integrate technology coming from the state.

Based on these results, some IPTE program faculty need assistance with basic technology skills, but all need assistance to see how technology fits into their courses and then in making it happen. As stated earlier, faculty from the College of Liberal Arts and Sciences are part of the IPTE program and will be included in all grant activities.

Technology in the PDSs

When the partnership began in 1994, most professional development schools (PDSs) had a computer lab, but few had computers or other technologies available in their classrooms. During the past four years, the amount of technology available in the PDSs has increased tremendously. Now, every PDS has between one and seven computer labs, with seven of the sixteen schools having more than one. All but one have from one to five computers and Internet access in every classroom. The remaining school has computers and Internet access in about 75% of its classrooms. Every PDS has a technology plan that guides their technology acquisition and use. Each of the six partner districts have district level technology teams that provide assistance to schools. This demonstrates a commitment to the use of instructional technologies.

PDS Faculty Technology Use. In a survey of the PDSs, the school leadership team was asked to determine the technology skill and use level of the teachers at their school. The ratings they used were: (1) Technology experts who use technology in creative and innovative ways, (2) Teachers who regularly use technology in their classroom, (3) Teachers who use just enough technology to meet school standards, (4) Reluctant users who need lots of encouragement and assistance, and (5) Non-users who avoid using technology at all. While some schools had more or less expertise, across the partnership, data indicate that 9% were considered to be experts, 21% regular users, 40% using just enough to get by, 20% reluctant users, and 6% non-users.

One school in the partnership chose not to participate in this proposal. We believe their reasons are factors that affect all schools and must be carefully considered when carrying out this proposal. The school's reasons dealt mainly with a feeling of overload. State-mandated, high-stakes, standardized testing, participation in a literacy grant, and district-mandated inservice leave little time in a teacher's day.

Based on these results, there is a need for teachers to be able to use the technology that is becoming more available to them in better, more innovative ways. As with the UCD faculty, some skill building will be necessary, but using inservice training is not likely to be successful. More creative ways must be found to work within the constraints of a teacher's day.

Teacher Candidate Technology Skills

During the first six years of the IPTE program, teacher candidates were asked to choose a leadership area to focus on while they obtained their license. One of the leadership area was technology. While during the first few years of the program, nearly all students with any technology background chose technology, in the last cohort of teacher candidates in leadership areas, technology expertise is not a determining factor. Teacher candidates with technology skills are just as likely to be in technology as any other leadership area. The revised program eliminated leadership areas in favor of post-licensure endorsement and certificate programs.

The teacher candidates entering the Initial/Professional Teacher Education program were asked to complete the Technology Prerequisite Skills Checklist. While no one skill was mastered by all teacher candidates, fewer than 10% of the 118 teacher candidates indicated that they could not pass 25 of the 38 skills. The biggest need areas were in creating PowerPoint presentations, creating spreadsheets, downloading and using pictures from a digital camera, and setting their VCR clock. This indicates that teacher candidates are entering with a higher level of technology experience, a reflection of the change in society in general. Based on these results, teacher candidates will need some assistance with basic technology skills.

Summary

All members of the IPTE partnership need some assistance in developing basic skills. All IPTE faculty, in the university and the PDSs, will need help in developing technology best practices and carrying them out in their classrooms. Creative ways of facilitating these changes that build on successful IPTE program structures must be developed in such a way as to not overly burden the participants.

Project Design

This proposal is part of a comprehensive effort to improve the Initial/Professional Teacher Education program in order to produce quality educators who will have the tools they need to meet the needs of their students. While technology is just one of those tools, it is one of the power tools that has the capacity to positively influence of the entire schooling experience.

Goals, Objectives and Outcomes

The vision for our program with regard to technology is that our teacher candidates emerge with the skills, knowledge, and dispositions to enable them to use technology appropriately in every aspect of their teaching career. The goal of this proposal is to transform the UCD Initial/Professional Teacher Education program into one where teacher candidates are immersed in technology best practices, both at the university and in their clinical experiences.

Michigan Teachers' Technology Education Network

Mesut Duran
School of Education
University of Michigan-Dearborn
United States
mduran@umd.umich.edu

Paul Fossum
School of Education
University of Michigan-Dearborn
United States
pfossum@umich.edu

Abstract: The purpose of this paper is to describe Michigan Teachers' Technology Education Network (MITTEN) project and some of the program's early impact on the preservice teacher preparation at the University of Michigan-Dearborn. MITTEN is in its first year in a three-year award funded through the U. S. Department of Education's Preparing Tomorrow's Teachers to use Technology (PT3) fund. The defining component of the MITTEN model is its creation of a networked learning community. The project's goal is preparing a cadre of future teachers with improved knowledge, skills, and confidence integrating information technology into the teaching and learning process in meaningful ways. The project will redesign computing, methods, and content courses, field experiences, and student teaching to ensure that students meet National Educational Technology Standards for Teachers (NETS*T) throughout their programs. A further intent is to form a self-sustaining development network among future teachers, faculty, and P-12 educators. MITTEN establishes networked learning circles (NLC)-comprised of student teachers, P-12 teachers, supervisors, technology specialists, and faculty-that focused on: a) early childhood, b) language arts, c) mathematics, d) science, and e) social studies.

Recent studies indicate that if future teachers are to effectively use technology their preservice preparation should employ multiple components. These components include course work in education computing, opportunities to observe faculty modeling the use of technology and the meaningful integration of technology into clinical field experiences (Duran, 2001; Moursund and Bielefeldt, 1999). Strategies for addressing each of these are becoming more common. But models for drawing all of the components coherently together are in short supply. This paper discusses the MITTEN project, which is aimed at tying all three components into preservice teacher preparation at the University of Michigan-Dearborn (UM-D).

MITTEN: A Networked Learning Community

MITTEN is designed to prepare a new generation of future educators with improved skills, knowledge, and confidence in integrating information technology into the teaching and learning process. MITTEN addresses this goal by creating a networked learning community dedicated to the transformation of teacher preparation at UM-D through integration of information technology throughout the entire educational experience of all prospective teachers.

The specific program objectives are:

- to prepare a new generation of P-12 teachers who are able to creatively and critically use technology to enhance student learning;
- to increase current teacher educators' ability to use technology to better prepare tomorrow's teachers and to model meaningful uses of technology in their professional practice;
- to increase inservice teachers' ability to integrate information technology into their curriculum and to mentor student teachers to use technology in a technology-enriched environment.

- to develop a series of technology learning resources (including software tools, Web-based curriculum materials, and hypermedia best practice cases) that model intelligent and powerful uses of information technology for future teachers, practicing teachers, and teacher educators; and
- to form a self-sustaining professional development network among future teachers, practicing teachers, and teacher educators to reach and use technology resources for their further professional development.

Preparing Technology-Proficient Educators

MITTEN offers three types of interrelated professional development activities to preservice teachers, inservice teachers, and education faculty: a series of Capacity Building Activities, a sequence of meetings of the Networked Learning Circles (NLCs), and a pair of Seminar activities. The meetings of the NLCs and the work undertaken within them are of primary importance to the project. The other sorts of activities, however, constitute important sources of support for that work.

Capacity Building Activities

The Capacity Building Activities are part of preparatory activities geared toward enhancing the productivity of the NLCs. Capacity building activities are designed to increase the levels of confidence and competence with information technology tools. The format of the activities is as group workshops, working lunch sessions, and one-on-one mentoring sessions. The general scope of the activities encompasses three needs areas—telecommunication tools, productivity tools, and educational multimedia—while specific emphases correspond to the needs that participants identify on needs assessments surveys.

During the Fall 2001, the first cohort group participated in the capacity building activities. The researchers will present the implications of these activities at the time of the conference.

Networked Learning Circles

The Networked Learning Circles or NLCs will facilitate learning about content specific use of technology in the subject areas. The participants' work within NLCs constitutes the core activity of the project. Each consists of faculty members in content areas, in teaching methods, and in educational technology together with student teachers and their mentoring school teachers and field supervisors. This alignment parallels in small-scale Goodlad's center of pedagogy idea (Goodlad, 1994). As Figure 1 illustrates, Goodlad's contention is that effective interaction regarding teaching improvement calls for engagement among three entities: schools of education, school districts, and colleges of arts and sciences. Certainly, while each of these three participants has its own functions other business to attend to, Goodlad has stressed that each is an essential and equal player in a healthy teacher preparation "ecosystem" (p. 9). Specifically, each NLC consists of student teachers (4), cooperating teachers from P-12 schools (4), student teaching supervisors (1), educational technology specialists (1), methods courses faculty (1) and content courses faculty (2) from related schools and colleges. More than just a setting, then, the center of pedagogy "brings together simultaneously and integratively the commonly scattered pieces of the teacher education enterprise and embeds them in reflective attention to the art and science of teaching" (p. 10).

Figure 1. The "Networked Learning Circle": a structure for collaboration on technology integration, adapted from Goodlad (1994).

Content experts: arts and sciences faculty	Student teachers and their technology-enhanced lessons	Methods and educational technology experts: education faculty
	Practitioner experts: school-based master teachers; college based student teaching supervisors	

MITTEN creates five NLCs, each related to one of five fields of study: (a) early childhood, (b) language arts, (c) mathematics, (d) science, and (e) social studies. The overarching task of each NLC is to develop and field-test authentic projects in which technology enhances teaching and learning in specific subjects addressing National Educational Technology Standards for Students (NETS•S).

During the Winter 2002, an initial cohort group of NLCs has commenced. The researchers will present the implications of the NLCs at the time of the conference.

Technology Seminars

Technology seminars address the social and cultural implications of information technology for schools and society. MITTEN offers two technology seminars in a year focusing on different issues. The Seminar activities are designed to build awareness of broader social issues related to educational technology, with attention to topics such as the "digital divide."

The first technology seminar will take place in the Winter 2002 focusing on the "digital divide" and its implication on the Michigan schools. The researchers will present the implications of the technology seminar at the time of the conference.

Learning with P-12 Partners

The members of MITTEN view teacher preparation as a university and community-wide responsibility. In addition to the project's private sector partner, RWD Technologies, the MITTEN program is a collaborative effort of the UM-D's School of Education and College of Arts, Sciences, and Letters, the Henry Ford Community College, and the public school districts of Dearborn, Livonia, Westwood Community, West Bloomfield, Redford Union, and Jefferson.

MITTEN is a three-year program with expanding participation. In each year, the project participants will include additional cadres of student teachers, cooperating teachers from P-12 schools, student teaching supervisors, educational technology specialists, and methods and content courses faculty from related schools and colleges.

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CONSTRUCTING SCIENTIFIC MODELS DURING TEACHER PREPARATION

Eugenia Etkina, Ph.D.
etkina@rci.rutgers.edu

Steven Barnhart, Ph.D.
barnhart@rci.rutgers.edu

David Brookes
dtbrookes@yahoo.com
Rutgers, the State University Of New Jersey
Graduate School of Education
United States

Abstract: An example of a content-area approach to technology infusion is presented. A physical science team helps pre-service teachers who have learned science in a traditional lecture setting develop the necessary skills to implement a discovery approach to learning in their own classrooms. Pre-service teachers use technology to follow the same inquiry-based model of experimentation that scientists employ in research. They observe phenomena that have been digitally recorded, slowing down the phenomena to collect data. They develop models to explain the data and test them by predicting unobserved phenomena, thereby constructing their understanding of physics concepts. The project has significant influence over abilities and attitudes of teaching candidates as they develop expertise in their disciplines.

Introduction

Science standards call for a discovery approach to learning but this method is hard to implement. One reason is that many teachers themselves learned science through a traditional lecture method and do not feel comfortable with a discovery approach (Tilgner, 1990). Science departments in the universities continue to deliver content in a traditional manner, so prospective teachers might only have the opportunity to learn science through discovery during teacher preparation courses in schools of education (McDermott, L.C., 1974, Zacos et.al. 2000). An inquiry approach to learning physics can be enhanced through the use of digital videos and Internet archival data bases (Etkina et. al. 2000).

The current project is part of a longitudinal study of a content area, team based approach to technology integration, where teams of professors, K-12 teachers, graduate students, and teaching candidates innovate and implement new technologies for learning (Barnhart, 2001). The Physical Science team focuses on using technology in real time data analysis. Data are collected by videotaping physical phenomena that happen so quickly, or on such a small scale, that naked eye observations are unreliable for data collection. Digitized videos allow students to slow down the phenomenon, see the details that go unnoticed in real time, and measure the position of an object at a given instant.

Experiments in Physics Instruction: a New Approach

Experiments are typically used in physical science instruction for two reasons: (1) To demonstrate a phenomenon, showing students what happened and why it happened, and (2) to test and verify a physical law taught in class (for example: students might conduct an experiment to verify Newton's second law). In both cases the instructor gives a lot of verbal and/or written guidance as students move through the procedures. Research has shown that such use of experiments has been ineffective in providing a context for meaningful learning (Roth et al, 1997). Instead, students learn much better when they construct their understanding, following a path like the one that physicists follow to construct new knowledge (Etkina & Van Heuvelen, 2001). This allows new roles for experiments in instruction.

Scientist's use of experiments may be organized into observational experiments and testing or application experiments. These two types of experiments are used together to construct a coherent scientific theory. The cycle may be summarized as follows: (1) A physicist observes a physical phenomenon, and may invent physical quantities to describe what is seen, looking for patterns in the data. (2) If some interesting patterns are seen, she may propose a mathematical model to fit the patterns. (3) She then uses the model to predict new (unobserved) phenomena or devise a real world application. (4) She then designs an experiment to test the prediction or try out the application. (5) If the results of the experiment were contrary to expectations, the physicist may make more observations, or revise the initial model asking such questions as: What simplifying assumptions did I make? Is there a different model that would adequately describe the initial observations? Can I make a more accurate calculation? And so on.

Using this approach as a guideline, we made videos of more than 50 experiments in mechanics, molecular physics and static electricity. Each was digitized and put on the web as a clip. Prospective teachers download the clip (http://www.pt3.gse.rutgers.edu/physics/frontp.html) and watch the experiment either in real time or frame by frame. The videos are categorized as scientists would use them: (1) observational experiments, for the first stage of the cycle as students observe phenomena, collect data, learn to represent them in multiple ways (tables, graphs, etc.) and interpret them, and (2) testing experiments, used later to evaluate the models students develop to explain the phenomena.

The initial work is usually done at home as a home lab. The next day in class the instructor discusses the observations with the students. Students are encouraged to suggest different explanations for the patterns of data. Using the explanations, students predict the results of a number of digitized testing experiments. After making their predictions, students watch the testing videos in class and see if their predictions were correct. An example of this cycle is the "Motion" module, one of nine modules used in science methods classes for pre-service elementary teachers. First students observe a clip of two objects (one 200 g and the other 500 g) dropped from the same height. They record positions of the objects at each frame, and use the table of data to draw a graph of position versus time and velocity versus time. The next day, using graphs created at home, students discuss the data in class and come up with a model to describe it. For example, they may create a model showing that the objects fall in the same way and the acceleration of their motion is constant at about 9.5 m/s^2. They use the model to predict what will happen if two objects are not dropped simultaneously. If they are falling with acceleration (the proposed model), the distance will increase; if they are falling with constant speed, the distance between them will remain the same. They test their predictions with the video clip of two balls dropped with a time delay. In this case the experiment confirms the prediction based on their model.

In the process, the students are given little or no explanation for what they see. They construct their own knowledge of physics in the same way physicists do. As part of the project, pre-service high school teachers follow the same process but provide more quantitative analysis, using real time data available through the web, such as NASA X-ray archives of photon counts collected by satellites (Etkina et. al 2000).

Conclusion

Teachers who have learned science in a traditional lecture setting are hampered in their ability to encourage constructivist learning in their classes once they begin to teach. This weakness can be overcome by modeling the approach scientists take when observing and predicting phenomena. The current project demonstrates that pre-service teachers who work in a digital science lab setting, given minimal but important guidance as they observe time and other variables, develop more meaningful understandings of physics. They then are able to provide their own students more innovative and authentic technological support for learning. Continuing work shows that the project is having significant influence over the abilities and attitudes of teaching candidates as they develop expertise in their disciplines.

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Infusing Technology Use into Pre-Service Teacher Courses: Lessons Learned

Donna Ferguson, Ph.D.
Department of Educational Technology
University of Northern Colorado
United States
dferguson@coe.unco.edu

Pei-Lin Liu, MA
Department of Educational Technology
University of Northern Colorado
United States
liu6187@blue.unco.edu

Abstract In June of 2000, the Department of Educational Technology at the University of Northern Colorado (UNC) received a PT^3 grant to prepare teacher education graduates to use technology effectively in their K-12 classrooms. This paper focuses on the lessons learned by PT^3 grant team members, while working collaboratively to redesign coursework in the department of Educational Technology, College of Education, and College of Arts and Sciences for undergraduate pre-service teachers.

Description of the Project

In June of 2000, the Department of Educational Technology at the University of Northern Colorado (UNC) received a PT^3 grant (Preparing Tomorrow's Teacher to use Technology). The grant, "Infusing Technology Use in the Preparation of Colorado Preservice Teachers," proposes a plan for systematically changing the teacher education programs at UNC by infusing technology throughout the curriculum. The grant plan builds on the strengths of the existing UNC Partnership Schools and the internationally recognized graduate programs in educational technology. The project has three overarching goals: (1) graduates of the UNC teacher education programs will effectively utilize technology for instruction in their classrooms when employed as full-time teachers; (2) UNC student teachers will effectively utilize technology for instruction in the partner school classrooms; and (3) UNC faculty members will effectively utilize technology for instruction and model appropriate technology use for the preservice teacher education students.

We are making progress toward these goals through five specific initiatives: (1) enhance the required educational technology courses for students in the professional teacher education programs; (2) model appropriate technology use and integrate technology utilization into the professional teacher education program courses; (3) model appropriate technology use and integrate technology utilization in the general education and content area discipline courses; (4) integrate technology use by preservice teacher education students in partner schools; and (5) build a model for the effective use of technology in preservice teacher education programs. All grant activities are focused on one or more of these initiatives.

The UNC PT3 project is now in its second year of activities. To this point, the project team has primarily focused on two main activities. The first was to incorporate the expectations set forth in Colorado's Standards-Based Teacher Act of 1999. This act requires a number of changes for the teacher preparation programs in the state, including the integration of technology across the PK-12 curriculum. The second area of focus has been with three cohorts of UNC faculty who have learned about and applied technology in new ways in their undergraduate preservice and general education courses.

Teacher Preparation Programs

Although there has been a major investment in technology for K-12 schools, the actual utilization and integration of this technology has been somewhat disappointing. A National Center for Educational Statistics (2000) study showed that 95% of public schools had Internet access in 1999. Although 65% of teachers had Internet access only 20% were using advanced telecommunications in their teaching (NCES, 1997). In 1997 and 1998, Persichitte, Tharp, and Caffarella completed studies commissioned by the American Association of Colleges of Teacher Education, which investigated student and faculty use of technology by colleges and departments of education. Both studies emphasize the importance of preservice teacher education students' (a) ability to use technology and embed it within their content areas and (b) exposure to effective models of technology use and integration throughout their preservice preparation programs.

UNC's PT3 team collected similar data during visits to the 21 partner schools (K-12) to speak with principals, teachers, and technology coordinators as well as observe each school's classroom uses of technology. The initial evaluation of the data collected have highlighted several key issues which are being addressed in redesign of the 200- and 300-level courses: (a) all schools visited have a fairly extensive infrastructure, both new and old machinery that is not being used to its fullest potential; (b) networks and file servers are playing a much greater role than could have been imagined; (c) the balance between platforms is shifting away from MAC and toward PC machines running the MS Windows platform and this is true across all grade levels; (d) teachers are not able to generalize how to use software outside of the way they have been originally instructed to either use it, or utilize it; (e) K-12 faculty want and need activities that they can integrate into their curriculum successfully; (f) student information management systems have become a critical component both in the individual schools, and in those schools' districts because state regulatory agencies demand extensive and comprehensive student data every year; and (g) with standards and assessments demanding more and more physical (time and energy) and financial (budgetary resource) support, technology facilitators (technology support personnel) have, as of late, become one of the lowest priorities on the K-12 personnel/time-allocation matrix.

Qualitative data gathered and analyzed by Lohr et al., that is significant to this project, found students felt the following about the introductory educational technology class: (a) the self-paced format was not only convenient, but gave freedom and flexibility; (b) the projects and rubrics were not as challenging as they could have been; (c) more examples and non-examples of each project would have been beneficial; and (d) fewer open laboratories would be preferable. The project team as a whole was disappointed the rapid application development (RAD) process and decided on implementing a full instructional design model for the PT3 redesign efforts of the ET department's undergraduate courses.

As a result of this study, the PT^3 team decided that self-paced instruction should be created using a template that has been originally designed to deliver learner-friendly instruction. This template allows for continuity and uniformity of language and format. In the process of the Lohr et al., research study, the two educational technology courses it encompassed (a 200-level course for freshmen and sophomores, and a 300-level course for juniors and seniors) have been brought current not only in the knowledge and skills they taught and developed, but also in the utilization and implementation of latest in computer hard and software.

The team has also imposed a collaborative structure onto the process in order to efficiently and effectively redesign the undergraduate coursework in the department of Educational Technology at UNC. The graduate assistants were divided into three teams: design, development, and utilization. The design team was to conceptualize the assignments, rubrics, and tutorials, as well as complete a task analysis, identify standards, write objectives based on the standards, and create the assignments and rubrics. The design team components were given to the development to operationalize. They put the design into practice by creating the text, graphics, tutorials, and PowerPoint instruction. Once the pieces of each project was uploaded to the team website, the usability reviewed all components making suggestions for additions, changes and corrections.

Faculty Cohorts

Currently, fifteen UNC faculty fellows (8 from the College of Education & 7 from the College of Arts and Sciences) have redesigned at least one of their courses to effectively utilize and seamlessly integrate technology. An advanced doctoral student in Educational Technology who serves as an instructional designer has individually supported the professors in their efforts. The faculty fellows also participate in seminars on technology use in the classroom delivered by experienced technology integration specialists. The content for each seminar has varied slightly based on the needs of the participants each semester.

After having worked with two cohorts of faculty, the UNC PT3 team agreed structure as needed for the process of working with faculty fellows. A checklist of sorts was created so the graduate assistants could make the best use of their time and expertise. The graduate assistant, faculty team go through the process of reviewing the original faculty proposal, identifying goals, setting a schedule, deciding on project restraints, producing mid-term and final reports, equitable division of responsibilities, and identifying faculty needs.

Summary

The need for well-prepared, technology proficient teachers who know how to infuse technology into the curriculum has been identified at the national level and also exists at the state and university program levels. Many state legislatures have mandated appropriate technology training for preservice teachers. The Colorado state legislature has mandated appropriate technology training for preservice teachers and local school districts have previously identified a technology deficiency in the teacher education programs that the UNC administration is committed to enhance. The UNC PT3 team, through the initiatives described here, is committed to support and advance the integration of technology in classrooms at the local, university, state and national level.

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Project Partners: K-12 /University Collaboration

Dave Forrest and Suzanne Sullivan
PT3 grant: Project Partners
New Haven Unified School District
California State University, Hayward
United States
dave_forrest@nhusd.k12.ca.us
ssulliva@nhusd.k12.ca.us

Abstract Project: Partners is a collaborative PT3 grant between California State University, Hayward (CSUH) and the New Haven Unified School District in the San Francisco Bay Area. To achieve our goal of helping pre-service teachers learn to use technological tools in teaching and learning, we have matched technology-proficient K-12 teachers with CSUH Department of Teacher Education faculty. The K-12 Teacher-Partners model the use of technology as a learning tool in their classrooms, and they work with faculty members to integrate technology-based instruction into pre-service methods courses.

Modeling Matters

Project Partners was founded on the idea that modeling matters; when teacher education professors model technology for their candidates, pre-service teachers are more likely to use computers with their students. The articles in the *Journal on Computers in Teacher Education* and the *Information Technology for Teacher Education* report that teachers are more likely to use computers with their students when technology is infused into their methods courses, and when pre-service candidates see computers being modeled by their instructors.

For example, British researchers, Yell and, Rehabber, and Stokes (2000), argue that teaching candidates must learn to use computers in the context of the subject specific disciplines they are learning to teach. Central to their "permeation" model are university faculty who model instructional technology, and who assign tasks where candidates must use computers to complete their course work. ("Technology in Teacher Education: examples of integration and implementation in early childhood courses", *Journal for Information Technology for Teacher Education*, Vol. 9, No 1, 2000, 95-109).

K-12 Teachers Model for University Faculty

To prepare University instructors to infuse technology into their courses, faculty members make monthly visits to the classrooms of NHUSD K-12 teachers who are expert in integrating computers in their curriculum. University instructors observe K-12 students working on computers and the management strategies employed in computer-based lessons. Professors post the practices and activities observed on a reflective journal page on the PT3 web site. In addition, they explain how technology enhanced student learning and discuss possible applications to their methods classes.

Not only do K-12 Teacher-Partners open their classrooms for observations to their Professor-Partners, but they also help education faculty infuse technology into their methods courses. Some K-12 partners visit the University methods classes to share a tech-integrated lesson with candidates. In other partnerships, K-12 teachers suggest ways that faculty can redesign their syllabi to include technology.

K-12 partners also submit the lesson the professor has observed to the K-12 Lesson Library. The Lesson Library contains over 300 technology inclusive K-12 lessons. These lessons all incorporate student use of computers to support teaching and learning core K-12 curriculum. Most of the lessons were designed by and used in classrooms of K-12 teachers from the New Haven Unified School District. Some Pre-service candidates contributed lessons as part of their credential preparation program; these lessons have been selected for inclusion through a juried process.

University Faculty Model for Candidates

In order to prepare University faculty to model technology with their candidates, Project Partners provides a variety of faculty development opportunities. On Friday mornings faculty attend Tech Tutelage sessions designed to improve instructors' technology skills. At these sessions professors learn to make PowerPoint slideshows and web pages for their courses. During the summer, twenty-seven CSUH professors attended the Summer Faculty Institute, which provided twenty hours of faculty training on educational hardware and software. In addition, professors received a laptop computer or stipend for attendance. During the school year, a full time PT3 staff member meets with professors to provide one on one tutoring, and help with curriculum redesign. As professors design tech-integrated activities for their teaching candidates, they post them in the PT3 Curriculum and Instruction library.

The visits to K-12 schools, and the PT3 skill development activities, help professors redesign syllabi in their curriculum and instruction courses, and to deliver instruction in new ways. In addition to putting their syllabi on-line, and using Power Point for classroom presentations, professors also have candidates design instructional activities with computers. A mobile cart, with ten i-books purchased by the PT3 grant, is brought into methods classes, giving candidates hands-on experience using computers. Candidates are asked to design lessons, which incorporate technology. Pre-service teachers also have access to the K-12 Lesson Library where model lessons are available on the web.

Candidates Use Technology with Students

The modeling of educational technology in the University classroom helps teaching candidates to use computers with their students. For example, action research conducted in the CSUH single subject social science methods class confirmed that modeling instructional technology was the single most influential factor in candidates' use of computers with their students. In addition, modeling in the methods class positively influenced social studies candidates' attitudes regarding their future classroom uses of computers.

The PT3: Project Partners has made headway in helping teacher candidates use computers with their students. However, modeling is a necessary but not a sufficient condition for new teachers to feel confident about using computers in their first classroom experiences. New teachers must also have accessibility to computers, see good modeling at their school site from veteran teachers, and feel that they have sufficient competence in others area of their teaching to experiment with computer based instructional strategies.

Future Directions

Now in its third year, the PT3: Project Partners has expanded its K-12 University partnerships. The Lesson Library continues to grow. In addition, Project Partners is collaborating with another PT3 project to produce six videos of K-12 teachers effectively using computers with their students. These videos will provide visual materials for candidates and professors to discuss in methods courses. Project Partners is also helping professors to redesign their courses with technology inclusive lessons. The inclusion of these lessons into the Curriculum and Instruction Library will be a major focus this school year and next summer.

Our hope is that when PT3: Project Partners grant ends, the modeling of educational technology for candidates in methods courses will be a regular part of pre-service instruction, so that our new teachers will be prepared to use 21st century tools with their students.

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Technology Integration: The Pedagogy of the 21st Century

Ms. Brenda Frieden
College of Education
Pittsburg State University
United States
bfrieden@pittstate.edu

Dr. Steven A. Scott
College of Education
Pittsburg State University
United States
sascott@pittstate.edu

Dr. Steven Mills
Institute for Life Span Studies
University of Kansas
United States
stevem@ku.edu

Abstract: The College of Education at Pittsburg State University (PSU), Pittsburg, Kansas, is establishing, evaluating, and validating a comprehensive, standards-based technology professional development model for teachers and teacher candidates that can be customized for each local context. This model uses a computer-based performance assessment to allow teacher candidates, university faculty, and cooperating teachers to demonstrate their proficiency in technology use and integration. In partnership with an educational software company, Synergistic Systems, Inc., and the University of Kansas, PSU is designing and implementing a web-based performance assessment system for validation of technology outcomes.

Introduction

Research indicates that few teachers believe they are adequately prepared for the challenge of using technology (Northover, 1999). The leading obstacle to the implementation of technology in education is not a lack of hardware or software, but rather the fact that many teachers are not technologically fluent. National statistics have shown that teachers receive far less technology staff development than any other professional group.

According to the Office of Technology Assessment (1995), the lack of teacher training is one of the greatest roadblocks to integrating technology into a school's curriculum. "Most teachers have not had suitable training to prepare them to use technology in their teaching" (p. 43). A majority of teachers reported feeling inadequately trained to use technology resources, especially computer-based technologies. Only twenty percent of educators felt their technology skills were high enough to integrate technology into their lesson plans. Forty percent of all teachers have never received any kind of staff development regarding technology (OTA, 1995).

In a 1997 report for the Milken Family Foundation, Kathleen Fulton used the term "technological fluency" to describe the changing definition of what teachers need to know and do with technology. Technological fluency is a combination of the information skills and literacy, communications skills and literacy, and the technology skills necessary to function in a technological environment. For students to acquire technological fluency as a part of their educational experience, they must be taught by technologically fluent teachers. Faculty with technological fluency would be characterized by modeling technology use in the classroom, applying technology skills across the curriculum, and applying technology skills to problem solving and decision making in authentic learning environments. Brand (1997) stated, "If technology is to be used by students, then teachers must possess the confidence, understanding, and skills to effectively incorporate technology into their teaching practices" (p.11).

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Overview

While most professional development models are based on teacher attendance or participation in a workshop or training activity, this project turned the model upside down and required in-service teachers to demonstrate technological proficiency through performance assessment rather than only attend workshops or courses. With this approach, learning expectations are expressed in advance and participants may use a variety of learning strategies to acquire the skills necessary for demonstrating their attainment of competency.

This project attempted to increase the quality and quantity of teacher interactions with technology by providing educational opportunities for college faculty and cooperating teachers through workshops, summer institutes, or small group and individualized learning experiences. The technological fluency of teachers was then validated through a performance assessment process related to relevant and authentic learning experiences. The PT3 grant, a three-year federal grant from the U.S. Department of Education's Preparing Tomorrow's Teachers to Use Technology program, provided the funding for this project.

Performance-Based Assessment

The role of assessment in many educational reform models or movements has taken on new meaning as reformers are finding that assessment standards and methods have considerable power as agents of change (Sheingold & Frederiksen, 2000). Although performance assessment can take many forms, it generally differs from the short answer or single problem approach of conventional assessment by focusing on the application of newly learned skills.

Performance assessment generally includes activities that could be called authentic activities similar to tasks a person performs in the real world. Performance assessment includes activities that accommodate multiple approaches and a range of acceptable products and results. Performance assessment activities may require learners to solve open-ended problems, create portfolios of products, or conduct experiments using computer simulations. The primary benefit of performance assessment is that it constitutes a measure of standards for performance of valued skills in a realistic situation and the performance task itself engenders a learning activity (Sheingold & Frederiksen, 2000).

Technological Fluency Standards for Teachers

Standards reflect shared values by identifying and describing those things that are important for a student to know and do. Sixteen technological fluency standards for teacher candidates, college faculty, and cooperating teachers were defined and established through a consensus process by the PT3 Steering Committee and were based on the PSU Technology Plan and the ISTE technology standards for students and teachers.

Technological fluency standards were organized into three phases: 1) technology operations, 2) technology management, and 3) technology integration. Each successive phase was intended to identify a set of technology skills and instructional strategies that exemplified increasing technology implementation and integration into classroom instruction and learning.

In our PT3 project we first established a set of technology standards and indicators that clearly described educational best practices for teaching and learning with technology that university faculty, cooperating teachers, and teacher candidates should implement in their classrooms. We defined teacher technological fluency as the integration of technology in the classroom by modeling technology use in the classroom, applying technology skills across the curriculum, and applying technology skills to problem-solving and decision-making in authentic learning environments. The technology standards and indicators were formulated by synthesizing national, state, and local technology standards and then identifying educational best practices that supported these standards within a local context. We then reinforced a pedagogy that enhanced and improved teaching and learning using technology tools and resources through performance assessment and financial incentives.

A technology standards integration matrix was established to serve as a basis or benchmark for performance assessment. The 16 technology standards comprised the main components of the matrix and then variations for each standard or component were mapped. These variations attempted to identify the actual teaching practices and instructional strategies that classroom teachers employ when integrating technology in a classroom. Variations for each component consisted of discrete categorizations that described best teaching practices using technology. The variations were mapped along a continuum from unacceptable use to ideal use.

The final version of the matrix consisted of the 16 technological fluency standards and a set of variations (best practices) for each standard. Each successive variation indicated a level of use representing a closer approximation of ideal use (see Technological Fluency Standards Matrix). The technological fluency standards were organized into three phases: Technology Operations (standards 1-6), Technology Management (standards 7-11), and Technology Integration (standards 12-16). The technology standards and best teaching practices were construed to be a reasonable and appropriate set of the instructional practices of teachers integrating computer technology in a classroom and to reflect the actual and ideal practices of teachers integrating technology in classrooms. Although these technology standards and practices were developed and tested in a particular educational context, their application may be relevant for use in analyzing the integration of computer technology in other educational contexts as well.

Technological Fluency Standards Matrix

Phase I – Technology Operations				
PT^3 Standards	PT^3 Indicators			
	1	2	3	4
1. Operate common technology devices including computer keyboard, mouse, monitor, printer, video camera, digital camera, VCR, scanner, or projection device	Use mouse and/or keyboard function keys to select a screen icon	Configure printer settings	Configure a computer's monitor for projection	Scan an image with a scanner and transfer to an electronic file
2. Perform basic file management tasks using a local computer drive or drive on a computer network	Search for a file on a local hard drive by name, type, or date	Create a folder on the hard drive and copy a file to that folder	Create an icon or shortcut on the desktop and use it to open an application	Zip and unzip a file
3. Apply trouble-shooting strategies for solving routine hardware and software problems that occur in the classroom	Properly shut down and restart computer when computer hangs or locks up	Check RAM usage and hard drive space	a) Run a utility to determine if a disk is repairable	Download and install a program from the Internet or a local drive
4. Use software productivity tools to prepare publications, analyze and interpret data, perform classroom management tasks, report results to students, parents, or other audiences, and/or produce other creative works	Create a word processing document and format for printing	Prepare a word processing document that includes a spreadsheet	Prepare a form letter and merge it with a mailing list file	Prepare a PowerPoint project
5. Use technology to communicate and collaborate with peers, parents, and the larger community through email, Internet, and discussion groups to nurture student learning	Send an email message to an existing name in the address book	Add a name and address to an email address book	Set e-mail program to apply a signature to email messages	Prepare a distribution list and send an email message to every contact on the list
6. Use technology to locate, and collect educational research/best practices information from a variety of sources such as library databases	Browse the Internet to locate useful information using specific URLs	Perform a search using an Internet search engine	Subscribe to and read electronic newsletters or journals related to an area of education	Perform a search of an academic database

Phase II – Technology Management		
PT^3 Standards	PT^3 Indicators	PT^3 Rubric
7. Practice and model responsible use of technology systems, information, and software	Adopt, adapt, and/or develop written classroom guidelines and procedures for students for computer and network use based on acceptable use policies, proper use of computer equipment and software, and copyright/license policies	1) Work product should be age appropriate 2) Address issues of copyright, proper use of equipment, and acceptable use policies a) Copyright/license b) proper use of equipment c) acceptable use policies d) age appropriate

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8. Facilitate equitable access to technology resources for all students 9. Manage student-learning activities in a technology-enhanced learning environment	Conduct and facilitate student learning activities or assessment by creating a lesson plan, unit, or project that uses technology resources such a computer lab (modular systems, mobile lab, or classroom computers), or discipline-specific technology tools, or web-based curriculum management tools	Create a learning activity that allows all students the opportunity to access technology resources (graphing calculator, metabolic cart)
		Create and post a web-based learning activity or assessment tool that allows all students the opportunity to access technology resources
10. Select information and educational resources, hardware requirements, and software features to support curriculum needs and standards	Investigate technology resources that align with learning objectives and curriculum standards	Submit a list of appropriate resources that support district, state, or national standards
11. Demonstrate strategies to assess the validity and reliability of data gathered with technology	a) Develop a strategy or strategies to determine validity and reliability of an educational website and use procedure to evaluate one website	1) Establish criteria to evaluate website validity and reliability 2) Select a website using the established criteria for evaluating the validity and reliability of the selected website

Phase III – Technology Integration				
PT^3 Standards	PT^3 Indicators			
	1	2	3	4
12. Employ technology in classroom learning activities in which students use technology resources to solve authentic problems in various content areas	Students may or may not use a computer go to support the completion of classroom learning activities	Students use productivity software to supplement classroom learning activities	FACULTY: Integrate one technology-based project within methods and field experience course work COOPERATING TEACHERS: Integrate one technology-based learning experiences per year into classroom instruction that is established for targeted curriculum themes or learning objectives TEACHER CANDIDATES: Integrate one technology-based learning experience per semester into classroom instruction that is established for targeted curriculum themes or learning objectives	FACULTY: Integrate two or more technology-based projects within methods and field experience course work COOPERATING TEACHERS: Integrate two or more technology-based learning experiences per year into classroom instruction that are established for targeted curriculum themes or learning objectives TEACHER CANDIDATES: Integrate two or more technology-based learning experiences per semester into classroom instruction that are established for targeted curriculum themes or learning objectives
13. Employ technology to address the diverse learning needs of students	Use small groups to complete some classroom learning activities	Use individual and cooperative instructional strategies to support the completion of classroom learning activities	Use individual and cooperative instructional strategies to support the completion of technology-based products of learning	Use technology resources to develop individual learning plans as appropriate for diverse learners
14. Apply multiple methods of evaluation and assessment to determine learners' use of technology for learning, communication, problem-solving, and productivity	Evaluate student technology skills using objective tests only	Evaluate student technology skills using objective tests and subjective evaluation of student-produced materials	Evaluate demonstrations of student technology skills using pre-determined checklists, rubrics, and benchmarks to assist students in assessing their own performance	Students are given the opportunity to demonstrate technology skills through live presentations, multimedia presentations, or web-based presentations
15. Engage learners in the development of electronic portfolios that document their technology-based educational experiences	Student work products are returned to student upon course completion	FACULTY: Teacher candidates maintain work products in a folder on disk media (hard drive, diskette, zip drive, etc.)	FACULTY: Teacher candidates develop an electronic portfolio of technology-based products of learning using a word processing document	FACULTY: Teacher candidates develop an electronic portfolio of technology-based products of learning using web pages or multimedia presentation applications

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		COOPERATING TEACHERS/ TEACHER CANDIDATES: Students maintain work products in a folder on disk media	COOPERATING TEACHERS/TEACHER CANDIDATES: Students develop an electronic portfolio of technology-based products of learning using a word processing document	COOPERATING TEACHERS/TEACHER CANDIDATES: Students develop an electronic portfolio of technology-based products of learning using web pages or multimedia presentations
16. Use technology resources and productivity tools to collect, analyze, interpret, and communicate learner performance data and other information to improve instructional planning, management, and implementation of instructional/ learning strategies	Write summaries or reviews of student progress and provide to students and/or send to parents using word processing or email	Use an electronic assessment tool to keep record and calculate student grades	FACULTY: Maintain, aggregate, and analyze teacher candidate performance data using an electronic assessment form COOPERATING TEACHERS/TEACHER CANDIDATES: Maintain, aggregate, and analyze student performance data using an electronic assessment tool	FACULTY: Teacher candidates use action research methods within methods and field experience course work to determine that technology or classroom teaching methods are impacting student learning COOPERATING TEACHERS/TEACHER CANDIDATES: Teacher and students use action research methods to determine that technology or classroom teaching methods are impacting student learning

Next Steps

While the progress to date has met with substantial success, there is still much work to do. Currently, the project's corporate partner is converting the Phase I assessment instrument into a commercial product with March 1, 2002, selected as the product launch date. The overall instrument is now being extended and expanded to include Phases II (technology management) and III (technology integration). The management aspect of the instrument developed for Phase I will support implementation of the additional phases, but greater human intervention will be required for their full implementation. Participants will develop portfolios as directed by the software, submit the portfolios for review, and receive feedback as to the level of fluency the participant has demonstrated. While each participant will have the freedom to choose the context and content of his/her portfolio, the rubrics will ensure that the skill indicators related to specific standards are captured within the portfolio. Submission of the portfolio, review, and feedback will all be transacted through an online interface. The instrument's data management system will allow the project directors to track and direct the participants through the phases of technological fluency.

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Teacher Candidate Applications of Telecommunications

Caroline M. Crawford
University of Houston-Clear Lake
United States of America
crawford@cl.uh.edu

Sue Hilburn
Preparing Tomorrow's Teachers to Use Technology Grant
University of Houston-Clear Lake
United States of America
hilburn@cl.uh.edu

Jana Willis
University of Houston-Clear Lake
United States of America
willis@cl.uh.edu

Abstract: Telecommunications offers the teacher candidates an environment through which to delve into higher order thinking skills within the methods coursework, student teaching internship experience as well as within the PreK-12 classroom environment. Modeling of appropriate uses of technology within the learning environment as the teacher candidate progresses through out their course of study emphasizes the numerous constructive opportunities to integrate telecommunications to reach the lesson objectives.

Introduction

Teachers desire numerous tools through which to communicate lesson objectives to the learners, opportunities to build communities of learners, as well as to focus efforts upon the unwritten curriculum that is of importance within all schools through out the nation and the world at large. Teacher candidates are novice instructional designers as well as instructors but the majority of teacher candidates, at this juncture within the history of educational training, are more comfortable with the idea of technological ideology. The philosophical as well as conceptual leap that must occur with the teacher candidates' use of technology within a learning environment is the instructional design and implementation of technologies. Further, modeling of such activities must be an objective of superior teacher education units.

The integration of technology within teacher candidate's methods coursework offers the opportunity to communicate at numerous levels of understanding. Through the support of the United States of America's Department of Education Preparing Tomorrow's Teachers to Use Technology grant, the design and development of a World Wide Web site through which the teacher candidates, inservice educators associated with the professional development schools (PDSs) that support the training of teacher candidates, PreK-12 learners and university faculty have the opportunity to delve into the world of telecommunications. A supportive environment has been created through which access to telecommunicative environs is available to the teacher candidates, as well as faculty and learners whom support the teacher candidate's professional learning opportunities.

Telecommunications encompasses several elements that can be positively modeled within a learning environment. listservs, chat sessions, bulletin boards, and electronic mail creates positive environments within a learning environment when focusing upon the scope and sequence of the instructional design process. Further, the instructor-centered and learner-centered focuses of telecommunicative uses are also elements that deserve further review.

Cognitive Flexibility

Cognitive flexibility offers further theoretical understanding concerning the nature of learning and the opportunities through which learning occurs within complex domains as well as ill-structured domains.

Spiro and Jeng state that, "By cognitive flexibility, we mean the ability to spontaneously restructure one's knowledge, in many ways, in adaptive response to radically changing situational demands.... This is a function of both the way knowledge is represented (e.g., along multiple rather single conceptual dimensions) and the processes that operate on those mental representations (e.g., processes of schema assembly rather than intact schema retrieval)" (1990, page 165). Additionally, cognitive flexibility "is largely concerned with transfer of knowledge and skills beyond their initial learning situation" (Kearsley, http://tip.psychology.org/spiro.html, paragraph 2). As such, cognitive flexibility is especially structured to support the integration and success of interactive technologies, such as telecommunications within the learning environment.

Telecommunications has the opportunity to reposition the learners beyond the mere obtainment of basic knowledge, towards opportunities through which the learners are enveloped within a world of understanding, analyzation and evaluation of the knowledge they are integrating into a conceptual framework of understanding. The complex and ill-structured domains delineated within cognitive flexibility theory aptly describe the world of telecommunications, as well as the opportunities towards achieving higher order thinking skills within the learner's conceptual framework of understanding.

Bloom's Taxonomy of the Cognitive Domain

As learners begin to obtain subject-specific knowledge, an emphasis must be placed upon the developing conceptual framework of understanding that is created. Bloom's Taxonomy creates an appropriate format through which to view the developing levels of higher order thinking skills as the learner moves beyond basic knowledge levels of information towards a level at which the learner is comfortable analyzing the information and then, finally, synthesizing and evaluating the information that has been appropriately and successfully incorporated within the learner's conceptual framework of understanding. Following is a brief explanation of the distinct levels of Bloom's Taxonomy, with a short definition and sample learning objective verbs made available for review. Further, examples of behavior are presented to emphasize the specific levels of understanding.

LEVEL	DEFINITION	SAMPLE VERBS	SAMPLE BEHAVIORS
KNOWLEDGE	Student recalls or recognizes information, ideas, and principles in the approximate form in which they were learned.	Write List Label Name State Define	The student will define the 6 levels of Bloom's taxonomy of the cognitive domain.
COMPREHENSION	Student translates, comprehends, or interprets information based on prior learning.	Explain Summarize Paraphrase Describe Illustrate	The student will explain the purpose of Bloom's taxonomy of the cognitive domain.
APPLICATION	Student selects, transfers, and uses data and principles to complete a problem or task with a minimum of direction.	Use Compute Solve Demonstrate Apply Construct	The student will write an instructional objective for each level of Bloom's taxonomy.
ANALYSIS	Student distinguishes, classifies, and relates the assumptions, hypotheses, evidence, or structure of a statement or question.	Analyze Categorize Compare Contrast Separate	The student will compare and contrast the cognitive and affective domains.
SYNTHESIS	Student originates, integrates, and combines ideas into a product, plan or proposal that is new to him or her.	Create Design Hypothesize Invent Develop	The student will design a classification scheme for writing educational objectives that combines the cognitive, affective, and psychomotor domains.

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EVALUATION	Student appraises, assesses, or critiques on a basis of specific standards and criteria.	Judge Recommend Critique Justify	The student will judge the effectiveness of writing objectives using Bloom's taxonomy.

(Huitt, 2000, paragraph 2)

The focus of the learning environment is to aid the learner in reaching the synthesis and evaluation stages of Bloom's Taxonomy. The higher order thinking skills that the learner must reach are areas of further interest and discussion.

Bloom's Taxonomy of the Cognitive Domain and Higher Order Thinking Skills

Achieving higher order thinking within the realm of a learner's conceptual understanding of the subject matter under discussion is an art that teacher candidates must glean from inservice educators, university faculty and numerous other mentors. Higher order thinking skills provide opportunities to provide higher order thinking occurrences for learners within a learning environment are supported by the further examination of Bloom's Taxonomy. Further, broadening the focus of higher order thinking offers the opportunity to emphasize the creation and understanding of information beyond merely the knowledge level of comprehension. Thomas, Thorne and Small (2001) offer a brief description of what higher order thinking skills emphasize.

> Higher Order Thinking, or HOT for short, takes thinking to higher levels than just restating the facts. HOT requires that we do something with the facts. We must understand them, connect them to each other, categorize them, manipulate them, put them together in new or novel ways, and apply them as we seek new solutions to new problems. (Thomas, Thorne & Small, 2001, paragraph 7)

Higher order thinking skills (HOTS) can be distributed into three main categories of understanding: content thinking; critical thinking; and, creative thinking. HOTS emphasize distinctly different levels within Bloom's Taxonomy, which offers the range of simplistic knowledge attainment towards more complex levels of understanding and working with information. The complex levels of working with information and learner's thinking processes and skills associated with HOTS parallels Bloom's Taxonomy within the levels of the synthesis and evaluation. "As patterns of higher order thinking are emphasized in learners within all levels of the educational system, each subject area emphasizes the creation of innovative aspects that aid the learner towards the creation and reconceptualization of thought patterns; in other words, viewing the information from numerous perspectives and within real-world environments" (Brown & Crawford, 2001).

Therefore, there is a clear pattern towards Bloom's Taxonomy of the cognitive domain and HOTS, which leads towards cognitive flexibility's ill-structured domain that offers the learner the opportunity to create and delve into further understanding of subject matter through the appropriate and successful integration of telecommunications into the learning environment. The modeling of telecommunications within the learning environment is accomplished through the integration of specific available opportunities within the teacher candidates' professional development. Following are specific telecommunicative opportunities that have been made available to teacher candidates, through the Preparing Tomorrow's Teachers to Use Technology (PTTT) grant.

Listservs

Listservs have been integrated into the communicative levels of electronic discourse for numerous years. Such a telecommunication ally offers the ability to disperse information to numerous people within a simplistic mode of interaction and transmission. The listserv available through the PTTT grant maintains a bi-weekly message to all teacher candidates, university faculty, inservice educators and administrators who have become subscribers to the listserv community.

Digital newsletters offering updates on professional development opportunities, new technological innovations for the learning environment, useful Web sites for subject-specific or foundational knowledge are offered. Each digital newsletter is focused upon a specific topic, so as to offer significant information that will be useful to the subscribers. As well, a listserv is a simplistic format through which to disperse important or useful information in an up-to-date, digital fashion. This ease of use maintains a one-way, asynchronous communication between the PTTT grant and the participants.

Bulletin Boards

Another asynchronous communication tools available forintegration within learning environments is the bulletin board. The opportunity to create threaded discussions maintains a communicative quality to the learning environment, without hampering the learner's ability to create an "anytime, anywhere" attitude towards information attainment. The communication is occurring within a threaded discussion, yet the learner can access and respond to the discussion at any point within their busy daily schedule. Teacher candidates are expected to maintain a rigorous schedule within the PDS learning environment and may not have the opportunity to maintain designated time allocation towards telecommunicative activities at specific points through out the day. Therefore, the ability to offer bulletin boards as a communicative activity maintains the thought pattern displayed within the discussion, but also maintains the freedom to review the discussion as an asynchronous entity. Further, the teacher candidate has the ability to develop and submit thoughtful responses to the discussion, without being hampered by time or keyboarding ability.

Electronic Mail

As a one-on-one asynchronous communicative tool, electronic mail (e-mail) is unsurpassed. Documentation concerning previous communications is easily obtainable within e-mail, due to the ability to archive e-mail communications for future use. This is an important aspect for teacher candidates to consider, as documentation of learner and parental communications are important elements when issues arise. Further, the ability to maintain personal communication with parental figures is a lifesaving event, as telephone communications can be wrought with difficulty. E-mail has the ability to communicate with a parental figure, as well as document the communication attempts. As well, the ability to communicate with a learner who may have course difficulties is an important element to the success of the learner.

Chat Sessions

Synchronous telecommunication opportunities are also an important element within the learning environment. Teacher candidates maintain that a virtual office hour are useful during their plan of study, and maintains communication with their university faculty whenever questions arise concerning coursework issues. The positive element concerning chat sessions is the ability to communicate back and forth within a real-time setting; however, the negative elements associated with chat sessions are the designated date and time allocation as well as the keyboarding abilities of some teacher candidates.

Integration of Telecommunications into the Learning Environment

As stated by the International Society for Technology in Education (ISTE), "Technology must become an integral part of the teaching and learning process in every setting supporting the preparation of teachers" (International Society for Technology in Education, 2001, paragraph 2). Further, "A combination of essential conditions is required for teachers to create learning environments conducive to powerful uses of technology. The most effective learning environments meld traditional approaches and new approaches to facilitate learning of relevant content while addressing individual needs" (International Society for Technology in Education, 2001, paragraph 1). Therefore, ISTE supports the integration of technology into the learning environment so as to create a supportive environment that emphasizes effective learning and addressed the learner's individual needs.

Instructor-Focused Versus Learner-Focused Integration

The implication for telecommunications modeling is that the ability to integrate telecommunications into the learning environment is simplistic; however, this is definitely not the case. Careful modeling of telecommunications integration into the learning environment must be created and supported by university faculty and inservice mentors. Only through this modeling of appropriate and successful telecommunicative ventures will the teacher candidates expand their conceptual framework of understanding concerning the integration of technology into the learning environments. Emphasis must be placed upon the ability to integrate technology as an instructor-focused activity as well as a learner-focused activity. Telecommunications could easily be integrated as an instructor-focused activity through the support of a listserv environment; while a learner-focused activity could easily be designed and implemented through the support of bulletin boards and chat sessions.

Conclusion

With the inclusion of telecommunications through out the learning environment, it remains that "The most obvious benefit of the electronic classroom is that it achieves what progressive educators could only dream of: a union of work and play.... There is no certainty that the electronic classroom will actually fulfill this promise, but it is this hope that makes the realization so attractive" (Ravitch, 1987, p. 28). The creation of learning environments that ready our learners for the complex, ill-structured world in which we live can only be appropriate towards the success of the future generations. Through the inclusion of technology, specifically telecommunications, the communicative nature of information and bonding has the opportunity to flourish.

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A Journey through Learning with Technology

Sara Geith
School of Education
St. Bonaventure Unversity
St. Bonaventure, NY 14778
geithse@sbu.edu

Abstract: This paper describes a preservice teacher's journey as she learns to use technology -- first for her own work and then as she learns to teach in elementary classrooms. Examples of lessons and projects in primary classrooms are discussed.

U.S. schools are adopting technology for instruction more than ever before. Certification programs are teaching and encouraging future teachers to integrate technology into their classrooms. The cohort of teachers graduating in the upcoming years will graduate with the knowledge of how to use technology to help them and how to integrate educational software into their lessons to benefit their students. Research shows that when teachers work together to make technology part of their classrooms their students learn more effectively and also prosper more in the world outside of their school. Studies conducted by the McRel organization show that students with access to technology in their classrooms perform better than their peers who do not have the same opportunity (McRel Products, 2000).

To fully appreciate the effect of technology one must look at the benefits technology has for teachers, how technology helps students learn, and how technology affects the students. During the first years of my college career I was introduced to technology. I learned how to use programs such as *HyperStudio*, *Inspiration*, and *Microsoft PowerPoint*. The university professors encouraged us to use these programs to organize our work and to help us during presentations. These programs, among others, are very helpful when teachers are organizing information for units or lessons plans. Programs such as *PowerPoint* can also be valuable for teachers if they need to put on a presentation for other school personnel or for parents who come to an open house or other meeting. For example, I created a *PowerPoint* presentation to encourage the parents in my community to accept Internet use in the classrooms. When I began using these programs another activity that I was working on was a unit on Alaska. We were focusing on how the position of Alaska in the United States helped promote explorers and travelers to populate America. First, I completed an Inspiration Web showing how I would integrate information about Alaska into each of the subjects that I was teaching. I have used this program for this purpose throughout my teaching career at Saint Bonaventure. I found that it was extremely helpful when planning my unit on the Healthy Body. I was able to brainstorm many ideas for each subject area and then I was able to create lesson plans and activities from there. It also helped because I was able to see the array of ideas that I wanted to cover and could then plan how long the unit would take to complete. Using the web as a guide for lesson planning is not the only benefit. You can use the web to help plan and create other activities. For example, when I created the web on Alaska, I was able to use it to help create a HyperStudio on Alaska. Having a base of the most important information I wanted to teach allowed me to create and interactive slide show to teach the children this information.

Another technological bonus for educators is the Internet. . Once again, referring to the Alaska presentation, I was able to create the Inspiration web and the HyperStudio based on information I obtained from the Internet. Teachers learn that the way to succeed in their career is to utilize all of the resources that are available to them. And the Internet is one of the best teaching resources available. There are countless web sites with teaching ideas, and even more that have information that you can share with your students. Planning lessons used to take teachers days…the Internet really helps speed up and spice up this process. . I am currently preparing to student teach next semester and the Internet has been one of my most important resources. I have been able to fins many important facts that I can share with the children, interactive web sites that I can teach them through, and a tremendous assortment of activities the help my lessons to become more exciting. Teachers have told me, and I used to see, that planning lessons used to take teachers days. I think that the Internet has not only helped to speed up this process but has also helped spice up lessons, and made them fun not only for the children but the teachers too.

As my college years continued I became more involved in elementary school classrooms. In the past year I have started interning in primary level classrooms. This opportunity has broadened my perspective of how to use technology not only for my purposes but also when I am teaching the children. By taking this step and bringing technology into my lessons, I have seen first hand what all of the research says. Technology is exceedingly effective when teaching children. Technology helps to draw the children into an activity, and because they are so intrigued by the new way of learning, technology helps keep them engaged in what they are doing, sometimes without even realizing that they are learning. I have taught the students in my classroom to make character and phonics webs using the program *Kidspiration*, and have also used Tom Snyder's *Community Map Maker* to teach the students characteristics of a community. Kidspiration is a program that helps children learn how to organize thoughts that they have and see the relationship between ideas they are being taught. For example, when I was teaching the children how to make a phonics web they learned about organization and relationship of a letter, to a word, to a picture. Each student chose a letter and then wrote three words in the connected bubbles that started with their letter. After this, they drew another bubble from each of their words and put a picture of the work they had chosen. When the students made character webs they put a picture of themselves as the main idea and branched five statements about themselves from the picture. From there they connected each bubble to one more to explain the idea they had previously stated. This helped them understand how to take their explanations to a higher level of thought.

Bringing a computer into a classroom is a wonderful anticipatory set. When I began my lesson I had the students' attention without using any words. When I began to explain what they were going to learn I did not lose their attention because they stayed focused on the technology that I was showing them. Children learn by doing, and part of that is visualizing. Technology allows you to show the children what they are learning, and then allows them to do what they have learned. Technology use supports greater learning because it allows students to immediately apply what they are learning. This is one reason that the community map-making lesson was extremely successful. The students enjoy drawing and if I had them create a map of their town on paper it would have showed them the same concept that the computer map showed them but by far the students learned more from taking their information and organizing it well enough to produce a replica map on the computer screen.

A final step in the learning process is excitement. Any teacher can tell you that children learn better when they are motivated and excited by what they are learning. Children love technology. My experience tells me that there is no other better way to motivate children than through the use of technology. When I taught the children in my second grade class how to use map making software to create a community it was one of the most successful lessons I taught all year. The students did not speak to their friends while I was talking, they worked in groups together to create a list of things that they wanted to put in their community, and when they had the chance to put their information on the computer they took turns with each other and worked together to make sure that their map was a replica of their real town. Finally, when the project was over and I printed them out a copy of their maps the delight in their eyes was astonishing!

As a teacher this is the factor that proves how important technology is to the children. The students looked at what was printed like it was a complete masterpiece. Technology helps children create pictures and write words in ways they never thought possible. Typically I see delight in the children's eyes when they realize that they have learned something new. When they learn something from technology this delight in insurmountable. The feeling that I get from seeing them happy makes the entire process worthwhile.

Technology can benefit all those that take time to use it in their classrooms. "Properly used, technology can enhance the achievement of all students, increase families' involvement in their children's schooling, improve teachers' skills and knowledge, and improve school administration and management" (U. S. Department of Education, 2000). My experience has also shown me that not only teachers and students benefit from technology use, but anyone that those teachers and students show the technology to also benefit. If all of these "players" join in the technological challenge, growth will occur, school systems will become more enriched, and together everyone will share the rewards of the new system they have created. During the presentation of this paper I will be able to introduce some the technology that I have used with my students. I will be able to present some of the students' work and hopefully portray the feelings that the students had from participating in my technology lessons.

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A Team Approach to Integrating Technology into the Teacher Education Program

Marsha A. Gladhart
College of Education
Wichita State University
Wichita, KS USA
marsha.gladhart@wichita.edu

Abstract: In the last decade, the College of Education (COE) at Wichita State University (WSU) has experienced the same challenge to better prepare teacher candidates to integrate technology that has been experienced by Schools, Colleges, Departments of Education (SCDE) throughout the United States. At WSU, the teacher education faculty decided to address this lack of teacher preparedness by adopting the ISTE NETS•T as technology standards for our graduating students. This presentation describes the three-layered approach used at WSU to integrate technology into the teacher education program to meet those standards. In the first layer, teams of teacher education faculty discussed, argued, collaborated, and finally developed a proposal to document how our teacher education students meet the ISTE NETS•T standards. The second layer involved student and faculty mentors who provided one-on-one assistance to faculty as they learned to use the technology in their instruction. The third level involved a series of faculty development workshops ranging from hands-on small group sessions to technology fairs open to the entire college. This presentation will share what our technology leaders learned from this process and the final integration proposal that resulted.

Layer One: Integration Teams

The process of integrating technology into teacher education courses presented a challenge to the faculty in the teacher education program at Wichita State University. The faculty in the COE had decided several years earlier that all technology should be integrated into undergraduate teacher education courses rather than covered in separate technology courses. Confident of having made a pedagogically sound decision to integrate, the faculty began exploring what integration really means and how it could be accomplished in our program. We discovered that this approach is simpler in theory than in practice. At first our attempts at integration were haphazard since faculty were already overloaded with goals and standards to be met and were not comfortable enough with technology to infuse it into their instruction. Our efforts focused on presentations to students in core courses, hands-on training in the computer lab when needed, and faculty development workshops and training to introduce new technologies to faculty.

In 2000, the Undergraduate Teaching Programs Committee adopted the ISTE standards (ISTE 2000) as our criteria for student proficiency in technology. The ISTE standards provided a starting point for structuring our technology integration. The Coordinator of Educational Computing distributed copies of the standards to all faculty in the teacher education program and began educating faculty about NETS•S and NETS•T standards and essential conditions for implementation. As faculty members discussed the standards, they began to question how the standards should be addressed in their courses. A number of issues arose as faculty attempted to integrate the technology to meet technology standards. Some of the more frequently voiced concerns and issues:

- Which standards should be addressed in what courses?
- What is my responsibility in teaching my students how to use the technology?
- I only have so much time to cover content, how will I manage to teach them how to use PowerPoint and other technologies without taking away?
- Should I require students to use technology to meet the course objectives or should I make technology optional?

The First Learning Experience

Our initial approach to supporting technology integration was to use the consultant model. WSU's teacher education program is organized in 4 blocks of courses. Each block addresses major program goals and builds on a scaffolding set of experiences with extensive field experiences. Supported by a PT^3 grant, a technology instructor and a curriculum specialist were given reduced loads to meet with each member of the first two blocks in the teacher education program and plan for technology integration. Faculty discussed the kinds of technology they required of their students, how they assessed student performance, and brainstormed new ways to use technology to help instructors meet the goals of their courses. This approach proved to be time-consuming and resulted in only marginal success in developing technology activities. Much time was lost trying to set up individual meetings with busy faculty. It also meant that dialog was only going on through the technology and curriculum specialists. The faculty members were not communicating with each other about their decisions on how to use technology, their concerns, or their successes. Some faculty members interpreted this consulting approach as an effort to tell them what to do in their classes. The difficulties with this approach reflect the necessity for change to be systemic if it is to be lasting and meaningful (Darling-Hammond & McLaughlin 1995; Kanter et al. 1992; Peterson 1995; Senge 1999). Instead of moving upward through levels of technology adoption (see Sandholtz, Ringstaff, and Dwyer 1990), the faculty continued to rely on the "experts" and to wait for further instructions. It became apparent that we needed to change our strategy to a more collaborative approach. We had learned first hand that isolated efforts of change are not effective and are often short-lived. If we wanted programmatic changes that would have a lasting impact on our teacher education program, we obviously needed to change our strategy.

The Solution

In order to increase communication and collaboration among the teacher education faculty we decided to bring faculty together in ongoing dialog about technology integration. A pilot team of 4 instructors was brought together to discuss technology integration in Blocks 1 and 2. These instructors represented special education, educational psychology, secondary education, and elementary education. Their goals were to identify ways that technology could be modeled in their classes and to determine what technology skills their students needed to be successful in meeting the recently adopted standards. Lively discussions centered on what technology integration really means, what skills should be expected of students, what responsibility did the instructor have in providing instruction in using the technology, and how should students be assessed.

At the end of the semester, faculty members and the technology specialist had formed a cohort that had some common understandings of both the challenges and the benefits of integrating technology. When asked to describe their experience to the next integration team made up of methods instructors, the first team members were excited about sharing what they had accomplished. At the end of their presentation, members of Team 1 strongly recommended that the second team work toward a sequence of technology skills within the block classes. They even volunteered to continue to work with Team II to accomplish this on their own time!

A second integration team included 9 methods instructors in Blocks 3 and 4 of the program. This group was considerably larger than the first integration team and represented a variety of adoption levels, technology skills, and content areas. This team used an online rubric generator to create a rubric to set goals and to guide their work toward integrating technology into their classes. As they discussed technology integration, it became apparent that they needed more training in how to use the technologies. A list of topics of interest was drawn up and used to plan faculty development workshops. This list was further developed into a whole day of concurrent sessions for the entire College of Education faculty and teacher education faculty in Liberal and Fine Arts.

The second team was unable to agree on a sequence of skills or how they should hold students accountable for meeting the ISTE standards because they only represented 2 of the blocks and didn't feel they could speak for the other blocks. Instead, they decided to focus on developing technology activities within their classes and sharing with each other. All technology activities were entered in a central database and a Web portal was set up so that faculty could view, edit, and search activities and technology tools for their classes. A grid of technology activities was designed that showed which classes were using technologies to meet their course objectives.

Again, the second team decided that the next integration team really needed to address issues related to student assessment in meeting the ISTE standards and to develop a plan for sequencing technology skills in order to scaffold student experiences in technology. Consequently a third team was developed with representatives from all blocks. A letter of invitation was sent out from the Dean inviting participants to engage in discussion with the end

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result being a formal proposal to the teacher education program committee of how the program was going to ensure that students met the ISTE standards. This time the technology specialist served only as a facilitator, bringing supplies and setting up computers when needed and only occasionally offering suggestions or asking questions. The faculty members were told that they were to come up with their own proposal based on their own understandings and needs.

Issues Addressed

All three integration teams addressed basic issues related to technology integration. Questions addressed were: (a) Which technology skills must students have and at what point in their program? (b) Is it enough for students to see technologies modeled or must they be able to use the technologies to teach? (c) How do we determine if our teacher education students can actually affect their students' learning by integrating technology? (d) Since we don't offer a basic skills course in technology, whose responsibility is it to train students to use the technology? (e) Some of our older students are really stressed out by all the technology. What can we do to help them? (f) When do faculty members find time to learn about the technology? (g) When do faculty members find time to re-design their courses to include technology?

The Final Proposal

These questions were discussed and argued at length over several months. The final proposal described three levels of learning about technology: (a) seeing (instructor models), (b) doing (student learns how to use the technology, and (c) applying (student plans lessons and activities with integrated technology. Five technology themes were identified to be carried out throughout the Block program: (a) communication, (b) instructional strategies, (c) research tools, (d) assessment, and (e) ethical, social, and legal issues. These themes were based on the content within the teacher education courses, rather than an outside model. The technology specialist was delighted that the teacher education faculty were able to work through issues and concerns and to come to their own understanding of technology integration through dialog and collaboration.

This team also developed a sequence of technology activities in each block that was presented to their colleagues in each block for feedback and comment. Suggested technology tools or strategies were indicated but not required. For example, Block 2 instructors decided that students would be able to conduct a Web search to solve a problem and to evaluate Web resources for authenticity and credibility but they decided not to identify WebQuests by name. This allowed more flexibility for instructors to choose the strategy that best matched their teaching style. Each block identified technology skills that students would need to meet course requirements and published those in course syllabi. Students were encouraged to improve or acquire technology skills by attending mini-workshops provided by the Tech Center staff on a variety of productivity and instructional software, by enrolling in one of the computer workshops offered for both undergraduate and graduate credit, or by seeking help through online tutorials. The final proposal measured student competencies by assessing the ability to complete an assignment or project that required the use of technology. For example, students were not graded on their ability to use desktop publishing but rather on their ability to meet a course requirement for effectively communicating information to parents through a newsletter.

Layer Two : Mentoring

Funding by a PT^3 grant provided student mentors for faculty. The student mentors were selected from undergraduate student applications and trained to meet faculty needs. The most popular requests were for assistance with setting up a Blackboard courses, creating Web sites, and media production. Our first mentoring efforts led us to conclude that student mentors could not produce work for faculty. They could only teach faculty how to produce their own instructional materials. Some faculty members resisted at first, saying they didn't have time to do the work for themselves. They really wanted a student assistant who would do the nitty-gritty work. However, the PT^3 grant staff decided to encourage faculty to become independent of technology and instructional support as much as possible and to limit mentor assistance to teaching faculty rather than doing their work for them. Eventually, most faculty came to realize that they learned more and were able to use the technologies better if the mentor functioned as a guide rather than as an assistant. We also discovered that by involving student mentors in faculty development activities, students learned more in order to be able to teach their instructors and that faculty members were impressed when students could use the technologies so expertly.

We also learned to limit the kinds of assistance offered to faculty. Instead of asking, "what do you need?" and then scrambling to train the student mentors to meet those needs, we decided to offer a menu of assistance from which faculty could choose. That decision allowed the staff to focus on training student mentors in depth and resulted in more independent mentors and mentees who required less supervision. Our student mentors began to be popular not only with faculty, but with their peers and college staff. We eventually had to develop guidelines to protect the mentors from all the demands on their time. We also discovered that increased technical assistance was necessary as faculty use of technology increased.

Layer Three: Faculty Development

We began our faculty development efforts with 2-day workshops led by outside consultants. These were minimally successful and involved only a few faculty members who were motivated to find two consecutive days they could devote to a workshop. Offering a variety of professional development opportunities has found to be more successful in both K-12 and higher education (Milone 1999, Rogers 2000). We finally developed an approach that provided this variety of experiences by including one-hour mini-sessions on topics requested by faculty, field trips to local schools and nearby Colleges of Education for inspiration, all-day technology fairs made up of concurrent sessions that faculty could select from to meet their needs, individual consulting by PT3 grant staff, and a network of model instructors we could refer faculty to when they had more questions.

The technology fair was one of our more popular efforts. Our partner K-12 schools requested we repeat the fairs at their schools with sessions designed to meet their teachers' needs. Grant personnel were also asked to help design and participate a university-wide technology fair as a result of faculty response to the college-wide events. For each fair, we selected a theme that was carried out in flyers, posters, signs, and the activities themselves. The excitement for our Dive into Technology event was heightened by lifesaver t-shirts, inflatable swim toys, ducks floating in the fountains, and a large seascape on a glass wall facing the computer center. Some faculty members ended up attending sessions all day, while others came and went according to their needs and schedules. The President of the University accepted our invitation to stop by one major event and even brought his wife to see what we were doing with technology.

Conclusion

Technology integration in the College of Education at WSU has evolved from sporadic efforts, one-shot workshops, and good intentions to an exciting program of activities. Technology is evident in teacher education courses, course syllabi have been revised to include technologies, faculty and students receive a variety of technical and instructional support, and excitement continues to build as the technologies become everyday tools for learning. A visit to the Technology Center may show students working on papers, completing online forms, developing instructional materials, and learning how to use HandSprings to track student progress. Students and faculty move between classrooms and the Technology Center with wireless laptops, digital cameras, and projectors. Technology is no longer confined to the Technology Center but is found where ever students and faculty are working together.

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Arkansas Schools: Erasing the Digital Divide

Cheryl Grable, Teacher Education, University of Arkansas at Little Rock, USA crgrable@ualr.edu

Pat Laster, PT3 Grant, University of Arkansas at Little Rock, USA plaster@ualr.edu

Ashia Jackson, Social Studies Dept., JA Fair High School, USA adsjacks@swbell.net

Abstract: This paper is a report of a graduate action research project and a Preparing Tomorrow's Teachers to use Technology (PT3) digital equity study. The study looks at technology access and other barriers at a metropolitan high school. A survey based on the International Society for Technology in Education (ISTE) standards for students was conducted in the spring of 2001 and is compared to a survey conducted four years ago at the same high school to assess ways the digital divide is being erased.

Introduction

The digital divide is of particular concern in the Little Rock metropolitan area. According to a recent article in the Arkansas Democrat (2001) Arkansas' technology work force is growing at one of the slowest rates in the nation and is ranked 45th nationally. Another example of the divide is illustrated by the following demographics from an urban Little Rock high school. JA Fair has a population that is 80 percent African American; many of them coming from low-income homes. It also has a new high-tech computer lab that has a student enrollment of 52 percent white and 31 percent African American. This type of information confirms the digital divide. A plan to erase that divide led to the school receiving a grant to become an information systems and technology magnet school which means state of the art technology. This study is an assessment to determine current student and teacher use of technology that will act as a base line for future implementation and improvement.

The Study

This research compares student access and use of technology at J. A. Fair high school. A survey based on access issues and the International Society for Technology in Education (ISTE) standards for students was conducted in the spring of 2001 with 260 students from a variety of classes that can be considered representative of the student population. Students in English, science, social studies, business and a technology lab were asked to complete the survey. The results were tabulated and compared to a prior survey. The previous survey was conducted four years ago with 700 out of 930 surveys completed. Although the surveys differ, some of the data is similar and can be compared to look at issues of access and barriers to technology for students and teachers.

The Findings

After studying both surveys and interviewing a teacher at JA Fair, several observations were made. In 1998, 40% of the students reported having a computer at home, compared to 78% in 2001. Another interesting statistic is the number of students who used the computers in the library. The 1998 survey reported 70% use of the computers at the school library, compared to only 40% of the 2001 students. A teacher suggested that in 1998 there was a librarian who placed an emphasis on using the Internet to conduct research and the current librarian does not. Another reason may be due to the fact that the students now have access to an Environmental and Spatial Technology (EAST) lab, a Plato lab, which has grown from six to sixteen computers, and more access to computers at home. The EAST Lab is a high tech lab centered around problem-based learning and the Plato lab is designed around a courseware program based on skills acquisition in a variety of content areas. There were three business education computer labs in '88 and four in 2001. In 1998, none of the Career and Technical classes had computers but now three are in home economics, seven in Marketing Education, and one in Coordinated Career Education. The Media Center has grown from four computers in 1998 to nine. In addition, the Little Rock School District now has its own technical support rather than using outside companies in as it did in 1998. In 1998, the only department office/workroom that had a computer was the Science department and it was outdated. Presently, each department has a computer with Internet access. In 1998, the only classes that had a computer were the business education classes. The science classrooms now have at least one computer with Internet access, and every classroom is wired for the Internet with computers on the way.

The Future

Greater improvements should occur since J.A. Fair has been approved as an IS and Technology magnet high school. It is becoming a center for advanced scientific research and experimentation with an emphasis in the environmental sciences, engineering and information sciences, and medical sciences. A vital part of this program will be the close tie with University of Arkansas at Little Rock's newly developed College of Information Science and Systems Engineering, as well as the Schools of Medicine and Life Science. A state of the art technology lab is in the works. One of the culminating experiences of the program will be a student operated and staffed business. "Connected Technologies ", the student business, will be implemented by eleventh and twelfth grade students proficient in information technologies. Students will research, plan, market, and manage a business that addresses the community's technology needs. Teachers will mentor the activity and will establish collaborative partnerships with local businesses and technology professionals. Information technology professionals representing various ethnic and racial groups will be invited to collaborate and share their perspectives on this and other large projects. This will allow students the capability to communicate with the Little Rock Public Library, University of Arkansas Medical School, and University of Arkansas at Little Rock Library Systems. To access these databases, students will register with each system. Parents will be encouraged to communicate with teachers via e-mail.

Another series of important and motivating experiences will occur in the "Information Systems Management Center." Activities in this area will train students in troubleshooting for the campus network and share information and software programs with all the computers on campus. These activities should excite students about Information Technology related careers while strengthening traditional academic programs with project-based learning experiences. This opportunity for entrepreneurship and small business management combined with Information Technology services will provide students with a meaningful "real world" understanding of the need for technology to ensure their success and advancement in the world of work.

It is evident that there are many hurdles to jump before the issues and concerns associated with bridging the digital divide to bring about digital equity are no longer concerns. JA Fair is in a unique position to help close the digital gap in this area. The success of this program will adequately prepare students for life in the 21st century. Student progress as they undergo this technological transformation will be tracked by keeping an on- going survey of students in the 9th grade as they progress to the 12th grade.

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On-Line and On Target: Strategies for Assessing the Educational Technology Competency of Pre-service Teachers

Neal Grandgenett, Office of Internet Studies, University of Nebraska at Omaha,
Omaha, Nebraska, United States, ngrandgenett@mail.unomaha.edu

Jean Jones, Nebraska Catalyst Project, Nebraska Department of Education,
Lincoln, Nebraska, United States, jjones@ndc.org

Bob Pawloski, Office of Internet Studies, University of Nebraska at Omaha,
Omaha, Nebraska, United States, bpawloski@mail.unomaha.edu

Mike Timms, Educational Research and Development, WestEd,
San Francisco, California, United States, mtimms@wested.org

Elliott Ostler, Office of Internet Studies, University of Nebraska at Omaha
Omaha, Nebraska, United States, elliottostler@mail.unomaha.edu

Abstract

The Nebraska Catalyst Project has sought to develop a convenient resource kit of educational technology assessments for the 17 teacher preparation programs within the state of Nebraska. Significant progress has been made in the range and quality of assessments being developed, which now encompass a variety of organizational approaches, including performance/portfolio, self-report, self-reflection, focus groups, surveys, and classroom observation strategies. Although these assessments are in various stages of development, they are beginning to be systematically available, and are starting to help the Nebraska teacher preparation institutions assess their individual progress in educational technology and teacher preparation. This paper provides a brief overview of each instrument under development by the project.

Introduction

It has been said that "You can't teach today's students with yesterday's materials, and expect them to have success tomorrow" (Teacher Librarian, March/April, 1999, p.34). It is indeed becoming a technological world, and the preparation of our pre-K – 12 students for the challenges of tomorrow no doubt demands a teacher preparation program that takes full advantage of educational technology. But how do we know when pre-service teachers are achieving the experiences that they need in educational technology through our programs? A good institutional linkage to teacher competencies in educational technology, and a good assessment process for those competencies, would seem to be two keys (Krueger, Hanson, and Smaldino, 2000; Smith, Harris, Simmons, Waters, Jordan, Martin, Cobb, 2000; Waugh, Levin, Buell, 1999). This paper overviews a variety of assessment strategies being tried at the 17 teacher preparation institutions participating in the Nebraska Catalyst Project.

The Nebraska Catalyst Project is funded by a grant from the U.S. Department of Education Preparing Tomorrow's Teachers to Teach with Technology (PT3) program and builds upon a strong partnership among the 17 Nebraska Teacher preparation institutions. This project is seeking to help create systemic improvements in the preparation of new teachers related to educational technology within Nebraska. This partnership also extends to various other Nebraska stakeholder institutions, including the Nebraska Department of Education, the Nebraska Association of Colleges of Teachers Education, the Nebraska Council of Teacher Education, the Educational

Service Units, the Nebraska Distance Learning Association, the Nebraska Educational Telecommunications Commission, the Nebraska Educational Technology Association, and the Nebraska Distance Learning Association. Participants also include a newly organized group of Nebraska pre-service students called SETA (Students Educational Technology Association).

The overall focus of the Nebraska Catalyst project is to strengthen teacher education settings as they relate to training future teachers to use technology effectively in the classroom. Four task forces are operating aggressively within the project, including Task Force I---Assessment Development, Task Force II---Completion Requirements, Task Force III---K-12 Teacher Cadre Development, and Task Force IV---Distance Learning. Task Force I and II have worked together to undertake the development of various prototype instruments to help assess pre-service teachers classroom readiness in educational technology.

Across the country, there are already a considerable number of informal instruments in use by institutions of higher education (IHEs) that attempt to get a sense of the success of their educational technology preparation of pre-service teachers. However, somewhat more rare, are instruments that have been systematically developed and carefully refined, targeted at reliability in administration and validity in content, and based upon standards or competencies such as those from the International Society for Technology in Education (ISTE). During the last few years, institutions also appear to be moving more toward a wider variety of assessment strategies, or are targeting strategies that are generally more qualitative ands hands-on in format, such as portfolios (Milman, 1999; Georgi & Crowe, 1998; McKinney, 1998; Petrakis, 1996)

The instruments that do exist are also fairly scattered across the institutional landscape, and thus sometimes not very convenient to interested institutions. To develop a locally convenient and multi-institutional resource kit of solid instrumentation was a major goal of the Nebraska Catalyst project. We believe that we have now made some strong progress in this effort, and the range of efforts and strategies undertaken is quite extensive. The efforts to date include a variety of organizational approaches, including performance/portfolio, self-report, self-reflection, focus groups, surveys, and classroom observation. These assessments are in various stages of development, but are even now becoming systematically available to help Nebraska institutions assess their progress in educational technology and teacher preparation.

The Instruments

The assessment instruments being developed are currently well within the refinement process, and within various pilot efforts by individual institutions. A brief narrative describing each of the instruments under development is provided below. More complete descriptions and background information can be found at the Nebraska Catalyst web-Site of http://www.necatalyst.org.

A Self-Report Instrument:

The Technology Ability Perception Self-Report Instrument (TAPSI) is an online survey that has been developed by administration to pre-service teachers at three IHEs in Nebraska. The Technology Ability Perception Self-Report Instrument (or TAPSI) has been developed as a general self-report instrument related to a pre-service teacher's perceived educational technology skills and knowledge. This instrument is already examining pilot data from more than 150 pre-service teachers retrieved during the spring of 2001, and is in a formal refinement process based upon that data analysis. The instrument is currently available for interested institutions, and the Nebraska Catalyst Project is offering initial consultancy help.

A Classroom Observation Instrument:

The Classroom Technology Observation Instrument (CTOI) is an instrument that is primarily for supervisors of student teachers. This Classroom Observation Instrument was prepared for the Nebraska Catalyst Project and is currently under further refinement (prototype already completed), with the assistance of an assessment specialist at WestEd in San Francisco. This instrument has already been used during the fall of 2001, and is structured to formalize the identification of the classroom uses of educational technology by both teachers and students. It includes an interpretive rubric for examining these various levels of educational technology (as well technology supportive constructs such as constructivism). Current conceptualization with the instrument are exploring its potential use on computer laptops or perhaps hand-held Palm devices, to make it more convenient to users.

A Web-Based Student Portfolio:

The development of a prototype for a web-based student portfolio has been underway through a direct collaboration between the Nebraska Catalyst project, and the two Nebraska PT3 Implementation projects (underway within the University of Nebraska system). The initial prototype of the student portfolio, which is currently "institution-based", now contains information from more than 500 students, across four different classes, and has been considered by NCATE (institutional visitation team) to be an evolving model that might be recommended to other institutions. The prototype is now available for more extensive use and refinement. In addition, the Catalyst project is also supporting a portfolio-developers special interest group, and is helping support various portfolio spin-off efforts at several of the partner institutions.

Pre-Service Teacher Focus Groups Protocol:

An initial focus group protocol was developed for use with pre-service teachers to support a group reflection process to examine pre-service teacher perceptions of how well Nebraska institutions are preparing their teacher candidates related to the use of educational technology for teaching and learning. To date, focus groups have been conducted at four representative institutions. The data from these focus groups has been carefully summarized, and is available on the project web site. In a follow-up process to the focus group effort (and based upon that protocol), a pilot web-based survey was also prepared for pre-service teachers. This web-based survey is expanding the input base of pre-service teachers, and provides valuable additional feedback on the perceived value and reform needs of their pre-service preparation programs.

Nebraska SnapShot Survey:

This web-based survey was conducted during February, 2000 and 2001, and focused upon determining the beliefs, use of technology, and the technology based needs of all Nebraska teachers, as connected to in-service education. A total of 4800 Nebraska teachers responded, providing a rich perspective on the current practices and needs of teachers in Nebraska, as it relates to educational technology in the classroom. The results have been disseminated to all Nebraska institutions of higher education, and the state legislature. Further information is available at the Nebraska Catalyst website or more directly at the URL of http://ois.unomaha.edu.

Faculty Survey:

A fairly extensive faculty member survey has now been piloted at one of the NE Catalyst's institutions, and Likert scale self-assessment data has been collected on more than 90 participating faculty members. Survey questions focus on two main areas, including 1) faculty knowledge and experience related to educational technology, and 2) faculty attitudes related to educational technology. Interested institutions have the instrument freely available to them for potential revision and use with their own faculty.

Technology Skills Certificate:

The Technology Skills Certificate effort is underway at a NECatalyst participating institution (The University of Nebraska at Lincoln) and is being conceptualized as a "class-based" electronic portfolio for pre-service teachers. The students within the class undertake a variety of technology related assessments, which result in a certificate of successful completion. The effort is currently under development, and is targeted at being a model for other interested institutions. Several institutions have benefited from periodic review of this effort, and from collaboration with the developers at the initiating institution.

Profiler Basic Skills Checklist:

Over 1200 pre-service teachers, at several Catalyst institutions have now taken this on-line self-assessment instrument. The data generated consisted of Likert scale responses to self-reflection based questions. Each individual pre-service teacher taking the on-line instrument receives both a response summary and a peer-based comparison diagram of their perceived strengths and weaknesses related to specific educational technology skills. The checklist prototype uses the popular Profiler web site and Internet data collection service, which can be contacted at http://profiler.com/.

CEO Forum Institutional Self-Assessment:

The Teacher STaR chart (School Technology and Readiness chart), established by the CEO Forum is also used by the Nebraska Catalyst project itself to provide an institutional profile for each of the 17 partner institutions regarding the status of educational technology within their teacher preparation programs. Questions provide feedback on technology integrated courses, faculty support, field experiences, and technology standards integration. Each institution receives an individual profile from the instrument web site for formative evaluation of the institution itself. It is also used for summary information on relative institutional progress across the project, which is being made available on the NECatalyst website. The Teacher STaR chart can be accessed from their web-site at http://ceoforum.org.

Stepping in the Right Direction

Although there is still considerable work to do, the Nebraska Catalyst Project believes that it has made a solid start on providing an array of assessment instruments for interested institutions. The institutions themselves have been good partners in this effort, and are taking ownership of various pieces of the assessment puzzle. A real contribution to the success thus far has been the willingness for institutions to experiment a bit, and a genuine interest by the talented members of participating institutions to collaborate.

As you might surmise from the descriptions of the instruments themselves, there has also been a keen interest to try to do as much as possible, in an *online* format. The participating institutions are finding this online format to be very convenient, and such a format has been one of the key reasons that so many pre-service teachers and faculty have already participated thus far in the prototype and refinement process.

The Nebraska Catalyst Project has also been a strong believer in a development approach that also provides a careful linking and integration of the instruments to various standards for pre-service education, such as those from ISTE. Such a commitment is helping ensure that the instruments that are developed are indeed *on-target*, for what they need to help assess, and encourage, related to educational technology.

By striving to be both online and on-target, the Nebraska Catalyst assessment instruments are seeking to become model examples of using technology-based data collection to assess the educational technology preparation of pre-service teachers. The Nebraska Catalyst project is also hoping that such instruments become truly useful tools for helping Nebraska teacher preparation programs examine the technology preparedness of their pre-service teachers. In essence, these new instruments are beginning to help us ensure that Nebraska institutions themselves will indeed be *"on-line"* and *"on target"* as they strive to help teachers prepare students effectively for their educational futures.

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Technology Integration Best Practices: Multimedia Style

Michele Hardwick, University of New Mexico, US

Abstract

The University of New Mexico PT3 (Preparing Tomorrow's Teachers to Use Technology) Project entitled "Shared Visions" has developed Multimedia Lessons that provide examples of technology integration best practices. The lessons were created in collaboration with K-12 schools and are presented using a Cognitive Apprenticeship Model template developed by the University of New Mexico. The online lessons provide an interactive approach to teaching and an additional resource to College of Education faculty in the area of technology integration. Conference participants will have an opportunity to view the lessons and explore the application of the cognitive apprenticeship model. The session will cover both practical and theoretical issues encountered in identifying field practitioners, articulating the instructional design process, and creating meaningful video footage of best practices.

Technology That Works in the Classroom for PT3: From Low Tech to High Tech Mobile Computing

PT3 Management Team, Albany State University, USA
Betty Hatcher, PT3 Project Director, Department of Educational Leadership and Foundations; Gerald Burgess, Director of Educational Technology Training Center; K. C. Chan, Department of Natural Sciences; Rani George, Department of Educational Leadership and Foundations; Rosemarie, Department of English and Modern Languages; Sam Masih, Department of Mathematics and Computer Sciences

Abstract: The support of a U. S. Department of Education initiative, Preparing Tomorrow's Teachers to use Technology (PT3), has enabled a multidisciplinary faculty teaching strategy reform process using a mini grant proposal/award model. With this support, core faculty are revising course syllabi to incorporate technology-rich teaching, enabling all core students to experience a model teaching setting, beginning with their earliest college classes. As year three of the reform process begins, changes in teaching strategies indicate that faculty continue to add additional technology, incorporating the latest in hand held, wireless mobile technology applications.

Introduction

The PT3 project at Albany State University, the SOWEGA Project, is now in its third year and has expanding the strategies which has marked the initiative as a hallmark for faculty support in implementing change on a small, historically black campus. Through the activities of the SOWEGA (Southwest Georgia) Project, faculty are embracing new teaching strategies and providing models for technology rich instruction for all core course enrollees, including teacher education majors.

Each PT3 grantee has distinguishing characteristics and for the SOWEGA Project, a hallmark of its design is the involvement of all faculty disciplines represented in core subjects. This factor allows PT3, through a mini grant system that supports faculty from all core disciplines, to influence students enrolled in all core content courses. This project design targets students for exposure to faculty who are teaching with technology-rich strategies thus impacting future teachers from the time they begin their college career.

During year two, with some carryover funds approved, the SOWEGA project management team expanded the mini grant award system from the first year of seven awards, to 12 awards. The number of faculty who proposed to enrich their teaching expanded, and in some cases, they each worked with teams of faculty within their departments. The departments with participating faculty were teacher education (7), mathematics and computer science, science, fine arts, English and history.

The funded proposals in the College of Education included the following: The course called Prep for Teachers proposed to incorporate a multimedia portfolio component for the class. Student teachers complete their final product during the course, but until this year, it has been in a hard copy format. The project involved technical support from the Educational Technology Training Center on campus. Two other COE projects targeted a course revision that moved the course to an on-line course format, using Web CT. Two other faculty awardees revised methods courses in the area of social science and language arts in ways that promoted student interaction with multimedia assignments. In special education, two faculty teamed to revise courses to incorporate increased student access to assistive technology product knowledge.

One faculty person in English and Modem languages continued that department's extensive adoption of revising teaching with technology, using student interactive assignments for the freshman core composition courses. In Fine Arts, the faculty teaching music appreciation explored software and Internet support and revised that core course with student-centered technology activity. In the natural sciences, a physics lab science course was converted to a web-based course delivery. In mathematics, an instructor with a research background and K-12 teacher training expertise used graphing calculators to provide workshops for math faculty and for K-12 teacher partner school faculty. Two courses in the social sciences (Georgia History and U. S. Government) were redesigned for content delivery via power point and Internet-based support, with a substantive assignment for student presentations. The student assignment supporting increasing writing skill development using technology resources and delivery.,

One project goal that did not progress during year one was implemented with a mini grant this year, with multimedia portfolio production for students beginning with the existing course called Prep for Teachers. During this course, students begin their student teaching, with one day per week devoted to completing Intech training, a model for implementing technology for K-12 teachers. One outcome of the Intech training is putting their portfolio work into a multimedia format. The first of these portfolios was completed this summer (5), with the Fall class (which will more appropriately be in the year three annual report) reaching completion for the entire class.

A major finding or outcome from the multimedia project has been a new awareness concerning the quality of student writing in the portfolios. With the entire portfolio more readily available, education faculty are now addressing an improved system for monitoring student portfolio work, with grading and rewriting/correction built in to each course component. In the previous design, students turned in their portfolio work as hard copy at the ending of the semester, a timeline that did not support student rewriting and editing with faculty supervision.

Project dissemination continues to expand, with presentations via panels, papers and workshops presented at venues that are local, regional, national and international. Local dissemination is regularly scheduled with the SOWEGA Project Summer Seminar, and one-day event that combines area K-12 teachers, our students and mini grant faculty in a session where technology-rich teaching strategies are shared. These outcomes are also shared in settings (state meetings) with other University System of Georgia teacher educators. Presentations have been made concerning the project outcomes at national conferences, and one international conference. Presenting faculty have been members of the PT3 management team. Workshops have been offered by both the management team faculty and mini grant faculty on campus for students, faculty and for stipend-supported area K-12 partner teachers.

During the year two phase of the project, the project model continued in its primary goal to provide a mini grant award funding for faculty who proposed syllabi revisions, incorporating technology to demonstrate model instructional technology applications; to support teacher education students in an intensive technology training process (Intech) and to collaborate with system partner schools in supporting K-12 student teacher supervisors in technology training with Intech.

The scope of the mini grant activities has broadened, with increasingly strong development of technology applications, indicating a new willingness to adapt teaching for on-line learning and student interactions. As newer technology has emerged (hand-held computers), more faculty are seeking training to incorporate newer developments into their already revised strategies, one indication that the initial faculty proposals are indications of a long-term process of change.

Outcomes of faculty efforts, including both year two outcomes and highlights from the year three activity will be presented here, including evaluation outcomes. Using a continuation of the formative process, evaluation outcomes are guiding the successive focus of each year during the three-year process.

Results of the Evaluation

The second year of the PT3 SOWEGA project was a major success. We had more faculty receiving mini grants. Faculty from the Colleges of Education and Arts and Sciences were given up to $6000 to revise their courses by infusion technology in their teaching. Twelve faculty members were awarded mini grants. Of these 7 faculty were from the College of Education and five were from the College of Arts and Sciences. Four of the professors put their courses on WebCT, three of these four faculty had web-enhanced courses, while one of the faculty members one had a full-fledged online course. The other professors included more technology in their teaching. One of the professors had students in the Preparation for Teaching course do multimedia portfolios.

In addition to the revision of courses, SOWEGA PT3 Project also conducted Palm workshops, Graphing calculator workshops and a summer seminar for college students, faculty and school teachers from the two local school districts.

Evaluation data was collected from the students and professors. On the student side, the measures included projects, essays, extended performances, portfolios, student attitudes, morale, and satisfaction. On the teacher side, we evaluate had them provide evidence of infusion of technology in their courses. Professors also completed surveys that provided information about technology assignments and the type of software they had used in their classes.

Students completed a computer attitude survey that measured their attitudes toward the use of technology. About 288 undergraduate students from the Colleges of Education and Arts and Sciences students answered these surveys. More than 85% reported positive attitudes toward the use of computers and a high degree of comfort in using the computer. About 15 Professors in the two colleges answered a technology survey that asked them about their use of various software programs. This survey measures faculty use of basic technology in their teaching and regular daily activities. Based on the results it can be stated that competency with basic computer operations ranges from beginning to more advanced. A system wide survey is underway to get a better understanding of faculty's level of technology competence. The SOWEGA PT3 organized a one-day summer seminar in June 2001. Approximately 65 participants responded to a survey about the usefulness of the summer seminar. Of the 65 participants who attended the summer seminar 95% rated the seminar as an "outstanding activity" and stated that they received "ample information." About 10 of the mini grantees made presentations at the summer seminar

The major aim of the SOWEGA PT3 project was to encourage professors to infuse technology into core Arts and Sciences courses and education courses. The pre- and post surveys were evaluated to see how many changes were made in the courses redesigned by the mini grantees. More than half of the twelve original syllabi had little or no technology components. The findings related to the revised syllabi are complex. When judged against the National Education Technology Standards, the syllabi were found to echo strongly with the standard Technology Operations and Concepts and Teaching learning and Curriculum standard but weak in Social, Ethical, Legal, and Human Issues.

SOWEGA PT3 - Year Three Indications:

Many of the initial changes in teaching strategies in the SOWEGA Project focused on level one changes, with beginners adapting their lecture style to incorporate technology in very basic ways. As year two progressed and as campus-wide faculty interest expanded, faculty began to look toward newer applications, such as moving to web-based delivery for much of the course or using Palm technology to support class management.

One change from the core focus has been an award to two different faculty teams whose focus is directed more toward the school system partners. This supports the project's goal for pairing student teachers with K-12 teachers who are both technology trained and practitioners. Dr. George Thomas teaches graduate courses in both statistics and Educational research, a course assignment that enrolls students from the K-12 classroom. His work with this population will expand that partner system's awareness of the need for student teacher supervisors who can support student teachers who are using technology in teaching.

Another faculty team composed of Dr. K. C. Chan and Dr. Gerald Burgess is designing a system to support faculty who are seeking ways to incorporate the use of hand held computers in teaching. This team is developing a workshop delivery for training both K-12 and college faculty in applications of this technology to support and manage instruction.

SOWEGA PT3 - Core Faculty Mini Grants from Year Two: An Overview

1. Instructor: Zephyrinus Okonkwo– College of Arts and Sciences
Course: College Algebra

The purpose of this project is to infuse technology in the teaching of MATH 1111- College Algebra. The outline of the technology-enriched MATH 1111–College Algebra course includes objectives such as the use of graphing calculators, interactive mathematical software, mathematical software, web-based tutorials, and multi-media classroom presentations. The students enrolled in the course will be given workshops on the use of the Interactive College Algebra Software, Maple V mathematics software, and graphing calculators. A web-based computer resource will be provided for students and faculty. Homework assignments will be provided on the web and students will be able to solve problems and submit their solutions to their instructors online. The three principal participants, other faculty, and two pre-service interns will participate in workshops to be organized by INTEC and the Project Director. The interns will develop the materials to be posted on the web. The interns will also help develop power point presentations, web pages, and other mathematical documents for instructors of the course. An in-service teacher will facilitate the training of the interns. Dr. Samuel Masih and Mrs. Connie Leggett will be the principal consultants for this project.

Project Outcomes included:The course outline for MATH 1111- College Algebra has been revised to include the infusion of technology in the teaching-learning process,Dr. Okonkwo, Mr. Shelton, and Mr. Myricks have undergone extensive training on the use of the graphing calculator technology in the teaching of College Algebra, faculty are getting training on the use of MathType, EXP for Windows, web-based instructional materials and document preparation, and the MAPLE software. A website is being developed. Our temporary page is http://www.asuemath.asurams.edu/algebra

2. Instructor: Dr. Deborah Bembry
Course: Early Childhood Curriculum:

This course is being redesigned to become a Web CT enhanced class. Students' syllabus and assignments were posted to the Web for easy access and retrieval. This format allowed the students to interact with the professor as well as each other.

Students still attended some classes since this is a web enhanced class rather than a strictly online course. Students presenting and demonstrating in class utilized more technology than previous classes. They searched the Internet for articles to crit ique, evaluated lesson plans for appropriateness for various ages and stages of development annd brought in software and evaluated its ease of use and suitability for elementary and preschool children. .

The following objectives directed the project: 1) Students will use a range of technology to demonstrate a comfort zone in locating, using and disseminating information. 2) Students will use a variety of technology and media to demonstrate a level of proficiency in use of technology in locating, using and disseminating information. 3) Students will interact with various technologies for the purpose of both transmitting and retrieving information. 4) Students will use technology routinely to transmit messages to the professor, each other and other customers as needed. 5) Students will use technology to help redefine the role of the teacher form "presenter" of selected information to "manager" of active learning. 6) Students will have access to data, reports, curricula and other documents necessary for proper preparation to teach. 7) Students will collect and share information while actively engaged in the learning process. 8) Students will explore and evaluate technology resources as they relate to early childhood and developmentally appropriate practices. 9) Students will practice responsible, ethical and legal use of technology, information and software resources.

3. Instructor: Dr. Surendra Pandey
Course: PHYS1001 Physical Science

The purpose of the project is to develop and offer the Physical Science course online as well as in traditional format. Since the course will be offered during Fall 2001, the development of materials is in progress. A web site has been created for the above course PHYS1001 on the WebCT, http://webct.usg.edu/; a list of simulations using Java applets has been prepared that will include various topics covered in the course; a list of sites has been prepared that include data, graphics, virtual experiments on selected topics in physics; the syllabus is being modified to reflect the online offerings and necessary instructions for students and the PD and student assistant have registered for InTech training to be held on May 7-17, 2001.

A list of useful sites to be used by Physical Science students (online or traditional) include:
Physics tutorials & simulations: http://smet.asurams.edu/physicsweb/
Selected topics: http://www.glenbrook.k12.il.us/gbssci/phys/mmedia/vectors/mzg.html
http://www.colorado.edu/physics/2000/waves_particles/wavpart2.html
Interactive: http://www.explorescience.com/activities/index.cfm
Periodic Table: http://trackstar.hprtec.org/main/display.php3?trackkid
JAVA Graphic User Interface: http://www.scis.nova.edu/~venkata/CISC665/gui.html
Resources for teachers: http://www.4teachers.org/

4. Instructor: Mrs. Gina Harbor- College of Education
Course: Special Education 3306

The mini grant course revision proposed was for SPED 3306. In addition, I have completed 12 modules for an additional course, SPED 5501, and I designed a course that is being taught by adjunct faculty, SPED 5515 (15 modules) All of the students in my courses are special education majors, and we meet class in a room equipped for teaching with technology. There are connections for the Internet and a projector. Student interaction is enabled through the use of such applications as WebCT, PowerPoint, Excel, IBM HotMedia, Netscape, Internet Explorer. Students use the discussion board and chat room features in Web CT to interact both in and out of class. Papers are graded and returned online, and grades are posted to an online grade book. Self tests online help students prepare for exams.

Sites such as PBS, CNN, and ABC help to keep students informed about current issues affecting special education. These sites usually require RealVideo Player. Students are then shown how to download and install the software. The objectives for my lessons focus on special education. The activities chosen to successfully meet the objective integrate technology. Students are taught the skills necessary to meet the objective on an as needed basis. I request that all of my classes be scheduled in the computer lab because I use the computer so frequently.

5. Instructor: Dr. Babatundi Abayomi- College of Education
Course: Measurement and Evaluation for Early Childhood Majors

Revisions for enhancing this course with technology will include moving toward more online interaction for students. This course is an introduction to the preparation, administration, and scoring of classroom assessments and tests. This course will also focus on the selection, administration, scoring and interpretation of standardized achievement and aptitude tests. The course will also address issues related to test norms and how to use test scores for effective guidance and evaluation. The course text has a companion website: A Virtual Learning Environment, and will utilize online information for review, student reporting and for accessing the syllabus and course assignments. The course includes four weeks of class meetings, with online instructional strategies composing the additional weeks of the semester.

6. Instructor: Mr. Michael Martin– College of Arts and Sciences
Course: Music Appreciation

The revision of the one of the core courses in fine arts, music appreciation, involved not only the addition of software and hardware, with some Intech training for the instructor. An additional need included a summer course in learning applications of software especially designed for music appreciation instruction. The redesign of this course was more technology intensive than some, owing in part to the large class size typical of most semester enrollment. The scarcity of teaching space for large classes, and preference given usually to departmental major courses, created a teaching situation for this course in which the instructor taught the same course in several different classrooms. The challenge of this arrangement was creating a portable technology support setting.

The changes to this course have inspired other faculty in the fine arts to technology for instruction to the extent that one of the year three awardees is a fellow faculty, teaching art appreciation. The addition of technology rich applications in these areas has truly revived the departmental approach to technology. Since all freshmen rotate through these courses, this is a critical area to demonstrate a model approach to instructional technology applications for teaching.

7. English and Modern Languages – College of Arts and Sciences

Instructors: Mary Gervin and Gloria Ridgeway

Course: English Composition – a two-course sequence for core instruction

The course revisions accomplished by a team of English and modern language faculty produced an improved, web-interactive process for student learning. Using the increased access to web-based teaching settings, the instructional focus changed to allow increased student t initiative for improving their writing skills. Via an on-line writing lab (OWL), students were able to monitor their own progress and access feedback beyond the traditional red ink, teacher-directed methods.

Hypertext resources were preferred over most other available software, as some of the limitations of software programs were prohibitive, including their expense, their hardware platform or specific network application limitations and the fact that they were time consuming.

The technology enhanced the writing process by empowering students to develop their writing skills. Instructors were able to achieve pedagogical goals while incorporating technology into the learning experience. The use of technology as complement to writing instruction can afford learners the opportunity to practice skills, promote self-direction, and meet individual needs without diminishing the learning experience.

The course revisions described are representative of the year two SOWEGA PT3 mini grants, and indicative of the broad range of both participation and variations of strategies employed by the mini grant faculty.

INTIME (Integrating Technologies into the Methods of Education): A PT3 Catalyst Grant

Doreen Hayek, University of Northern Iowa, US

Reports from the National Council for Accreditation of Teacher Education (NCATE) and the Office of Technology Assessment (OTA) have called attention to existing deficiencies in teacher preparation programs in preparing preservice teachers to use technology effectively in the PreK-12 classroom. *Technology and the New Professional Teacher* (NCATE, 1997) reports that preservice teachers should be required to apply technology in their courses and should see faculty model technology use in the classroom. In addition, *Teachers and Technology: Making the Connection* (OTA, 1995) suggests that in teacher preparation programs where faculty model technology use, students will adopt the use of educational technology in their instruction. The National Center for Education Statistics survey of 2001 points to the immense progress in computer and Internet accessibility made in U.S. public schools since 1994.

But in order for undergraduate students to learn to use technology when they teach, it is vital that university professors change the way they prepare teachers to use technology.

According to conclusions drawn by the OTA, it is not enough to tell students about what is possible. "They must see technology used by their instructors, observe uses of technological tools in classrooms, and practice teaching with technologies themselves if they are to use these tools effectively in their own teaching" (OTA, 1995, p. 185). It is far more common, however, for education faculty to discuss technology, have students read about it or demonstrate technology, rather than model it or require students to incorporate technology use into their lessons or units (OTA, 1995, p. 185). The purpose of the INTIME project is to provide the necessary resources for methods faculty to revise their courses to model technology integration and require preservice teachers to apply technology, along with components of quality education, in their lessons and units.

The information presented in the National Center for Education Statistics survey (2001) makes the INTIME project even more relevant and necessary in the total picture of how preservice, inservice, and methods teachers can improve student learning at all levels through the use of technology presently available in U.S. educational institutions.

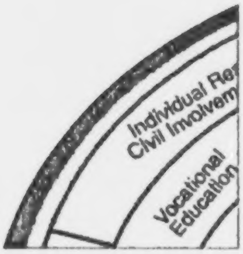
INTIME Goals:

INTIME (Integrating Technologies Into the Methods of Education) is a $2,397,594 Catalyst Grant to the University of Northern Iowa's College of Education from the U.S. Department of Education. The three-year INTIME project addresses deficiencies in teacher education programs in preparing preservice teachers to use technology effectively in the PreK-12 classroom. The purpose of INTIME is to provide the necessary resources for methods faculty to revise their courses, model technology integration, and require preservice teachers to integrate technology, along with components of quality education, in their lessons and units.

This session will show how the project is intended to produce change in teacher training programs in three ways: 1) The project provides web-based learning resources to support new teaching and learning processes in teacher training courses; 2) Teacher trainers can model technology integration in their classes and use the video scenarios and online discussion forum to discuss the technology-based learning process; and 3) INTIME provides a Faculty Online Discussion Forum through which teacher trainers can share strategies for integrating technology with other trainers.

Participants Involvement and Outcomes:

1) The participants will understand the "Technology as Facilitator of Quality Education Model". The model includes the following dimensions: students at the center of their own learning, principles of learning, content standards, teacher knowledge, information processing, democracy, teacher behavior, and



technology. Technology encompasses and permeates all the "lenses" or elements of the model that involve interaction of student learning elements.

The seven dimensions of the model provide a way for educators to view the integration of technology related tools into a robust educational environment. The materials the project features include over 300 web-based video scenarios of preK-12 teachers using technology as part of their daily instructional activities. Each of these examples includes the lesson plan, an interview with the teacher, a lesson overview, alignment with content standards, and a list of technology tools and resources. Beyond providing the information necessary to recreate the lesson, the activity is also viewed through the lenses of Technology and quality education elements.

The project sets up a framework for a robust educational environment and identifies key points at which technology should be implemented and evaluated to determine its impact. The project also allows the integration of new research findings into the appropriate segments of the model while maintaining the structure to evaluate the impact of technology tools on these new findings as part of an ongoing evaluation process.

2) The participants will view and critique online video vignettes of technology integration and quality education in a PreK-12 setting via video streaming technology. They will consider what content standards are addressed, how technology is integrated in the curriculum, and what other components of quality education are implemented in the lesson.

3) The participants will discuss the project as well as share their ideas about its goals, applications, strengths, and weaknesses.

ABSTRACT:

The purpose of InTime (Integrating Technologies into the Methods of Education) is to provide the necessary resources for methods faculty to revise their courses, model technology integration, and require preservice teachers to integrate technology, along with components of quality education, in their lessons and units. The project develops online video vignettes to be utilized in methods courses that include videos of best practices showing from PreK-12 classrooms where teachers are integrating technology in a robust educational environment. The participants will view and critique one of the online case studies of best practice in technology integration and quality integration via video streaming. The issues addressed in this session will be interesting for deans, administrators, faculty, and decision-makers of all expertise levels.

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Explorations in Modeling and Visualization in Mathematics and Science Immersed in Pre-service Teacher Education

Timothy Hendrix, University of Illinois at Urbana-Champaign/Office for MSTE, US

The National Council for Teachers of Mathematics has articulated in Principles & Standards 2000 (NCTM, 2000) the integral nature of the ***processes*** of doing mathematics. To know mathematics is more than recalling a loose-leaf notebook of facts—to know mathematics is to do mathematics. The Principles and Standards call for mathematics teaching to reflect these emphases in several ways. Mathematics learners should interact with mathematics concepts in multiple representations. Visual, numerical, and verbal means of viewing mathematical relationships should be employed as well as symbolic development. Viewing concepts from multiple perspectives promotes an environment conducive to making connections between mathematics concepts and phenomenon in real life, as well as to other mathematics concepts.

Today's citizenry must make informed decisions daily that involve such an assumed understanding of mathematical and scientific relationships. NCTM (2000) refers to a 'model' as a "mathematical representation of the elements and relationship in an idealized version of a complex phenomenon" and urges educators that "students' use of representations to model physical, social, and mathematical phenomena should grow through the years." Similarly, the AAAS Benchmark science standards also point to the importance of modeling in the science curriculum. Students should be able to create models that reflect the nature of increasingly complex phenomena, understanding both the underlying assumptions of the model and the mathematical/scientific relationships between the elements of the model.

The national report ***Shaping the Future: New expectations for Undergraduate Education in Science, Mathematics, Engineering and Technology*** (NSF, 1996) strongly recommends that undergraduate programs "make creative uses of technology to promote modeling and visualization." Technology enhances greatly the ability of students to explore models in mathematics and science. The types of representations and methods available to construct and manipulate different models allow students to explore many more interesting and realistic problems than traditionally experienced in high school classrooms. But the question remains as how to generate widespread implementation in the K-12 environment. The National Research Council (1989) makes the suggestion in the report ***Everybody Counts*** that "reform in undergraduate mathematics education is the linchpin for K-16 reform." Furthermore, "college and university faculty [should] make introductory courses attractive and effective…lecture less; try other teaching methods…[and] link scholarship to teaching."

As a component of the Ed Grid PT3 group, the Office for Mathematics, Science, and Technology Education at the University of Illinois at Urbana-Champaign works with the pre-service teacher education programs in mathematics and science to provide opportunities for modeling and visualization. In this panel presentation, faculty from the disciplines of science education and mathematics education will share this model for pre-service teacher education. Collaboration has been a theme that has contributed to the success of this model as science and mathematics education faculty work together to promote connections between the two disciplines. Different ways to implement visualization tools in pre-service coursework will be demonstrated and discussed. The panel presentation will provide a more detailed view and discussion of how various offices and grants within a college/university combine to support the integration of intensive technology tools in a pre-service teacher education program.

Within the pre-service teacher education program, there is an intentional recursive pattern of "immersion→reflection" that eventually leads to synthesis. We cannot expect beginning teachers (or any teachers) to use a tool for learning if they have not learned via those tools themselves. Learning about instructional technology is not sufficient; one must learn mathematics/science through the use of powerful technology to realize the power itself. Rather than teaching pre-service teachers about how to use the tool in mathematics and science, we have afforded them the opportunity to explore different representations of concepts via the use of powerful technology tools.

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Throughout the teacher education programs in mathematics and science, pre-service teachers engage in multi-layered activities to enhance pedagogical content knowledge. In the first year of the two-year program, an emphasis is placed on engaging the pre-service teachers in activities that deepen their content knowledge of mathematics/science in an inquiry environment via the means of tools such as computer-based laboratories or Internet-based Java applets. Pre-service teachers are often unfamiliar with the use of these tools in secondary mathematics/science classrooms. Pre-service teachers in the cohorts are encouraged to reflect on how such inquiry and tools contribute to their deeper understanding of mathematics and science. At the end of the second year in the professional program, novice teachers who have completed 3 semesters of field experience, as well as a student teaching apprenticeship, are challenged to explore a wider array of instructional technology tools. The novice teachers are expected to synthesize\ two years of theory and practice to envision possible ways to implement computer-based laboratories and Internet tools in the classroom in order to promote inquiry in mathematics and science.

Field experiences and grants that involve local schools engage in-service teachers in faculty development as well as inclusion in the teacher education process. Analysis of student activities and reflections leads to further research about visualization and teacher development. The entire enterprise of theory, research, and teacher education becomes interwoven, thus creating a model for professional development and lifelong inquiry.

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Implementing Change: Attitudinal Factors
Teaching Middle School Math/Science Teachers to Enhance Curriculum Using Technology
Project ImPACT at Farragut Middle School

Donna Henson-Boyers, doctoral candidate in Instructional Technology, Curriculum & Evaluation
University of Tennessee, Knoxville, United States, dhensonb@utk.edu

Susan Skuda, Project ImPACT Coordinator, University of Tennessee, Knoxville, United States
sskuda@utk.edu

Abstract: As part of a PT3 grant at the University of Tennessee, math and science teachers at Farragut Middle School are thinking about their teaching in new ways. A training model developed under Project ImPACT (Implementing Partnerships Across the Curriculum with Technology) partners interns with mentor teachers. These partnerships receive training that focuses on how technology can be used to support and enhance curriculum concepts in math and science.

The University of Tennessee is a recent recipient of a U.S. Department of Education PT3 (Preparing Tomorrow's Teachers to Use Technology) grant. Project ImPACT (Implementing Partnerships Across the Curriculum with Technology) is designed to work with some of the schools in the Professional Development Program, capitalizing on the partnerships of intern teachers and their mentoring classroom teachers. It has the dual focus of exposing professional teachers to technology that can be used to enhance their curriculum, and preparing preservice teachers to use technology for improved learning in their future classrooms. This paper will focus upon the effect of this technology training, resulting attitudinal changes, and their perceived impact upon the success of the program.

Farragut Middle School is the largest of 14 Knox County middle schools and the only middle school level Professional Development School site included in Project ImPACT. Students at FMS are grouped heterogeneously into teaching "teams" led by teachers who are specialists in language arts, mathematics, science or social studies. Six mentoring teachers, four in math and two in science, together with their intern teachers, participated in Project ImPACT technology training. Mentoring teachers received a stipend for their participation, and intern teachers were issued laptop computers and printers to use throughout the school year.

A major activity of Project ImPACT at Farragut Middle School included the creation of a learning strand model designed to help teachers develop applications of technology in the curriculum areas of math and science, with consideration of special education issues and needs addressed throughout the training. Through Project ImPACT, mentoring teachers, interns, the university faculty supervisor, and the school technology coordinator participated in training consisting of five weekly three-hour sessions, supplemented with matching support sessions of two hours each. Project participants also attend periodic team meetings.

The math and science learning strand was developed and delivered by a doctoral student in the field of Instructional Technology who has seventeen years' classroom experience. The trainer was supported by a staff member who was in the unique position of having served previously as Farragut Middle School's building level technology coordinator. The in-depth knowledge of the facility, equipment and the staff brought by this support person contributed to the effectiveness of the learning strands, team-building, and support at FMS.

An initial self-evaluation revealed that the mentoring teachers felt they had low to moderate technology skills, with most of their experience in electronic grading, word processing and email. All of the intern teachers had participated in at least one technology class as part of their required coursework, and most felt competent in their use of technology. One of the premises of Project ImPACT was that the interns' relative comfort and familiarity with technology, coupled with the mentoring teachers' classroom expertise would provide a fertile medium for infusing technology into the curriculum.

Training began with the introduction of *Inspiration*, software used for a variety of brainstorming and organizational tasks. The instructor modeled the use of the software as the teachers brainstormed their priorities and needs in topics to be covered during the 15 hours of training. Mentors and Interns then worked together to create an instructional unit, using the software as their organization tool. The next session focused on mechanical and technical aspects of setting up a class set of laptop computers, class management, and an exploration of online resources and lesson plans (http://web.utk.edu/~impact/teacherresources). The presentation software, *PowerPoint*, was introduced over the next two sessions, and teachers began creating lessons and resources to elaborate and enhance the curriculum they were covering. In that context, they learned to work with a variety of digital media, from digital cameras, to scanners, to capturing images from the Internet. Another session taught the creation of a webpage, using *Netscape Composer*, and the resulting pages provide another tool for teachers to use to maximize and focus student learning using the Internet. Woven throughout the training was the awareness of special needs students, and methods that could be used to support their learning, such as the use of text to speech, clear visuals, and enlarged text. Teachers also had the opportunity to explore and evaluate a variety of software and other technologies such as digital microscopes.

Perhaps the most powerful change that came about during the two months of training, however, was one of attitude. Teachers who began with an attitude of open skepticism ("I don't have time to do this," or "I don't see why I would use this is my classroom") found themselves eagerly creating PowerPoint presentations to add a visual component to their lessons. One teacher began as an absolute neophyte, very concerned about his lack of technology skills. After just a few sessions, he was not only using the technology, but combining several applications into lessons he will use later in the year. He is also eagerly planning ways for his students to work with classes of previous interns and teachers at other schools through the use of video conferencing. Another teacher observed that she had attended several workshops about PowerPoint and had never been able to use it. After completing her first PowerPoint project during a training session, her sense of accomplishment and empowerment was contagious. Still another's comment, "You know, the only reason anybody is doing this is for the stipend," later became "It's too bad every teacher at the school doesn't have the chance to learn this." Teachers who have worked alone within their own classroom found themselves collaborating and planning lessons together, and sharing units so that one unit could serve double-duty. They are beginning to see themselves as a community of educators, rather than as individuals teaching in isolation.

A key component to the changes coming about at Farragut Middle School is the teachers' sense of empowerment in the use of technology. At the beginning of the project, they were encouraged to identify their training needs and interests, and the training was tailored to meet these needs. This engendered an atmosphere of ownership and began a collaboration among teachers, interns, and Project staff. The competition associated with teaching in isolation is giving way to the trust and mutual support of community and a contagious enthusiasm that continues to grow. The sense of increased competence, coupled with new ideas and options for instructional dynamics have ignited a flame of learning for both the teachers and their students.

Acknowledgements

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Benchmarking Technology Readiness: Results from the CATALISE Technology Assessment Tool (A PT3 Catalyst grant project report)

Ellen Hoffman, Eastern Michigan University, US
Donald Nelson, Western Illinois University, US

Recent studies have indicated that improving the capabilities of preservice teachers to integrate technology into teaching and learning requires systemic change within a teacher preparation institution (Cooper & Bull, 1997; International Society for Technology in Education, 1999; Mehlinger & Powers, 2002; National Center for Education Statistics, 1999; National Council for Accreditation of Teacher Education, 1997; Willis & Mehlinger, 1996). Based on this premise, the CEOForum on Education and Technology (2000) developed the Teacher Preparation StaR chart, an assessment tool designed to help institutions in systematically benchmarking their progress, with indicators ranging from "Early Tech" to "Target Tech."

Since the instrument's release, over 260 deans and directors of education schools and colleges signed a commitment letter indicating their support for assessing their progress and using the StaR chart in that process. The original StaR chart provided a good beginning but needed refinement. As a result, CATALISE (a PT3 catalyst partnership), after getting permission from the CEO Forum, has gone through a rigorous process to evaluate and refine the chart so that it can become a key component in technology planning for all SCDEs.

The PT3 catalyst grant program is designed to implement and improve the StaR chart as part of a larger program, CATALISE is assisting colleges and universities in technology planning, action, and results. CATALISE (Consortium for the Application of Technology and Learning Innovation in Schools of Education), is led by Western Illinois University bringing together four major teacher preparation institutions (Eastern Michigan University, California State University, Los Angeles, University of Alabama-Monticello, and Towson University), the Teacher Education Council of State Colleges and Universities (TECSCU), and partners NCATE, NCREL, the Metiri Group, and Apple Computer.

By working with TECSCU institutions, the project's goal is to significantly impact technology planning and policy for teacher education at participating colleges and universities. The project includes an online assessment tool based on the StaR chart which allows institutions to track their own progress as well as obtain comparisons with other institutions. Support is provided through mentoring, online resources, CD-ROM cases studies, and satellite and video broadcasts to assist participating colleges and universities.

In addition to providing the policy and research context for the new assessment tool, new research results developed through work by CATALISE on key issues facing SCDEs in assessing and improving technology integration will be presented as background. As a result of surveys and focus groups with SCDE leaders, issues identified include the need for standardized concepts, better measurement tools, and "gap" areas that were commonly identified among institutions as requiring assistance. The focus is on providing research results through a pragmatic lens to provide a framework that will benefit participants in their own institutional strategic planning.

The process and issues in creating the revised chart will be presented to illustrate the common concerns that arose through a piloting study of the chart and its features. The areas in which changes have been made will be described along with the rationale for these new features.

The revised chart has additional features that should enhance its usefulness:

- Determine progress in meeting NCATE 2000 technology standards
- Provide data for internal or external reviews
- Produce visual charts that can be used in institutional planning
- Relate institutional progress with other comparable institutions using standardized measures
- Assuring that technology decision-making is data driven

- Providing evidence for needs that can be presented to higher level authorities as a priority for action
- When used for annual assessment, the tool presents a report that shows year-to-year progress.

The revised chart, now available to users on the World Wide Web, not only helps institutions assess their programs but provides feedback on the results in relation to others schools that have completed the questions. These results will be reviewed during the session to help participants understand the range and scope of technology programs among SCDEs. The results reveal the emerging strengths across programs as well as the ongoing issues facing institutions. The results include both quantitative findings as well as responses to open-ended questions that provide additional material that suggest both increasing sophistication and unintended consequences that require additional thought for future improvements to the instruments.

The chart will be distributed so that participants will have the opportunity to test and discuss the new assessment instrument and understand how to implement the chart in their institutional assessments. Test questions will be reviewed in a short interactive format to provide an opportunity for questions and feedback. The session will also introduce the CATALISE clearinghouse, a Web based resource designed to provide examples of program implementations that help illustrate the chart areas.

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A Study of K-6/University Collaboration: Principles and Practices

Dale Hoskisson, Valley City State Univerity, US
Gary Thompson, Valley City State University, US
Dave Bass, Valley City State University, US

Abstract

This paper will discuss the nature of collaboration and how it worked in practice for the participants in a PT3 grant. The collaboration takes the form of development teams consisting of the K-6 classroom teacher, at least one preservice teacher, and a university faculty member. The collaboration is funded through a PT3 grant. These teams gave the K-6 teacher extra support and expertise and the preservice teacher practical experience in integrating information technology into the curriculum. The participants in most teams were able to achieve a sense of equality among themselves. A student consultant protocol is being developed to address areas of concern after one year of experience with the teams.

A Study of K-6/University Collaboration: Principles and Practices

In the fall of 1996, in order to help preservice teachers achieve greater success in transforming education with the power of information technology, Valley City State University (VCSU) became a notebook campus. All faculty and students are issued a notebook computer for 24 hour use. Almost all classrooms are wired for student and faculty use of the internet and with large screen video projection capabilities. Information technology is ubiquitous and a normal part of daily life on the campus. Then, in 2000, the teacher education program developed a collaborative effort with K-6 classrooms. The heart of the effort is two-fold: 1) to provide in-service teachers with technology expertise and support for their efforts to integrate technology into their curriculum, and 2) to give preservice teachers practical classroom experience in integrating technology into the curriculum.

The collaboration takes the form of development teams consisting of the K-6 classroom teacher, at least one preservice teacher, and a university faculty member. The collaboration is funded through a PT3 grant. These teams gave the K-6 teacher extra support and expertise and the preservice teacher practical experience in integrating information technology into the curriculum.

This paper will discuss the nature of collaboration and how it worked in practice for the participants in the PT3 grant.

Principles of Collaboration

Lanier (1980) defined collaboration as “a complex interplay of talents and knowledge that come together at appropriate times to produce a commonly valued end result which no single party could have produced alone”(p. 409). Thomas (1972) described a continuum stretching from conflict through cooperation and coexistence to collaboration as the end point.

Generally, there are two conditions necessary for a successful collaboration. First, the participants should feel that they are equal in status. Second, they should have mutually agreed upon goals. A third quality that also plays an important role is equal participation in the decision-making process (Million and Vare, 1997) Friend and Cook (1996) believe that the necessary characteristics of collaboration are mutually agreed upon goals, voluntary participation, and equally valued professional resources to contribute to the goals. Clevenger (1997) adds another element: the members need to believe that the collaboration serves their individual interests.

The Collaborative Projects

The teams select specific projects to work on and develop. To do this, typically, the university student would visit with the K-6 teacher and discuss what projects the teacher would like to do. The student would then discuss with the university faculty what would be the best way to accomplish the project. The dynamics of how this occurred varied greatly from project to project but there were always several face-to-face meetings with all three members to coordinate and evaluate.

A Sense of Equality

Successful collaborations involve a sense of equality among the participants. Each member needs to feel that she or he has value and is important to the effort. We were worried about helping the university students feel that they were an equal partner. This might seem difficult to achieve in a setting with one student and two teachers, one of whom would be grading the student. However, the students' reports indicated a sense of equality. This was due in part to the fact that the students usually had much more experience with the technology than the K-6 teacher. Also, the university faculty was involved mostly as a consultant and provided ideas more than direction or evaluation so the students seldom felt the need to "please the teacher." The following are typical comments from the students:

We worked side by side most of the time. After I showed the teacher how to use digital cameras, she took pictures while I helped students insert information into PowerPoint.
I showed the teacher how to use the technology. I also created instructional sheets so students could learn how to use the technology.
We were always working together. I would demonstrate how to use the technology, then we would both do it together.

The K-6 teachers had that same feeling of equality. They were the classroom experts. They knew what would fit into their classroom and what their students were ready to do. They perceived the university students as having valuable expertise in information technology and therefore as vital members of the team. The teachers made comments such as the following:

My practicum student was extremely dedicated and willing to share knowledge about technology.
I enjoyed the opportunity to work more closely with the practicum student--we approached the project as a team.

Initially, the university faculty were to be an integral part of the team. However, due to time restraints and the natural dynamics of the situation, we became outside consultants called in as needed. We usually ended up trouble shooting the problems that the students could not solve. As mentioned above, this turned out to be an advantage in helping the students feel more confidence in their value to the collaboration.

One area in which the projects did not meet the principles of effective collaboration was equal participation in the decision-making process (Million and Vare, 1997). This was by design. Because the ultimate responsibility for the success of the K-6 students rested on the K-6 teacher, so did the authority for the final decision in all matters. We felt that the classroom teacher needed to be comfortable with all activities. All team members had input in the decision making process but the K-6 teacher had the responsibility to make or approve all decisions.

Problems occurred with some teachers who were so unfamiliar with information technology that they did not feel equal or that they could really make the decisions. Also some students did not feel comfortable with going into a classroom and directing activities. To address these issues, we are currently developing a student consultant protocol. The protocol includes a set of interview questions for the student to ask the K-6 teacher about curriculum topics, available technology and software, and any specific needs. There will also be a process for contacting the teacher, gathering the information, consulting with the university teacher for ideas, then arranging a meeting with the three individuals to discuss possibilities and help the teacher make the decisions.

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The Use of Multi-Media, Web-based Technology to Prepare Tomorrow's Teachers
Outline

Willis Copeland, Sarah Hough, David Pratt, Heidi Stevenson-Bagnall. University of California, Santa Barbara.

How can the multimedia and interactive capabilities of the World Wide Web be used to improve the professional preparation of teacher credential candidates? Surely, when a teacher education faculty member posts on a course website a syllabus and even a brief autobiography very little is added to the educational experience of students in that course. Yet such posting is typically the extent of use of the web by most teacher education faculty. What more is possible?

This proposed panel will discuss a series of web supported, multi-media modules that are being used with credential students at the University of California, Santa Barbara, in the context of a U.S. Department of Education-funded PT^3 project. SITE 2002 attendees will have the opportunity to learn about how the thoughtful use of web-supported technology has been implemented in the program, and to hear about and discuss its possible impact on the development of the credential students that the program serves. Members of the panel will represent four perspectives: the Course Professor, the Technical Designer, the Teaching Assistant; and students in the course.

Theoretical Framework

The traditional model of learning assumes that knowledge of practice is easily transmitted from teacher education professor to student, the assumption being that the mind is representational, a mirror of some pre-defined ontologial reality, and that once "transmitted" this knowledge is easily applied to real-life contexts (Cobb, 1994). Under this theory of learning there should be no conflict between what is learned in a lecture hall at the university and its application in a school classroom. A plethora of writings by a host of educational researchers tells us that this is not the case. For example, McDiarmid (1990), reminds us that " beginning teachers tend to believe that they were not taught essential knowledge, such as how to manage a classroom, regardless of whether or not they were exposed to such knowledge." (p12).

The development of credential students' technological expertise in UCSB's Teacher Education Program is largely based on a constructivist view of learning. This view sees knowledge as an *adaptive function* (Glasersfeld, 1990), in which a learner comes to know by responding to experience. According to Savery (1995), "we cannot talk about what is learned separately from how it is learned...rather, what we understand is a function of the content, the context, the activity of the learner" (p 31).

The web-supported materials discussed here have been designed to encourage credential students at UCSB to use their experience as a source of learning.. While engaging in a series of activities which could not be undertaken without taking advantage of particular capabilities offered by the word wide web, credential students analyze and reflect upon their own experiences as they consider a variety of issues related to the use of technology to further educational purposes..

In our work thus far we have developed three types of activities:

Interactive multi-media assignments. We have constructed several web-based modules that require credential students to consider technological and pedagogical issues in light of their own experiences in classrooms. For example, a web page for a child development course presents streamed video recordings of three pupils, who are at different stages of logico-mathematical development, attempting to solve the same geometric problem. After credential students have viewed the videos on line, they are asked to type into the web page their responses to a series of questions designed to encourage their exploration of the differences and similarities that they see across the videos and, thus, to further their understanding of child development in mathematics. The students' responses, once submitted, go to a database that can be viewed through a web-based interface by the course instructor for grading purposes. Further, the instructor can identify interesting or irregular trends in students' responses and raise issues based on these for discussion in the next class meeting.

Online Video Cases. We have developed a series of on-line activities which present, on a course's website, exemplary video cases of technology use in classrooms. Students are first encouraged to view the cases, repeatedly if necessary, until they feel that they "fully understand" what is occurring in the video. After this examination, students are asked to respond to a series of questions that elicit their analytical thoughts about the segments viewed. The responses of all students in the class are submitted to a database that is used by the course instructor to identify topics that will be used in the following class to challenge students' thinking.

Online examinations. To give prospective teachers experience with a non-traditional testing environment, we have created examinations that offer 'feedback" to the user as well as guided opportunities to correct their answers. This environment utilizes a combination of hypertext and Java programs to "branch" and thereby offer challenges to students' responses that are most appropriate to those responses.

Our Presentation

Samples of the above will be presented and discussed from four perspectives:

Course Professor's Perspective: Educational purposes and pedagogical techniques will be the focus of this part of the presentation. What are we trying to accomplish with these web-based tools? How are they used as part of the course?

Technical Designer's Perspective: The use of video streaming technologies and hypermedia creates a powerful forum for offering working examples of classrooms in which technology is being applied appropriately. What were the technical difficulties that we encountered when attempting this use of the web? How were they overcome?.

Teaching Assistant's Perspective: Implementing interactive web-based learning modules with students enrolled in the technology course has not been flawless. As with implementing any new technology, we have had our share of technical, design, and pedagogical challenges. The perspective of the teaching assistant focuses on development, testing and implementation of the modules themselves, as well as overseeing their use by students. Sharing what went wrong and what can be improved in the creation and implementation of these modules will be valuable information for anyone looking to design and implement similar technology strategies.

Credential Student's Perspective: Credential students have the opportunity to participate in learning activities that are entirely new to them. They cannot complete all requirements of the course without going on-line. The medium is the message. Is examination of video cases easier when one is less rushed, working at home rather than having to be immediately responsive in a live university class? Is the immediate feedback when they take the on-line examines more gratifying and in informing?

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Redesigning Courses to infuse technology in a Pre-Service Teacher Education Program

Erin K. Hunt
Department of Educational Technology
University of Northern Colorado
United States
ehunt@coe.unco.edu

Manisha Javeri
Department of Educational Technology
University of Northern Colorado
United States
manisha_javeri@hotmail.com

In June of 2000, The Educational Technology Department at the University of Northern Colorado (UNC) was awarded a PT3 (Preparing Tomorrow's Teachers to use Technology) grant. The project includes five initiatives that are designed to bring about systematic change within the teacher education programs at UNC. The initiatives are enhance the Required Educational Technology Courses for Students in The Professional Teacher Education Programs, model Appropriate Technology Use and Integrate Technology Utilization Into the Professional Teacher Education Program Courses, Model Appropriate Technology Use and Integrate Technology Utilization in The General Education and Content Area Discipline Courses, Integrate Technology Use by Preservice Teacher Education Students in Partner Schools, Build a Model for the Effective Use of Technology in Preservice Teacher Education Programs.

This paper is solely concerned with initiatives two and three, or the initiatives regarding the modeling of appropriate technology use within courses at UNC. Thus far fifteen faculty members have been chosen from various disciplines within the university to redesign a course so that it incorporates technology in effective and appealing ways. These courses include PTEP (Professional Teacher Education Program) and general education/content courses, chosen each semester (fall, spring, and summer). Proposals are accepted from tenured, tenure track, and longstanding term appointment faculty for PTEP, general education, and content-area courses. The faculty members are selected each semester based on a proposal review process and the probable success of the project. All selected faculty members are already competent users of word processing, email, email attachments, and Internet browsing. The interested faculty member proposes the suggested changes for a particular course by indicating how technology will be used and modeled in the course. These changes may include content-specific materials and activities that utilize technologies such as Web-based learning environments, online forums, multimedia project-based learning activities, multimedia portfolios, modeling, and simulations. The project staff, the College of Education Leadership Council, the Arts & Sciences Administrators, and both college deans review the proposals.

Faculty members who are chosen to participate are released from one course and have access to a small budget, $500, for the purchase of software. Each faculty member who is accepted to participate redesigns and augments one course they currently teach. Along with the PT3 project staff, they identify appropriate places to infuse technology into the course, develop appropriate technology-based materials to be used in the course, and redesign the course to accommodate technology. Each faculty member is paired with an advanced student in Educational Technology who serves as the technology coach and instructional designer. This support averages four hours a week throughout the entire semester. The released instructors also participate in a faculty development seminar on technology use in the classroom.

A major focus of this effort is modeling by the selected faculty members, appropriate uses of technology in the various courses they teach, including the delivery of instruction, the faculty member's use of technology both in instruction and in course management and their students' use of technology both as a learning tool and as an aid to their future roles as teachers. All course materials are shared with all faculty members who teach the particular augmented course.

To expand on the current redesign efforts, four case studies have been chosen to relate in detail the redesign process. Each case study looks at one of the chosen faculty fellows and relates information regarding the redesign process, the end product, and the possible diffusion of technology integration to other courses and to fellow colleagues.

Faculty Fellow #1 is a Mathematics teacher for the preservice teacher-training program at UNC. Her previous technology experience included knowledge of Word and PowerPoint. Her main goal for becoming involved in the PT3 grant was to create a website for her methods course. Besides creating a website, she learned to use software tools like Dreamweaver, PowerPoint, Excel, Scanning and Photoshop. She also learned to download software from the Internet.

At the end of the semester this faculty fellow was able to create a website that had important components for her students to have an access to online resources, especially when they were out student teaching. The graduate assistant's role in this process was to help her plan her project, make her feel comfortable with learning the software tools and their integration in her math class.

Faculty Fellow #2 was an expert in his technology skills previous to applying for the grant. He had worked as a graduate assistant for 3 years in creating online electronic portfolios at another University. He is well versed with many programming languages as well as HTML and JavaScript. His main goal for being a part of the PT3 grant was to be able to design an online class for the preservice teachers in the principles of scientific inquiry. This is the last class that the students are required to take before they go out for their student teaching. This class uses a multidisciplinary approach i.e., integration of chemistry, physics, earth science, and literature to develop scientific inquiry skills.

This faculty fellow used the Blackboard interface as a supplement for his class, instead of creating a website. This was mainly because UNC's center for Professional development provided all the technical support in creating any class shell on use of Blackboard. The Graduate Assistant's role was that of instructional designer, rather than a technology support person. The Graduate Assistant helped him find many articles related to scientific inquiry and online learning environments, some conceptual units form chemistry and physics that could be integrated in his class. This faculty fellow also decided to use visualization software called "World Watcher" as it is available for free online. Overall, his redesigned class focused on developing scientific inquiry skills using technology in a constructivist learning environment.

Faculty Fellow #3 teaches the Educational Psychology class for secondary pre-service teaching students. The course covers classroom management, theories of learning, etc. She currently uses PowerPoint and Digital Video to illustrate different lessons. However, these are limited to her laptop and cannot be accessed by students outside of the classroom. Once she began the project Fall 2001, she decided that it was imperative to place her materials online so her students could return to them for greater understanding. She also was leaving the University soon and wanted to leave the materials for the other faculty responsible for the course. This led to the creation of a class website, using Dreamweaver. It also put a focus on converting her IMovie's into Quicktime video for use on the website. She found many other areas throughout her course to infuse technology. She enhanced assignments that were used every semester with technology. She also decided to look into websites and chat rooms that adolescents frequent in order to explore what kind of adolescent culture exists online. She hopes to bring this information to her preservice students.

The redesign efforts put forth by this faculty member are already diffusing to her other courses. She is finding that many of her online materials will be of use to the graduate courses she teaches. She is planning on constructing her materials in such a way that they are applicable to a variety of her classes. This faculty member has also already begun to be concerned with collaboration among her fellow colleagues. She is planning on launching a department wide listserv that will be for use among both faculty and graduate students within her department.

Faculty Fellow #4 also redesigned his course Fall 2001. He teaches an educational foundation class that all preservice teaching students are required to take. Course topics include the history of education, multiculturalism, etc. Before the redesign, there was no technology use within his classroom.This professor chose to redesign his course by making the primary project a technology assignment. The primary project is to work collaboratively in groups and create the ideal school. In this case, generally a paper was turned in with information on it. He decided that it would enhance the assignment to have these schools represented virtually. This meant that each group would now create a website for their schools allowing not only the typical written content to be present but to also utilize pictures, graphics, and hyperlinks to give a better representation of those ideal schools.

The course to be redesigned was four credit hours and met four times a week. This allotted time to create a technology component into the course every week that would support their webdesign efforts. This faculty member is also creating the "shell" or interface that will hold all of his student's projects and therefore will gain web development experience including basic graphic design that should lead him in his efforts to technically support his students next semester. Generally, this faculty member teaches at least two, if not more, of this course every semester. He feels that his ability to work with anywhere from 60-100 pre-service teacher candidates will have a wide spread affect. He is very willing to take some course time to ensure this occurs.

Redesigning an educational technology class to place a focus on Integration

Erin K. Hunt
Department of Educational Technology
University of Northern Colorado
United States
ehunt@coe.unco.edu

Manisha Javeri
Department of Educational Technology
University of Northern Colorado
United States
manisha_javeri@hotmail.com

In June of 2000, The Educational Technology Department at the University of Northern Colorado (UNC) was awarded a PT3 (Preparing Tomorrow's Teachers to use Technology) grant. The project includes five initiatives that are designed to bring about systematic change within the teacher education programs at UNC. The initiatives are enhance the Required Educational Technology Courses for Students in The Professional Teacher Education Programs, model Appropriate Technology Use and Integrate Technology Utilization Into the Professional Teacher Education Program Courses, Model Appropriate Technology Use and Integrate Technology Utilization in The General Education and Content Area Discipline Courses, Integrate Technology Use by Preservice Teacher Education Students in Partner Schools, and Build a Model for the Effective Use of Technology in Preservice Teacher Education Programs.

This paper is solely concerned with initiative one, or the initiative regarding the redesign of the preservice educational technology courses at UNC. All elementary, middle grades, and secondary preservice education students are required to take two one credit courses throughout their teacher preparation at UNC. The goal behind the initiative was to redesign these to maximize their benefit to our students. The first year of the grant the PT3 team redesigned the 247, 248, and 249 classes. These courses all had a distinct "tools" focus. Finally, the second year of the grant, we have worked to redesign the 347, 348, and 349 courses. Because of the tools focus in the 200 level courses, we wanted these to have a focus on integration. Between the two courses, the Colorado State Technology Standards and the NETS standards have been met for preservice teacher education students.

The 300 level undergraduate classes focus on the "Technology Integration" aspect. It is very important for the preservice teachers to understand the theory and practice of technology integration in their classrooms. Most students taking the Educational Technology classes associate the field with learning to use computers. This notion is carried over by them in their student teaching experience as well. The redesign of the educational technology classes was to make the students think, "Why are we required to take a Technology class in our curriculum?", What is my philosophy of the use of technology in education?", How can technology utilize different learning strategies?", "What are some of the classroom management issues surrounding use of technology?", etc.

All the above goals were achieved by redesigning the class that was formally tool based, in which only the different computer programs were taught. The new redesign look will have the following components

1. Lesson Plans

A lesson plan is the backbone of a teacher's instruction. Teachers that make time to create a lesson plan will greatly benefit from the process, implementation, and analysis. Students in 300 levels are familiar with the most productivity tools (like Word, Excel, Dreamweaver, and others) that they have learned in their 200 level classes. Students will now create lesson plans to integrate the tools with the content. They will also incorporate the state standards and teaching strategies to develop a lesson plan that effectively integrates technology. The scaffolding for this would be given by discussing the theory of technology integration, instructional design theories, instructional strategies, room design, and classroom management. Differences between the one computer classroom, multi-computer classroom, and utilizing a computer lab will also be discussed.

2. Case Study

The final portion of the class will utilize a case study to create a problem-based scenario that is embedded in practice. The case study will last for a total of seven weeks. This case study will be delivered through a flash driven interface virtually. Students will meet every week for discussion regarding the case study and for help from the instructor.

Throughout the case study, a scenario is developed in which the student has just gotten a new job that will fit both their particular age range of interest, i.e. elementary, middle-grades, or secondary. For the elementary preservice students, the content will be focused on literacy. For the secondary and middle-grade students, the content will focus on their particular content area. Within the case study scenario, the classroom the student is taking over was awarded a small technology grant the year before with specific equipment software provided as a result.

The student is given the resources such as standardized test scores, grade reports, and Individualized Education Plans which model what teachers at our partner schools are given yearly. Other data will be presented via text, digitized video, and digitized audio. The students will be asked to create a needs analysis that is data driven from the available resources. They will then produce a lesson plan that seamlessly integrates technology to help solve the "gap" or problem arrived at in the needs analysis. Other "problems" come up throughout the case study such as technology and classroom management issues, room design issues, and equipment failures. This gives the students a place in which to apply the information that was gained at the beginning of the semester to solve a problem within a real world context.

Integrating Technology into Standards-Based Teacher Preparation "Changing the Way We Do Business"

Kenneth Janz
Instructional and Information Technology Services
Indiana State University, USA
kjanz@indstate.edu

Elizabeth Jared
Department of Elementary and Early Childhood Education
Indiana State University, USA
eejared@isugw.indstate.edu

Christy Coleman
Department of Educational and School Psychology
Indiana State University, USA
cpcolem@isugw.indstate.edu

Abstract: Indiana State University (ISU) is working with students and faculty with support from the Preparing Tomorrow's Teachers to Use Technology (PT3) initiative to create a teacher education program that uses technology as a natural extension of the learning process. As students progress through this program, they will experience technology -enhanced course instruction, develop a technology -rich portfolio document, and engage in technology -rich field based experiences. University faculty members are actively involved in developing the types of technology -enhanced projects required in the professional teacher education courses. Trainings focus on ensuring that the course requirements meet the standards established by ISTE, NCATE 2000, and IPSB Content and Developmental Standards, and the ISU Unit Assessment System.

Introduction

The key facilitator in this learning process and in the infusing of technology in the curriculum is the classroom teacher. He/she affects student achievement by the instructional methods utilized, curriculum presented, assignments given, and performance expectations. As noted in the Report of the National Commission on Teaching and America's Future, "What teachers know and can do is the most important influence on what students learn" (p. 6). Therefore, it is imperative that teachers, with various levels of experience, be prepared to meet the rising standards currently being placed on education.

National associations and organizations have outlined specific standards and performances for teacher preparation. The National Council for Accreditation of Teacher Education (NCATE) developed a series of six standards that will be used to assess the preparation of P-12 educators. According to the NCATE 2000 Board of Examiner's documentation, "The conceptual framework(s) is knowledge-based, articulated, shared, coherent, consistent with the unit and/or institutional mission, and continuously evaluated" (p. 2). Indiana State University (ISU) has embraced the NCATE 2000 goals and aligned the teacher preparation programs with these goals coupled with a commitment to performance-based assessment.

The Indiana Professional Standards Board (IPSB) has charged institutions of higher education in the State of Indiana with creating an individual Unit Assessment System as a vehicle for documenting student performances. This Unit Assessment System includes a series of performance indicators outlined by the IPSB. The IPSB identified portfolio assessment as the key performance-based measure to be used in reporting levels of achievement to the state for initial licensure. ISU and the School of Education (SOE) have decided to use portfolio assessment as the vehicle for preservice teacher evaluation.

In addition to following the standards outlined by the NCATE 2000 and IPSB guidelines, ISU also recognizes the standards prescribed by the International Society for Technology in Education (ISTE). Such standards provide performance-based indicators that are used to assess the technology competencies of teachers and preservice teacher candidates.

Project Implementation

Indiana State University is working with students and faculty with support from the Preparing Tomorrow's Teachers to Use Technology (PT3) initiative to create a teacher education program that uses technology as a natural extension of the learning process. As students progress through this program, they experience technology-enhanced course instruction, develop a technology-rich portfolio document, and engage in technology-rich field based experiences.

University faculty members are actively involved in developing the types of technology-enhanced projects required in the professional teacher education courses. Frequent technology staff development trainings are provided to all faculty members involved in teacher preparation. Training focuses on ensuring that the course requirements meet the standards established by ISTE, NCATE 2000, and IPSB Content and Developmental Standards, and the ISU Unit Assessment System. Specific faculty members are directly responsible for ensuring that these technology standards are infused into the identified course curriculum. Content area faculty members participating in this project are introduced to various technology possibilities that could be used to enhance classroom instruction.

ISU students enrolled in the undergraduate preservice teacher preparation program are currently required to develop a paper portfolio demonstrating competence in the standards-guided program of study. Students are now being required to create and maintain a technology-enhanced portfolio that includes specific performance-based unit assessment requirements. In order to facilitate a common understanding of technology, ISU freshmen and transfer students are required to enroll in an information technology literacy course as part of their general education requirements. During this course students will be instructed on how to construct the portfolio. In addition to developing foundational skills, students enrolled in the teacher preparation program are required to demonstrate technology proficiency by creating various technology assignments. During the portfolio review process, students present and explain each artifact; the faculty members facilitate a reflective discussion regarding the students' choice. This enables the student to verbalize the rationale for his or her selection.

Currently, the ISU teacher preparation program has embedded practicum experiences into each of the methods courses. Students are assigned to various classroom settings where they are responsible for the instruction, assessment, and management of classroom children. Students are expected to demonstrate their use of teaching skills with school-aged children. This experience provides an opportunity for undergraduate students to apply what they have learned in their course work to an authentically rich teaching situation. This is an invaluable experience for students as they are able to develop their own individual teaching style.

As part of the responsibilities of the field-based experience, students are required to develop an elaborate technology-enhanced project that reflects their progress toward becoming a professional educator. Students are assigned a project on such topics as parental involvement, classroom management, or service learning. The students are required to implement the project in his/her classroom setting. These extensive projects will enable the students to integrate technology into areas of teaching that are often missed in daily preparation. Students will then submit documentation of this in their technology-enhanced portfolio.

The ISU faculty member and the classroom teachers act as mentors who assist with the field experience technology project. During the field experience, both mentors will make frequent observations of teaching performance. The student teacher will demonstrate his/her competency in integrating technology into the classroom. The mentor teachers will then assist the student in carefully selecting artifacts and student examples to be used in the project documentation.

The entire field-based component reflects a strong commitment to best practices in education. ISU ensures that the graduates in education are prepared with the most current content knowledge and technology skills available. By integrating technology throughout the ISU teacher preparation program, students are exposed to increasingly complex applications of technology into the classroom.

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Creation of Online Resources for Faculty in Higher Education: A PT3 Project

Seung Jin
Curriculum and Foundations
Cleveland State University
seung.jin@csuohio.edu

The Modeling Instruction with Modern Information and Communications: the MIMIC Project, a U.S. Department of Education Implementation Grant, was designed to prepare pre-service teachers to integrate technology into teaching and learning. One of the goals of the MIMIC project is to create an online community to connect three populations: 1) teacher educators, 2) classroom teachers and 3) preservice teachers with the integration of technology in instruction. To achieve this goal, the MIMIC site was developed by a collaborative team including faculty in Educational Technology and students enrolled in a Master Degree program in Educational Technology at Cleveland State University. Since the Fall of 1999, the MIMIC site has been expanded as a key instructional resource for technology integration in teacher education program beyond a form of dissemination for the project.

The paper describes the findings of an evaluative study that examines the effectiveness of this MIMIC site and the key factors that promote more widespread effective uses of the MIMIC site. The evaluative study has being conducted in three phases: 1) self-evaluation, 2) team-evaluation, and 3) survey and interview to participants. In the self-evaluation phase, the developer reviewed a number of web sites related to PT3 projects and analyzed the strengths and weaknesses on each site. The findings of this inquiry were reflected in the revision process of the MIMIC site. For the team-evaluation, the leadership team provided the developer with comments on components to be updated or added/deleted. For the survey/interview phase, survey data will be collected from approximately 40 participant faculty members and mentors at Cleveland State University and five partner institutions of higher education. The survey questions will find out the following variables: participants' needs, interaction with online resource, access frequency of each component, adoption of online resources in their course, willingness of material submission, personal interests of the site, provision of feedback/suggestions, etc. During the Fall of 2001, semi-structured interviews will be conducted to approximately 10 volunteers who participate in this project.

The aim of this formative evaluation is to improve the usability and effectiveness of the MIMIC site based on participants' needs. The result of this study will produce a successful model of collaborative online resources that can be used as a primary teaching tool in teacher education programs.

PT3: Attitudes and Concerns of Preservice Teachers

Margaret Johnson, Southern Illinois University, Department of Curriculum and Instruction, US
Jennifer Earls, Southern Illinois University, Department of Curriculum and Instruction, US

Training future teachers to be tech users has become a priority for education departments in universities and colleges throughout the US. Graduates must be savvy in classroom climates where technology integration is the key. Introducing technology to novice instructors can cause anxiety. This paper explores the attitudes and concerns of pre-service teachers participating in classroom technology integration as part of the Southern Illinois University PT3 grant – Project LIFT-Off. Seventy-five teacher preparation undergraduate students enrolled in their first semester of the Teacher Education Program (TEP) completed pre- and post- surveys measuring concerns about technology and computer attitudes. The students participated in hands on training as well as workshops and in-class discussions of technology throughout the semester. The results showed that ….(The results are pending -December 2001- and will be reported in this paper). The concerns survey data was complemented by pre- and post- focus groups. These focus groups explored student concerns about using technology in instruction. Computer skills were also measured and used to help students choose professional development opportunities that helped to fill a gap in their skills.

Technology delivery using a flex cam to cross the digital divide in rural Tennessee schools

Pat Jordan, Tennessee Technological University, US
Margaret Phelps, Tennessee Technological University, US
Carl Owens, Tennessee Technological University, US

Tennessee Technological University in Cookeville Tennessee is a recipient of one of the U. S. Department of Education's PT3 (Preparing Tomorrow's Teachers to use Technology) Grants. One of the primary components of the Tennessee Tech grant is to provide funds to place in each of the twenty-two partner schools a multimedia cart for their use. The partner schools, which are located in five sparsely populated rural Tennessee counties, are for the most part the schools where the field experience students and student teachers from the university are placed. The primary purpose of the cart is to provide state of the art technology that can be easily moved from room to room in the schools in order that the university students might have access to the same technology, which they experience in the methods classes they are required to take before they are placed out in the schools. The components of each cart, the total cost of which is approximately $5000, include either an Apple or PC platform desktop computer, a 32-inch TV, a focus box that allows the computer to "talk" to the TV, a VCR and a flex cam. During the course of the nearly three years that the carts have been in the schools, without a doubt, one of the most used and therefore most valuable pieces of technology on the cart has been the flex cam. Our experience with these carts shows that not only the student teachers but also their mentor teachers are using the flex cams more than any of the components on the cart. Many times the flex cam is removed from the cart and taken to a classroom where it is interfaced with the VCR and the TV in the room. A benefit that allows the remainder of the cart technology to be available for use by other teachers. Our presentation will focus on the flex cam as an application of technology that we have found "really does make a difference". The flex cam, more than any of the other cart components makes it possible for even an inexperienced teacher to use technology successfully. Once the teachers experience technology delivery via the flex cam, we have found they immediately begin to plan ways to procure one that they can keep in their classroom all the time.

The flex cam is a relatively uncomplicated piece of technological equipment that is used in conjunction with a VCR and a television to project items that are "seen" by the camera mounted on the end of the flexible neck of the equipment. The flex cam also has audio capability, which allows recoding of a voice, or other audio cues through the use of the VCR. The flex cam as a technology application allows the teacher to effectively demonstrate or illustrate items to an entire class through the use of the VCR, which interfaces with the television.

The objectives of the session are threefold: 1. To highlight a method of technology delivery through the use of a flex cam which we have found to be a very user friendly item for all the teachers who have been introduced to it through our grant; 2. To demonstrate the use of the flex cam to facilitate the integration of technology into sample lessons which have been developed by classroom teachers, student teachers and the PT3 staff; 3. To offer to the audience an opportunity to experience "hands-on" practice with the flex cams.

The audience who would benefit most from this presentation would be teacher education faculty, teacher education administrators, and elementary and secondary teachers. The level of experience necessary to successfully utilize the flex cam would be beginning to intermediate. There are no prerequisites.

We propose to bring with us three flex cams, which we will demonstrate to the audience. As the final part of our presentation the audience as a part of a "hands-on" exercise will then use the flex cams.

The demonstration portion of the presentation will highlight lessons that have been developed by the PT3 staff for use in staff development sessions conducted in our partner schools. One such lesson uses the flex cam to project the pages of a book such as a primary teacher would do when reading to her students thus allowing each student to easily view the pages while not interrupting the flow of the lesson. Another lesson demonstrates the use of the flex cam to show bones of a frog, and other fragile objects, which do not easily lend themselves to handling by little learners but are excellent teaching aids for the elementary teachers. The flex cam allows for the learner to view objects from a multi-dimensional perspective that is useful in math lessons that use manipulatives. Other lessons will highlight areas such as music, physical education, mathematics, history, geography and art. There are an unlimited number of uses of the flex cam in the projection of small objects for ease of the entire class to view. Another use of the flex cam is to utilize the audio functions in conjunction with the camera to allow students to be taped and recorded such as we might do with a video camera. Teachers have used the flex cam in this manner to make video to be used in evaluation or for presentations and programs. The Interns will demonstrate the use of the flex cam for such projects as student book reports where videotape can be made for the student to take home for the parents to view.

The flex cams that we will demonstrate will not be the models that can be interfaced with a computer. While e have used that model on the carts that we placed in our college level chemistry and biology departments, the higher cost of the software for the computer model flex cam is prohibitive for the carts which we placed in the elementary and secondary schools.

In the audience participation section of our presentation we will use our PT3 Grant Interns to assist those present who wish to experience the use of the flex cam. We will bring four flex cams so that we can offer three stations with flex cams and a fourth where we will demonstrate the connection requirements for the flex cam to the VCR and the TV. At the first station, because we have found that the neck of the flex cam is resistive enough that beginners hesitate to use the necessary force to place the flex cam on the object to be projected, we will assist with that aspect using the flex cam to view the participants and make a videotape which can be projected during the session. At a second station we will instruct the users in the proper way to orient and focus the flex cam for projection of books or other written material. At the third station we will demonstrate the attachments that fit on the head of the flex cam that allows the flex cam to be interfaced with a microscope and the one that will hold the forceps for the projection of very small objects or insects in the "bug box". We will demonstrate the use of the microscope with the flex cam at this station. At a fourth station the Interns will demonstrate the proper method for connecting the flex cam to a VCR that will be then hooked to a TV thus allowing the participants to practice the necessary adjustment to the VCR to cause the image to be projected on the TV.

Project START: Southeast Student Teachers Are Revitalizing Teaching Through Technology

Cheryl Lani Juarez
Miami Museum of Science
United States
cjuarez@miamisci.org

Abstract: Project START (http://start.miamisci.org), is a PT^3 Catalyst grant that provides higher education arts and science and education faculty in six southeastern states (Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina) with tools and training to help prepare tomorrow's teachers to integrate technology -rich learning resources into the science curriculum and coursework. START activities and resources prepare technology -proficient facilitation teams to model technology integration in their teaching practice, facilitate the articulation between Arts and Science and School of Education faculty and school districts, and provide ongoing online and onsite dissemination support.

The Miami Museum of Science and the University of Miami School of Education and College of Arts and Sciences collaborated to adapt the Museum's teacher technology training model and materials. Partners included the Eisenhower Consortium for Mathematics and Science Education @ SERVE and the Smithsonian Institution's National Museum of Natural History.

Project Summary

Project START, a PT^3 Catalyst grant, that provides higher education arts and science and education faculty in six southeastern states (Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina) with tools and training to help prepare tomorrow's teachers to integrate technology-rich learning resources into the science curriculum and coursework. START activities and resources prepare technology-proficient facilitation teams to model technology integration in their teaching practice, facilitate the articulation between Arts and Science and School of Education faculty and school districts, and provide ongoing online and onsite dissemination support.

The Miami Museum of Science and the University of Miami School of Education and College of Arts and Sciences collaborated to adapt the Museum's teacher technology training model and materials to use with faculty responsible for preservice teacher preparation. The Eisenhower Consortium for Mathematics and Science Education @ SERVE assisted in the recruitment of cadres of key stakeholders committed to initiating reform in Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina to serve as START state facilitation teams. Each state team included six or seven three-member teams that consisted of one faculty member of the College of Arts and Sciences, one from the School of Education, and one district official responsible for technology training.

During the first two years of implementation (September 1999 through August 2001), each state team attended a four-day institute in Miami to prepare to adapt and replicate the modules relevant to their local needs. All costs for the Institute were covered by the grant. START Institutes provided participants with the tools to train others to: navigate the World Wide Web and to find science resources using effective search strategies; evaluate web sites that are valuable in addressing National Science Education Standards; discover a variety of available online courses, and how these materials can be used most effectively and the process for developing and applying criteria for evaluating online courses; explore mechanisms, strategies and resources for electronic collaboration ; use videoconferencing to enhance teaching and learning; create professional portfolios using presentation software and web-based tools; create professional educator home pages on the World Wide Web; and replicate the strategies and materials provided at the START Institute.

During the third year, all state teams attended a regional conference, hosted by another project partner, the Smithsonian Institution's National Museum of Natural History (NMNH). Participants shared dissemination progress and challenges within and across states, refined their own state and local replication plans, and learn firsthand how Smithsonian scientists use technology in their work.

Each participant received a Trainer Toolkit that included a comprehensive Trainer Guide, set of Learning Cards, and a CD-ROM containing all presentations and training materials. As an incentive for replication, participants also receive digital cameras to facilitate the web page development workshop as well as to document their replication activities.

Throughout the project, START staff provides ongoing technical assistance, and continually updates the robust START web site - http://start.miamisci.org. The web site includes current data regarding replication activities carried out by the 120 START Master Trainers in the six southeast states.

Project START is funded under The Preparing Tomorrow's Teachers to Use Technology (PT3) Program, a competitive grant program authorized under Title III of the Improving America's Schools Act of 1994. Grants awarded under this program support innovative teacher preparation program improvements developed by the consortia composed of higher education institutions, state agencies, school districts, nonprofit organizations, and others who are joining forces to develop well-prepared, technology-proficient educators.

ACTT Now to Link Pre-service and In-service Teacher Education: A PT3 Panel

Jennifer Kidd
ACTT Now
Old Dominion University
Norfolk, Virginia United States
jennifer@infi.net

Patrick O'Shea
Technology Department
Brunswick County Public Schools
Lawrenceville, Virginia United States
patrick.oshea@brun.k12.va.us

Shawn Haws
Technology Department
Brunswick County Public Schools
Lawrenceville, Virginia United States
shawn.haws@brun.k12.va.us

Dwight Allen
Curriculum and Instruction
Old Dominion University
Norfolk, Virginia United States
dwallen@odu.edu

Catherine Cheely
Technology Department
Brunswick County Public Schools
Lawrenceville, Virginia United States
cathy@brun.k12.va.us

Daniel Curry-Corcoran
University of Virginia
Charlottesville, Virginia United States
dec7m@cms.mail.virginia.edu

Daniel Downs
Technology Department
Brunswick County Public Schools
Lawrenceville, Virginia United States
dan.downs@brun.k12.va.us

Freddie Terry
Technology Department
Brunswick County Public Schools
Lawrenceville, Virginia United States
freddie.terry@brun.k12.va.us

Lee Vartanian
Old Dominion University
Norfolk, Virginia United States
lvartani@odu.edu

Abstract: Old Dominion University and Brunswick County Public School's PT3 partnership ACTT Now (Aligning Certification with Technology Training) provides technology training for pre-service and in-service teachers, university faculty, and the parents and students of a poverty-stricken rural school district in Southside Virginia. Results from the first year and a half of three grant programs are discussed: an internship program for pre-service teachers, a field-based masters degree program for in-service uncertified teachers, and technology training for university methods faculty. The initial findings from a new project initiative partnering pre-service and in-service teachers for collaborative lesson plan development are highlighted.

Introduction

Aligning Certification with Technology Training Now (ACTT Now) represents a unique partnership between Old Dominion University (ODU), in urban Norfolk, Virginia, and Brunswick County Public Schools (BCPS), a k-12 district in rural Southside Virginia. Over the past year and a half, the ACTT Now project has been working to create technology proficient teachers in both institutions and to counter the effects of the digital divide pervasive in poverty-stricken Brunswick County. ACTT Now's $1.3 million three-year grant is funded through the United States Department of Education's Preparing Tomorrow's Teachers to Use Technology (PT3) initiative and consists of five major components:

(1). An internship program for Old Dominion's pre-service teachers
(2). A field-based masters degree program for Brunswick's uncertified and provisionally certified teachers
(3). Technology Opportunities for Parents and Students (TOPS): an evening technology-training program for Brunswick County community members
(4). Student Technology Assistance Teams (STAT) and
(5). Technology training for Old Dominion's methods faculty

During the summer of 2001, the ACTT Now grant team developed a new project element linking ODU's pre-service and Brunswick's in-service teachers. Starting fall 2001, in-service and pre-service teachers were paired to collaborate in the development of technology-infused lesson plans. This new initiative has dramatically enhanced three grant programs: the internship, the field-based masters program, and the technology training for methods faculty while building synergy within the project as a whole.

Grant Components

Internship

The typical ten-week student teaching placement in the final semester of a pre-service teacher's training provides at best a truncated, incomplete picture of the teaching process and the teaching profession. Student teachers begin their placements after the school year has started and complete their student teaching before the year ends. Student teachers often are not responsible for submitting grades and completing report cards nor do they meet with parents to discuss student progress. Much is left to learn during the first year of teaching. The ACTT Now internship program offers a more complete experience for pre-service teachers while also providing personalized technology training so graduating teachers will be well prepared to meet the needs of 21st century learners.

In lieu of the regular student teaching requirement, ODU pre-service teachers can elect to complete a one-year or one-semester paid internship in Brunswick County Public Schools. Interns begin their placement either during new teacher orientation in August, or during the in-service days at the start of the district's spring semester in January. Interns remain in their position until the end of the semester or year. Interns accept the same responsibilities as regular classroom teachers except that they are only required to teach half time. This leaves ample time for interns to meet with mentors, supervisors and technology specialists, and to observe and assist in other classrooms. Interns attend weekly technology workshops and receive personalized one-on-one technology assistance from Brunswick County's Instructional Technology Specialists.

ACTT Now's partnership with Brunswick County enables ODU to provide a technology rich environment in which to prepare its pre-services teachers. Brunswick County Public Schools has emerged as a leader in technology despite the dismal statistics of its community, including one of the highest illiteracy rates in Virginia. Through the innovative leadership of its technology department, Brunswick County has acquired technology resources parallel to and in many cases often surpassing those in the wealthier districts surrounding the nation's capital. Hardware resources include wireless mobile laptop labs, Intel microscopes, SmartBoards, Palm Pilots and probes, digital cameras, computer labs and projectors at each school and Internet accessible computers in every classroom. A bank of educational software such as the highly acclaimed Inspiration and Kidspiration and the latest Tom Snyder products are also available for teacher use. Four instructional technology specialists and the director of technology work to help teachers integrate these new tools into their classrooms and curricula. These resources provide ODU interns with cutting edge 21st century learning environments.

A unique funding mechanism allows the internship program to operate with minimal external funding. Brunswick County leaves one teaching position vacant for every three ODU interns it accepts. The money allocated to the teaching position is used to pay stipends to three year-long, or six semester-long, interns and their mentor teachers. Brunswick County, in effect, hires three teachers for the price of one.

In addition to a $8000 per year stipend, interns receive a laptop for use while they are involved in the internship program. Because Brunswick County is approximately 100 miles from Norfolk, the interns are provided with free housing or a housing stipend. Full year interns are eligible for health insurance coverage and will start at step two of the salary scale should they be hired the subsequent year. All interns are guaranteed a job interview upon completion of the program.

Dictated by the grant proposal, the goal of each intern is to find new ways to incorporate technology into the planning and preparation of lessons, to design lessons that utilize recent software applications, and to develop project-based lessons that require students to use a variety of technological media for both the construction and presentation of their work. Weekly technology workshops expose the interns to different technologies and model strategies for technology integration. Brunswick's instructional technology specialists work one-on-one in the interns' classrooms helping them transition the skills they learn in workshops into actual classroom implementation.

In the beginning of their internship, interns focus on technology as a tool for planning lessons, creating materials, or as a means to deliver instruction, for example, PowerPoint presentations. In the first semester of the program, most interns did not surpass this basic level. A few interns stall at this initial stage; but most are able to change their focus and embrace technology as a tool for their students to use by mid-way through their placement. At the end of the second semester of the program, the interns reported using technology both as a tool for themselves and their students.

Software applications
• 5th grade class created a timeline of Virginia History using Tom Snyder Timeliner software • Students used Inspiration to make a bubble chart • Teacher used the Magic School Bus (Oceans) software to teach ocean environments
Webquests
• Students completed Virtual Jamestown WebQuest • Students completed teacher made WebQuest on the First Battle of Bull Run
University of Virginia's Etext
• Class read John Smith etext narrative on Virginia Indians • Class examined original maps of Virginia from the 1600's

Internet Resources
• Teacher used BrainPop.com movies and quizzes to teach the earth's structure and plate tectonics • Teacher led students in MayaQuest lessons • Students interacted with digital models of portions of the sea floor • Students viewed prehistoric marine animals • Students manipulated ocean currents • Teacher showed site devoted to runaway slaves—including original documents of advertisements for runaway slaves • Class looked at indentured servants database to see if their relatives were indentured servants during the colonial times
Internet Research
• Students researched the scientific name and habitat of microorganisms • Students researched the answers to photosynthesis and cellular respiration questions • Students researched the geological process which led to the formation of sea floor • Students used Internet to look up information on Vertebrates and invertebrates for a written and oral presentation
Presentations
• Students used the mobile lab to create webpages illustrating the major causes of WWII • Teacher made presentations on a variety of topics: figurative language, prepositions, slavery, Monarch butterflies etc. • Students made PowerPoint presentations on an author they researched
Hardware Applications
• Students observed microorganisms with Intel Computer microscopes and laptops • Teacher used the SmartBoard for discussion/interactive activity on rainforest – students could draw rainforest animals over a picture of the rainforest

Table 1: Classroom activities using technology as reported by interns (spring, 2001)

As of Spring 2002, ACTT Now has had 36 interns participate in the program. Interns have reported beneficial but demanding experiences. They believe that their internship experience gave them a more realistic picture of teaching and thus better prepared them for teaching than a regular student-teaching placement. They felt they were completely immersed in the school culture and developed an authentic sense of the responsibilities a teacher has both inside and outside the classroom. Follow-up surveys and interviews during interns' first year teaching placements will provide additional data on this and the internship's impact generally. Interns indicate increased comfort levels with technology but a desire for more instructional assistance for seamlessly integrating technology into their instruction and more teaching strategies that will enable students to be fully engaged in the learning process.

Field-based Masters Degree Program

Old Dominion University's Darden College of Education has been a leader in distance education for the past decade. Its Teletechnet program brings 4-year degree programs to students in remote areas throughout Virginia and the nation. Previously, its onsite courses served the urban population of Hampton Roads. Through ACTT Now, the Darden College of Education's virtual hand materializes in a remote rural community greatly in need of educational and economic resources. ODU offers a three-year, 33-credit masters degree program in general elementary or general secondary education on-site in Brunswick County. And on the planning block for fall 2002, is an executive doctorate program for Brunswick's interested teachers and administrators envisioned as a combination of on-site and Teletechnet courses.

Nearly one third of Brunswick's teaching staff is currently enrolled in ODU's field-based master's program. Brunswick County has difficultly both recruiting and retaining teachers. Low teacher salaries and the remote location contribute to a near 20% turn-over rate. Brunswick County is able to market ODU's field-based masters degree program as a means to both attract and keep good teachers. Through the use of grant funding, Brunswick pays the fees, tuition and book costs for all of the teachers enrolled in the program. In return, teachers agree to teach in the district one year for every year they were enrolled in the program.

The main emphasis of the field-based master's program is learning to improve instruction through technology. Teachers already certified complete a core of courses emphasizing curriculum development, instructional strategies, assessment techniques and the use of action research as a vehicle for self-reflection and instructional improvement. Uncertified teachers replace elective courses with state requirements such as Reading in the Content Area but otherwise complete the same core classes. All courses employ technology integration and require teachers to demonstrate the transfer of learned skills into the classroom environment. As with the internship component, the teachers' initial forays into technology are teacher-centered. As teachers gain experience and confidence, the sophistication of their technology use improves. Teachers in the program fall along a continuum from novice to technology award winners. Starting in spring 2002, more experienced FBM teachers will serve as mentors to those less experienced.

An early finding severely altered the overall course content for the FBM. The majority of the teachers lacked a fundamental knowledge of instructional strategies. The most powerful applications of technology require students to be independent learners. A majority of Brunswick's teachers were using teacher-centered lecture-based activities as their modus operandi. In October 2000, 83.3% of uncertified teachers reported that they were more inclined to lead a classroom discussion that was centered around simple questions that cover previously assigned material as opposed to a discussion generated by questions from students where the teacher's role is to point students in directions that can assist them to find the best answers. Also 70.8% of uncertified teachers believe that students prefer to have this type of discussion. Before teachers could begin to use technology in ways that fully engaged the students, they needed to learn student-centered instructional strategies and believe that students can learn in that manner. Hank Becker's research shows that teachers who exhibit more traditional teaching behaviors are far less likely than teachers embracing a constructivist approach to allow students to use new technologies even when the traditional teachers have five or more networked computers in their classroom (McKenzie, 2001). Instruction in the FBM program has since centered on student-centered instructional strategies and implementation.

Instructional Technology Specialists in Brunswick County Public Schools work directly with teachers including those individuals enrolled in the field-based masters degree program. They have several duties assigned to them but the most important is to assist teachers in the development of lessons and activities that infuse technology. Instructional technology specialists first help teachers learn to use hardware and software resources. Teachers select a resource to explore and then either schedule a series of appointments with an instructional technology specialist for one-on-one mini-workshops or attend an after-school professional development workshop. Following the skill development workshops, teachers collaborate with an instructional technology specialist to create a lesson, project, or activity in which the selected resource is infused into a classroom lesson. Brunswick County Instructional Technology Specialists spend the majority of their time in classrooms: modeling and co-teaching lessons using technology, observing lessons, and giving feedback to teachers. Brunswick's four instructional technology specialists act as assistants in the field-based master's class sessions and ensure tools and strategies introduced in class are implemented in teachers' classrooms.

Technology Training for ODU Methods Faculty

An obvious method of producing technology proficient teachers is to provide teachers with technology training while they are enrolled in a teacher education program. The Preparing Tomorrow's Teachers to use Technology (PT3) initiative was created to do just that. ACTT Now is fairly unique among PT3 projects in that many of its programs take place outside a school of education. The internship program offers intense technology training for pre-service teachers willing to live and teach in Brunswick County for at least a semester. The field-based masters program provides technology training and certification for Brunswick's in-service teachers who lack licensure. The majority of Old Dominion's pre-service teachers are not affected by these two initiatives. They receive technology instruction through one mandatory technology course and prior to ACTT Now, received little in the way of instruction for actually using technology in the classroom. Within the college of education, ACTT Now is providing training, resources and support to methods faculty. Members of the methods faculty are encouraged to model technology-infused instruction in their courses so pre-service teachers learn not only learn to use technology, but learn how to teach with it.

A serious barrier to this goal was the lack of resources within the college. Methods faculty had limited access to computer labs and no access to recent software programs or small hardware devises such as PDAs, Palm Pilots, microscopes, and digital cameras. The purchase of a wireless mobile laptop lab allowed methods faculty to bring the technology into their regular classrooms. Faculty attended workshops using the mobile labs and were then able to use the same equipment and programs in their own classrooms. Brunswick County lends software and equipment not available at ODU. Graduate students and instructional technology specialists from Brunswick provide group and individual follow-up training sessions for faculty based on their expressed interests. An incentive program encourages participation among the staff: faculty who complete the two-part training sessions earn software packages of their choice.

Linking Pre-Service and In-Service Teachers

While the internship program, the field-based masters degree program and the technology training for the methods faculty were improving the proficiency of the teachers involved in the programs, the project as a whole lacked synergy. Nothing seemed to strongly link the separate components of the grant. In the summer of 2001, a new project element was conceived by Cathy Cheely, Brunswick's Director of Technology. Cheely's idea was to link the disparate elements in a manner not previously considered. ODU pre-service teachers enrolled in methods courses onsite at ODU would be paired with in-service teachers enrolled in Brunswick's field-based master's degree program. Together, the pre-service teachers and the in-service teachers would plan a technology-infused lesson.

Pre-service teachers are required to plan a lesson or a lesson unit in their methods classes. Normally, these lessons are designed for a hypothetical class and are never implemented. Symptomatic of the disconnect between higher education and secondary education, pre-service teachers plan lessons for ideal students in ideal classrooms that do not exist in real schools. Rarely do pre-service teachers consider SOL pacing guides, special education students, students who work at different rates or students performing dramatically above or below grade level when developing these lessons. By partnering with an in-service teacher, the pre-service teacher is provided with a real context in which to plan a realistic lesson. The Brunswick field-based masters teachers provide relevant information on their classrooms and curricula to the pre-service teachers via a monitored discussion board. The pre-service teachers then begin to develop lessons as assigned by their methods instructors. The collaborative process begins as the pre-service and in-service teachers negotiate the details of the lesson over the discussion board. When both parties are satisfied, the pre-service teacher submits the final lesson plan to be taught by the Brunswick teacher in his/her classroom. The lesson is videotaped and sent back to the pre-service teacher along with a written analysis. The videotaped lessons provide a wealth of instructional material for the individual methods students and for the methods classes at large.

The tool for collaboration during the first semester was a free online bulletin board service called EZBoard. A "community" was created for the field-based masters program which included a "forum" for the collaboration process. Within the collaboration forum, there was a "topic" area for each FBM student. All discussion between an ODU methods student and their FBM partner took place within the "topic" area for the FBM partner. Each participant had an individual login and password to enter the area but the dialogs could be viewed by all participants. This way the FBM instructors and the methods course instructors could monitor the online collaboration. During the second semester, grant staff member and FBM instructor, Patrick O'Shea, created a specialized database program to serve as the discussion board. This allowed all communication to be stored on Brunswick County's servers and eliminated the commercial advertisements ubiquitous in EZBoard.

First Semester Results

The first semester of the collaboration project was completed in December 2001. Over one thousand communications were posted on the discussion board. There were sixty-three partnerships between sixty Brunswick field-based masters teachers and interns and seventy-seven ODU methods students. Forty-seven lesson plans were delivered, performed and videotaped. These partnership was deemed successful. Sixteen partnerships did not yield a lesson plan and were therefore termed unsuccessful.

	Total Partnerships	Successful	Unsuccessful
Number	63	47	16
Percentage	--	74.6%	25.4%

Table 2: First semester pre-service/in-service collaboration partnerships (December, 2001)

In successful partnerships, field-based masters teachers reported very positive experiences. Many said that they either learned a new idea or were reminded of a technique they had long forgotten. "It is always refreshing to read another teacher's ideas. Sharing ideas is an excellent way to grow in our profession!" (Denise Painter, field-based master's student).

Another student explained the benefit of "being open to creative teaching and learning, and the willingness to try something different - even if I thought it wasn't going to work. Overall, I enjoyed the experience. It gave me a chance to, not only 'think outside the box,' but to actually 'teach outside the box.'"(Ronald Thornhill, field-based master's student).

Nearly all FBM teachers expressed a desire for their pre-service partners to come to Brunswick and teach or assist in the lesson personally. One FBM teachers indicated that she felt her partner was "cheated" out of the most important part of the lesson planning process: implementation.

The amount of collaboration varied even among successful partnerships. In some cases a partnership was labeled successful because it resulted in an implemented lesson plan, but the collaboration between the partners was minimal. In these cases, the field-based masters students reported experiencing frustration with the project. Many of their online postings went answered for weeks. Subsequent discussion with pre-service teachers revealed that some methods course students felt pressured to respond to postings and adhere to schedules dictated by their partner teachers.

Unsuccessful partnerships were victim to similar circumstances. In most cases, the fault was attributed to inconsistent expectations between ODU methods students and FBM collaboration partners or inconsistent expectations between ODU methods faculty and FBM instructional staff. In very few instances, "bad" matches between FBM and ODU students were made where pre-service teachers could not create lessons appropriate to their partner teacher's subject or grade area. Additionally, both pre-service and in-service teachers identified concerns arising from asynchronous communication. The electronic environment prevented some partnerships from reaching a personalized level. Some partners used email or telephone conversations to establish initial rapport and used the electronic tools only after they had developed a relationship with their partner.

Other obstacles that hindered partnerships were variations in the lesson plan format used by the Brunswick teachers and those used by the methods faculty and students, the field-based masters teachers inexperience with peer-coaching techniques, and a general lack of understanding of the collaboration process by both parties. These issues are being addressed in the second semester of the project.

Impact on Grant Components

The ODU pre-service teachers who serve as interns also participate in the collaboration project. Because they recently completed methods courses themselves, they are natural partners for the current methods students. Interns give presentations in methods courses and provide written feedback to methods instructors on the preparation they received in their methods courses as part of their internship responsibilities. So, interns already serve as a gateway between the two institutions. Involving them in the collaboration project intensifies the link and provides the grant leaders with a unique perspective. Since the interns are ODU students, they are privy to the pre-service teachers perspective yet, because they are immersed in Brunswick schools, they understand the mentality of Brunswick teachers. This gives them the unique position of seeing the project from both sides.

Just as the interns are enhancing the collaboration project, the collaboration project is enhancing the internship program. All the methods students are either required to or have the option to participate in the collaboration project with Brunswick yielding increased visibility for ACTT Now. The collaboration project ensures all education students learn about the Internship option and thus serves as an automatic recruiting mechanism. Pre-service teachers involved in the collaboration project have several opportunities to visit their partner teachers in Brunswick County, and at the same time, observe the interns in action.

There are numerous benefits to participating field-based masters teachers. The collaboration project established peer coaching and peer review professional practices. Many teachers had not previously collaborated with other teachers, nor had they acted in a mentoring or peer-coaching role. Within these new roles, the teachers tutor their partners on instructional strategies and technology applications learned in class thereby strengthening their own understanding. They gain a new perspective on the teaching process and incorporate fresh ideas into their instruction. They are held accountable for their instruction via the videotaping process. And finally, they are required to thoroughly analyze the lessons prepared by the pre-service teachers forcing citing evidence for its success or failure. This analytical process helps the teachers learn to analyze the merits of their own lessons.

The collaboration project has direct benefits for both the methods students and the methods faculty. As a result of their one-on-one collaboration with in-service teachers, methods students will be more cognizant of the many issues involved in the lesson planning process and will have more realistic expectations when planning subsequent lessons. They will *see* first hand through the videotapes where their lessons succeeded and where they fell short, and they will receive the teachers' take on the lessons' strengths and weaknesses. Brunswick teachers help pre-service teachers plan lessons utilizing technological resources. A resource library including the instructional and technological resources available in Brunswick has been created at ODU so the pre-service teachers can peruse materials and experiment with hardware and software tools they may want to include in their lessons.

The collaboration project provides methods faculty with a reality check. Higher education has a reputation for being out of touch with current k-12 classrooms. The collaboration project ensures methods faculty are abreast of the realities facing today's teachers and are preparing their students adequately for the classrooms they will enter. Methods instructors are invited to visit Brunswick County to serve as guest lecturers in the field-based masters courses to share their expertise and model the methods they advocate for the pre-service teachers. While in Brunswick, they can observe first hand how Brunswick Instructional Technology Specialists are coaching teachers to use the latest technology resources. These resources can, in most cases, be borrowed so ODU faculty can receive individualized training on specific software programs and hardware devises they see in Brunswick. ACTT Now provides motivation for methods faculty to visit Brunswick and to use technology. Methods instructors who visit Brunswick receive a stipend and those who participate in the collaboration project earn a visit to a technology conference of their choice.

Conclusions

The ACTT Now project continues to impact both the pre-service teachers at Old Dominion University and the in-service teachers in Brunswick County. As more data is collected through the grant's external evaluation process, the extent of the impact will become clear. Already it is evident that the latest initiative of ACTT Now, the collaboration project, has had significant effect on three components of the grant project: the internship, the field-based masters degree program and the technology training for methods faculty. The partnering of pre-service teachers from an urban university and in-service teachers in a rural school district has led to increased technology proficiency for both groups.

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PT3 Implementation at the University of North Texas

Gerald Knezek
Department of Technology and Cognition
University of North Texas
United States
gknezek@tenet.edu

Rhonda Christensen
Department of Technology and Cognition
University of North Texas
United States
rhondac@tenet.edu

Tandra Tyler-Wood
Department of Technology and Cognition
University of North Texas
United States
wood@tac.coe.unt.edu

Dana Arrowood
Department of Technology and Cognition
University of North Texas
United States
arrowood@coefs.coe.unt.edu

Theresa Overall
Department of Technology and Cognition
University of North Texas
United States
theresa@unt.edu

Garry Mayes
Department of Technology and Cognition
University of North Texas
United States
mayes@coefs.coe.unt.edu

Michele Maldonado
Department of Technology and Cognition
University of North Texas
United States
mlm0012@unt.edu

The Millennium II consortium is implementing seven preservice teacher initiatives in the north Texas area. Technology-infusion activities are designed to continue the expansion of services to meet educator preparation needs of the state and nation. The emphasis for this three-year project is closing the digital divide. The key areas of quantity, quality and equity are addressed in the preparation of technology competent and confident new teachers. Major objectives in progress include:

- Increasing the quality and quantity of preservice technology integrating educators
- Expanding technology-infusing methods courses and instructor modeling of technology

- Providing technology enriched assignments and assessment for special education preservice teachers
- Establishing technology enhanced academic content courses for preservice teachers
- Establishing fast track credentialing for technology aides to be degreed teachers
- Developing Internet-based quality resources for preservice teacher courses
- Recruiting new millennium teacher educators from technology infusing classroom teachers to work as technology fellows in the project.

The University of North Texas (UNT), seven K-12 school units, a multi-campus community college, and two professional associations have joined forces to implement project goals and objectives to achieve intended outcomes. The Millennium II consortium was awarded a U.S. Department of Education Preparing Tomorrow's Teachers to Use Technology Grant (PT3). The lead partner, the University of North Texas, contributed Higher Education Assistance Funds for in-kind hardware/software purchases for this effort, adding to the time and effort contributed by other partners. Approximately 700 new technology-infusing educators are targeted to be produced by the project over three years.

UNT includes one of the largest teacher education programs in Texas, preparing approximately 750 teachers each year in a variety of K-12 programs and all discipline areas including special education. The Professional Development School (PDS) model requires that the education of teachers be linked directly to learner-centered schools. Through alliances with schools throughout the Dallas-Fort Worth Metroplex, preservice teachers work directly with children for at least two semesters. From the beginning of the PDS efforts at UNT, technology has been a tool for acquiring information, increasing instructional options, individualizing assessment, accessing resources, and promoting communication. Both the College of Education and PD schools continue these efforts.

Full realization of learner-centered teacher education intertwined with learner-centered schools in which technology is being applied effectively and interactively requires three elements that are not fully in place. First, modeling and effective use of technology by faculty and students throughout their university and teacher education experience is required so that students "live with technology" rather than being told that they should integrate and infuse it in their teaching. As technology and its possibilities for improving education continue to change, faculty need time and support to learn to use the technologies and to demonstrate applications in the classroom.

The second needed element is continuous application of technology during preservice internship and practicum experiences. UNT works with schools, teachers, faculty and intern supervisors so that preservice teachers become leaders in modeling and using technology for assessment, instruction and equity. Third, the university needs vehicles for extending technology training to new groups of teacher candidates beyond those served directly on campus. By extending the opportunities for technological competence and confidence beyond the traditional boundaries of the campus, the College of Education seeks to bridge the digital divide in teacher education to rural and urban settings.

Each of these elements addresses the need for teachers who are better prepared in content, pedagogy, and technology. In addition, each of these elements requires that the College of Education faculty in teacher education and technology work with partners to achieve these goals: partners within the University who provide the content coursework for new teachers and partners who provide schools as living laboratories for students to develop their teaching skills.

Teaching Transformation Teams: Providing Face-to-Face and Virtual Teacher Preparation Experiences

Karen Kortecamp
The George Washington University
Graduate School of Education
and Human Development
Washington, DC 20052
karenkor@gwu.edu

William Booz
The George Washington University
Graduate School of Education
and Human Development
Washington, DC 20052
whb@gwu.edu

Marti Jackson
Fairfax County Public Schools
Fairfax, Virginia
Marti.Jackson@fcps.edu

Abigail Bartoshesky
The George Washington University
Graduate School of Education
and Human Development
Washington, DC 20052
abartosh@gwu.edu

Abstract: Faculty in The Graduate School of Teacher Preparation and Special Education at The George Washington University have benefited from participation in a Preparing Tomorrow's Teachers to use Technology (PT3) grant. Expanding beyond workshops and course releases to improve technology skills, faculty are teaming with public school teachers and graduate students as they redesign courses in the Master's degree program to reflect technology standards. This collaborative approach has complemented existing graduate school and public school partnerships and facilitated change in instructional practices and course content and modes of delivery.

Introduction

George Washington University's (GWU) vision for preparing tomorrow's teachers to be better users of technology in their teaching has not changed. However, its approach to making this happen has. The goal of GWU's PT3 Implementation Grant continues to be facilitating faculty members' improvement of their technology skills and their use of technology tools and strategies as a natural part of their methods and foundations courses. The project, *Teacher Technology Leaders* (TTL), is intent on keeping the focus on the course content and the ways in which technology use can enrich the curriculum. A study by Di, Dunn and Lee (2000) reveals that an integrated approach to instructional technology in foundations courses positively influences students' perceptions of technology use and enhances their abilities to use advanced technology for their teaching and learning. Through the TTL Project staff's support of faculty in changing instructional practices to utilize technology in meaningful ways, students in the teacher preparation programs are developing technology competencies. Additionally, the project has paved the way for faculty, graduate students and P12 teachers to work collaboratively in redesigning courses to better apply technology tools. Connections between the professional development of pre-service teachers, experienced teachers, and university faculty provide for what Lieberman and Miller (2000) refer to as the "rub between theory and practice" that is essential in educating professionals.

This paper describes two TTL Project components that demonstrate GWU's commitment to collaborative partnerships that focus on integrating technology in the teacher preparation programs. The aim of the first project was to utilize technology to expand and improve content in one of the foundations courses. The second was to create a "virtual space" to foster and support collaboration.

Teaching Transformation Teams

One of the greatest strengths of the PT3 grant program is its encouragement of grant recipients to make changes in their approaches as experience and collaboration with other grantees suggest. The TTL Project staff learned from the experiences of other grantees that having faculty work on teams is far more productive than providing them with course releases and expecting them to attend group workshops and other training opportunities. As a result, TTL reorganized its faculty involvement in project activities by encouraging faculty members to form *Teaching Transformation Teams*. Each team works together over the course of a semester and develops a final "product."

Each *Teaching Transformation Team* is made up of a faculty member, a P-12 classroom teacher, and a graduate student. This 3-person team works on a course development project to culminate in either a new course or a major redesign of an existing course with increased emphasis on the integration of the use of technology to deliver the course and the use of technology by participating students to complete course assignments. This work might, for example, result in the conversion of a course so it can be offered online. The team develops a detailed work plan delineating milestones to be met throughout the semester. Team members meet at least once a month with a member of the TTL project staff to discuss tasks and identify project/partner or University resources. The development team is also expected to meet at least once or more between its meetings with the TTL staff member. Weekly status reports are entered into an online reporting system maintained in the TTL Prometheus (GWU's online course management tool) course set up to be used by all teams to share information. In our first semester (Fall 2001) not all teams were pure,

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that is, some consisted of a faculty member and a classroom teacher, who also was enrolled in a GWU graduate program. One team was made up of two faculty members from a program and a graduate student from the program.

The faculty member is the lead member of the *Teaching Transformation Team* and responsible for planning team member assignments to achieve the desired outcomes of team activities. He/she is responsible for successful completion of all planned tasks and has total oversight responsibility of the participating P-12 teacher and graduate student. He/she sees that team meetings with the TTL staff are scheduled and that all reporting of team activities using the TTL online reporting tools is completed weekly. The participating faculty member receives supplemental compensation in a lump sum at the end of the semester of the team's work.

The P-12 classroom teacher serves as a mentor on the *Teaching Transformation Team* to assist the faculty member with technology skill building and the development of meaningful technology-related activities related to the team's content area. The teacher then assists the faculty member and the graduate student in the incorporation of these activities into the presentations or course on which the team is working. The graduate student provides clerical, research, and technology support to the team's lead faculty member. The graduate student works with the classroom teacher to develop technology-related activities related to the team's content area. The faculty member may direct the part-time graduate student to complete weekly reports using the TTL reporting tools. The participating classroom teacher and the graduate student are paid as part-time employees of GWU throughout the semester.

Six faculty members formed teams during the fall semester of 2001. One team worked collaboratively to redesign a foundations course in the teacher preparation program. This survey course addresses all issues of diversity including special education as well as human development. The team redesigned this course to utilize technology to facilitate opportunities for students to access credible web-based resources in the form of research, organizations, and teaching materials and to use those resources to expand their knowledge of development and diversity issues. All course materials were put online using Prometheus. Because team members felt the special education components of the course were not sufficiently addressed during class time, the team created webquests for seven special education topics. The idea was to a) increase students' knowledge of particular disabilities, b) engage students in practically applying what they'd learn, c) encourage collaboration in conducting research and, d) increase discourse about the disability being studied. Webquests can be viewed at http://home.gwu.edu/~karenkor/tred208.

The Virtual Curriculum Laboratory

The TTL Project staff began using GWU's online course management tool, Prometheus, during the first year of the Implementation grant to provide an easily accessible virtual space where participating faculty could share ideas and materials. Using Prometheus served three purposes: 1) to provide a necessary anytime/anywhere virtual space for sharing, 2) to encourage faculty to become familiar with this online tool that is freely available to them, and, 3) to serve as a model of how Prometheus could be used for a purpose other than a normal class. Although Prometheus was easy to use to facilitate online faculty dialog and resource sharing, project staff decided that some of its "course" features were unnecessary for our project purposes. In addition, work on another component of the TTL Project to be developed with one of its school district partners, Alexandria, Virginia, needed to begin. The main purpose of the component, *Virtual Curriculum Laboratory*, was to provide a collaborative workspace, so it was a natural tool to build for use with the project's *Teaching Transformation Teams*.

The Ultimate VCL

The GWU/Alexandria City Public Schools *Virtual Curriculum Laboratory* component of the TTL Project is intended to serve as a community-building tool, as well as a resource development tool. It is a web site that provides access to built-in collaborative tools for small teams or "Labs." The VCL differs from other such online collaborative spaces (e.g., University of Missouri's Shadow netWorkspace, TAPPED IN, and MimerDesk) not only in the toolset it will ultimately provide, but also in its focus. In the initial development phase, VCL provides virtual collaborative workspace for teacher-to-teacher, IHE faculty-to-teacher, and in-service teacher-to-pre-service teacher-to-IHE faculty cooperation. In later phases, virtual workspace for some portion of the 6-12 population will be added.

The scope of the *Virtual Curriculum Laboratory's* features originally defined by TTL Project partner Alexandria City Public Schools (Virginia) includes:

- A Collaborative planning "place"
- A library with
    - teaching resources
    - streaming video and data
    - actual resources or links to other sites' resources
- Online professional development "place" with access to
    - lesson plans, electronic texts, graphics
    - video library of "best practices"

    - what are now "normal" components of any online course delivery system
- An online course delivery and assessment tool for teachers to "teach" classes

The VCL Reality

One prerequisite that has stood out in discussions about what the TTL Project's VCL should look like is that the VCL interface should be uncluttered with limited items and choices. The VCL is public, however, all who want to use it must have an account to identify them and allow for differing levels of access. In doing this, the TTL Project staff rolled plans for a password-protected, database-driven intranet site into the VCL web site. The *Virtual Curriculum Laboratory* web site is a dynamic, database-driven site. A user's access level and group assignments determine what the user is able to see and do. For example, faculty level access means the faculty user will see a link to the TTL Project's equipment check-out page that other users will not see. Information in each user's database account record is used to determine to which Labs a logged-in user has access. Likewise, information in a group's ("Lab") database record allows members of that LAB to make the LAB private to only its members or public to others in the *Virtual Curriculum Laboratory* community.

Therefore, armed with an account ID and password, one logs into the *Virtual Curriculum Laboratory* web site and is immediately taken to a page that displays the threaded discussion of the user's default Lab. Each user can create or be a member of multiple Labs ("Lab" here is used to mean a "team" or "group"), but the user must identify one Lab to be his/her default. This default home page illustrates the development team's belief about the main purpose of the Lab: it is a place where two or more people work collaboratively and communicate primarily by posting messages to each other in a threaded discussion. So, that is what users will first see when they log in. One can switch to other Labs, to which one belongs, through a dropdown menu. Likewise, one can post to the discussion or send e-mail to individual Lab "partners" by clicking on the corresponding name on the left of the screen, or to the whole (current) group by clicking on "Lab Partners" heading. Menu links on the user's home page allow users to move to screens where they can collect URL links to share and look at as they develop their "product" (new course, course unit, presentation, etc.), post files to share with other Lab members (private team or "global"), or post research or idea notes to share with team members. The Reports feature of VCL allows participants to collaborate on the development of one or more reports of their work on their product. These ideas fit perfectly with what we see happening when several teachers collaborate on a project, as well as with the tasks of our *Teaching Transformation* Teams.

Conclusion

The team approach supported by a virtual workspace was highly effective in furthering the development of faculty members' technology skills. Team members commented that the collaborative approach of the transformation teams led to higher quality products and provided a supportive structure for achieving team goals. Each member increased her technology skills and sharpened her understanding of specific disabilities that impede learning. The evaluation of numerous web sites for possible inclusion in the webquests resulted in the creation of a databank of credible online sources now available to students. An added bonus to redesign of the course is that students will experience firsthand an instructional method that puts technology to good use in the classroom.

The work of the teams was greatly enhanced by the opportunity to communicate and share via the Virtual Curriculum Lab. Discussions occurred regularly but did not require face-to-face interactions. Works-in-progress were posted to a common space so that all team members could evaluate, comment and advise. Opportunities for cross-team communication encouraged participants to share what they were learning. The monthly face-to-face team meetings with a TTL Project staff member(s) helped to keep the team focused and the work on schedule. Overall, we find this supportive, collaborative approach to faculty development to be very promising.

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Mentoring: Support and Reinforce Technology Infusion through Building Relationships

Jiang Lan, Southern Methodist University, US
Katie Sheridan, University Of Alabama At Birmingham, US
Betty Nelson, University Of Alabama At Birmingham, US
Lois Christensen, University Of Alabama At Birmingham, US

Abstract:

The University of Alabama PT3 team proposes a Panel Presentation to discuss lessons learned and best practices in establishing and fostering mentoring relationships as a mechanism in successful technology infusion in preparing future teachers. Drawn from our experience working with five higher education institutions and eleven P-12 school districts in the Birmingham area, the presentation will include 1) a brief introduction to the various mentoring initiatives; 2) the objectives and activities of each mentorship initiative; 3) positive outcomes as well as problems and solutions in building relationships for professional growth; and 4) management challenges. The panelists will discuss both theory and practice, and compare their experiences with each other and with interested audiences.

Mentoring: An Operational Definition

Mentorship is a label for a concept that connotes a "philetic" association, a relationship based on teaching through brotherly or sisterly love and dialogue (Broudy, 1972). The concept of mentoring has its root in the epic Greek myth, The Odyssey. In our project, this metaphor serves as an example for an ideal professional affiliation occurring among members of the university faculty and between university faculty and P-12 teachers, to provide each other with support, counsel, friendship, reinforcement and constructive models, for effective technology use in teacher development (Christensen, 1992).

Mentoring as a Mechanism for Technology Infusion

One of the problems associated with using technology is that, because it changes so quickly, one-shot development sessions are never sufficient (ISTE, 1998). A long-term solution is to develop self-sustaining users of technology. This is best accomplished through the development of learning communities. Through mentoring initiatives, the UAB PT3 project provides technological training as well as on-going support for teacher education faculty to infuse technology systematically throughout the curriculum. As an outcome of the mentorship, in a three-year period, the Mentors and Mentees reach a significant number to form a critical mass within the Partnership organizations. This critical mass will become the basis for the paradigm shift we have envisaged to support and sustain the significant technology infusion efforts.

The UAB PT3 Project

Led by the University of Alabama at Birmingham, the PT3 project is now well into its second year of operation. The project aims at infusing technology into the entire teaching/learning experiences of all prospective teachers in the Greater Birmingham Area Holmes Partnership organizations, composed of five colleges/universities and eleven P-12 school districts. Participating higher education institutions include public and private, small liberal arts colleges, a historically black institution, and a large comprehensive, research university. Participating school districts include urban and suburban, affluent as well as economically disadvantaged schools.

Central to our project is training and mentoring for faculty members to infuse technology into content/pedagogical courses and learning activities. Three mentorship groups have been formed to achieve the project goal: 1) The Technology Infusion Program (TIP), a mentorship initiative among higher education faculty; 2) Teaching + Technology Program (TTP), a mentorship initiative between P-12 teachers and higher education faculty; and 3) Assistive Technology Mentorship.

The Technology Infusion Program (TIP)

The Technology Infusion Program (TIP) is designed to build a learning community among higher education faculty. TIP focuses on 1) expanding the knowledge-base through incorporating dynamic and multimedia materials into the content area of learning; 2) empowering teaching and learning through introducing new paradigms made available by technology (e.g., visual learning, simulations, synchronized and asynchronized communications, etc.), and 3) enabling faculty to restructure their practice to reflect the successful application of National Educational Technology Standards and Alabama Courses of Study guidelines.

Teaching + Technology Program (TTP)

As research indicates, one of the significant problems in teacher education is the gap between theory and practice. For obvious reasons that most teacher education faculty went through their formal training without adequate exposure to and experience in technology (It did not exist at the time!). Yet some P-12 teachers, because of their professional belief, the need of the classroom, or pressure from society, peers, or home, have found ways to incorporate technology effectively into their teaching. The Teaching + Technology Program (TTP) has paired higher education and cooperating P-12 faculty together to model the use of technology. This includes, but is not limited to, practicum, field experiences, and student teaching.

Assistive Technology: Each One Teach One Model

The number of students with disabilities educated in inclusive classroom settings continues to grow. The education of these students is a collaborative effort and responsibility of regular and special educators. Assistive technology is a relatively new field to the vast majority of faculty in university settings. Very few teachers involved have experience or training in this area. As a result, very few students have had the opportunity to benefit from its potential. Currently, UAB offers the only course in assistive technology among the Partnership institutions.

The mentorship initiative for assistive technology connects together higher education faculty and P-12 teachers to explore options for field-based learning regarding assistive technology. The mentorship employs the Each-One-Teach-One Model to support the goal of disseminating knowledge of assistive technology. Training modules for assistive technology specific hardware/software have been developed and made available online. In addition, a webliography of assistive technology resources has been posted on the project web site.

Facilitating and Managing Mentoring Relationships

As with any complex endeavor, the success requires hard work from all parties, starting with the leadership. The leadership team of the PT3 project is composed of a Project Director, who, together with other members of the leadership team, sets the vision for the project. Mentorship is our means to successful project implementation. Each mentorship initiative is directed by an Activity Director, who communicates the vision of the project to participants, encourages and inspires innovation, and enables meaningful interactions among participants, groups, and between the participants and the project leadership team. In addition, a project coordinator provides essential administrative assistance to the mentorship, allowing activity directors to focus on fostering and nurturing the mentoring relationships without the burden of management details.

It is challenging to manage mentorship relationships across sixteen organizations with about a hundred participants. One of the lessons we have learned is that clear communication of expectations from the project to participants and vice versa is absolutely essential. To bring everyone, mentors, mentees, and activity directors and other project staff, on the same page, we have developed thoughtful and user-friendly management tools, e.g., learning agreement, checklist, project calendar, etc. At the presentation, we will share these tools with our audience and discuss their uses. Through the mentorship initiatives, we strive to cultivate groups of dedicated teacher educators who are not only instructional leaders in their respective discipline, but also confident and self-sustaining technology users.

What You See is What You Get: Virtual Field Trips and Pre-Service Teachers

Patty LeBlanc, Ph.D.
Department of Education, Stetson University USA
pleblanc@stetson.edu

Abstract: In June 2000, the Department of Education at Stetson University received notification of a grant awarded by the U.S. Department of Education to support the integration of technology into pre-service teacher education a part of the national PT3 initiative. Located in central Florida, the T3 project is a consortia of five key partners: Stetson University (the fiscal agent), Bethune-Cookman College (an historically black college), Volusia County Public Schools, the Florida Independent College Fund, and Time Warner Communications. The purpose of the T3 project is to prepare pre-service teachers to effectively infuse technology across the curriculum to enhance teaching, learning, and student achievement. The focus of this presentation will be to describe the use of two-way interactive videoconferencing to enhance pre-service teacher education, to share preliminary results of our efforts, and to present lessons learned during the implementation process.

T3 and Virtual Field Trips

Virtual field trips were designed to enable pre-service teachers at B-CC and Stetson to "peer into" an elementary classroom in order to unobtrusively observe real-time teaching. If the videoconference was held during normal school hours, the teacher education professor would facilitate discussion on methodologies, curriculum, classroom management, etc. If timed carefully so as not to interrupt the normal school day, pre-service students would also be able to ask questions of the classroom teacher. In this way, anyone at Stetson or Bethune-Cookman could take a virtual field trip to this classroom anytime during school hours.

Infrastructure, Support, and Costs

In order to implement virtual field trips for our pre-service students, a great deal of infrastructure had to be created and/or tapped into through grant partners. To put things simply: *the PT3 grant enabled us to do things we could not possibly have done without external funding.* Grant money was used to purchase a portable two-way interactive videoconferencing station with a SVHS video recorder and a tracking camera for SU, B-CC, and one of the grant's partner schools, Bonner Elementary. Bonner is an inner city school located in Daytona Beach, Florida, about 27 miles from Stetson and approximately 1 mile from Bethune-Cookman College. Bonner was chosen as the target school because most of our pre-service teachers are elementary majors and because Bonner is working hard to integrate technology effectively to improve student achievement.

Implementation

One of the T3 summer boot camp teachers, Ms. Carol Collucci, volunteered to be the videoconferencing queen at Bonner, and the equipment became a part of her tiny 4th grade classroom. The children in the class were so excited about "being on TV"! Ms. Collucci told me on numerous occasions that she was not going to sugarcoat *anything*. What our pre-service teachers would see would be the regular stuff of everyday classroom teaching--the good, bad, and indifferent.

Initially, the videoconferencing sessions were scheduled to coincide with elementary methods courses at SU and B-CC and were coordinated with Ms. Collucci, the project director, and the university tech support people. In the beginning, the project director facilitated the videoconferences at Bonner while the tech support people at Stetson and B-CC were in the room with the pre-service teachers and their professors. After a few successful videoconferences, the tech support people were no longer required in the room at the university and college, but were always on call during the scheduled videoconferencing sessions. The use of the equipment eventually became fairly transparent for both SU and B-CC, and Ms. Collucci and the children became accustomed to both literal and virtual visitors in their classroom. Much of the video transmitted during the videoconferences was recorded on SVHS tape to be compiled and edited during year 2 and 3 of the project to create case studies of technology integration.

The videoconferences began at the end of the fall 2001 term and continued throughout the school year. One of the project director's goals during the implementation phase was for the systems to be used often in order to justify the tremendous costs involved. In most cases, we scheduled a virtual field trip at a specific time to view a specific lesson in a specific content area. Occasionally, we simply decided to "take a look" at what was happening with Ms. Collucci and her students.

Lessons Learned

The impact on pre-service teachers is still in the review stage, but some preliminary trends have been observed:

- Virtual field trips are pedagogically useful for pre-service teachers, and the model used here could be replicated at other universities, given the infrastructure required.
- Professors had to be led. They did not typically choose to videoconference unless the project director set it up. Professors, however, did respond positively to videoconferencing.
- Pre-service teachers were fascinated by the interpersonal communication that went on between students and teachers during class time. On the whole, comments and discussions tended to center around classroom management and the affective aspects of teaching more than on the content and teaching methodologies. Some typical reactions:
    - "I had no idea how much of the teaching day is spent managing behavior--at the expense of teaching content and/or skills."
    - "Teaching is exhausting work."
    - "Ms. Collucci is so patient."
    - "How will I ever be able to manage so many children with so many needs?"
- While pre-service teachers found the videoconferencing interesting and informative, they felt that they gained more when visiting/observing a classroom face-to-face. The project director theorizes that the "gestalt" of interpersonal dynamics in classroom interactions is more easily observed in person that in 2 dimensions.
- The equipment worked very well once everything was finally set up and tested. It was not, however, used as frequently as the project director would have liked.
- Many of the pre-service teachers wanted to meet Ms. Collucci and her students in person. Being relatively close geographically was a distinct advantage in that respect.
- The children responded positively to the school-wide attention they achieved on campus.

Virtual field trips have proven to be an interesting, but expensive way to examine and critique classroom teaching and to collect vast amounts of video data on teaching and learning. We believe that this highly collaborative technology shows a great deal of promise in teacher education.

Acknowledgements

The T3 project is funded by the U.S. Department of Education as part of Preparing Tomorrow's Teachers to Use Technology Initiative (PT3). The project will receive $967,263 over three years, which is 42% of the total cost of the project. The T3 consortium will contribute $1,343,060 (58%) of the total project costs over three years.

Preparing Tomorrows Teachers To Use Technology Implementation Grant 2000 – 2003

Preparing Tomorrows Teachers To Use Technology Implementation Grant 2000 - 2003

Energizing Teaching to Empower Students through Emerging Technologies across the Education and Liberal Arts Curriculum

M. Lynn Lester
Assistant Professor
Graduate Education Department
Clarke College
United States
llester@clarke.edu

Abstract: Clarke College, in partnership with the Catholic Archdiocesan Schools of Dubuque, is implementing a program to raise the technology learning curve of pre-service teachers, college faculty, and K-12 teachers and students. Our project aims to create a "school" environment in virtual space where teaching is transformed through technology. At this poster session project outcomes of PT3 grant goals are presented. These goals are to create: 1) innovative improvements in our existing liberal arts and teacher preparation program by enhancing coursework and student activities through transparent use of technology resources; 2) a learning exchange to facilitate digital connections between and among Clarke College faculty and K-12 teachers in our Archdiocesan Catholic Schools, and 3) an online graduate Alternative Teacher Preparation Program for re-entry teachers, mid-career adults and out-of field teachers. Exemplary faculty/student projects are showcased to demonstrate learning outcomes resulting from integration of technology across the liberal arts and education curriculum.

Clarke College, a campus of 1250 students in Dubuque, Iowa, in partnership with the Catholic Schools of the Archdiocese and the Iowa College Foundation, is implementing a program to raise the technology learning curve of teacher education students, college faculty, and K-12 teachers and students in the Catholic Archdiocesan Schools of Dubuque, Iowa.

The goal of our project is to create a "school" environment in real and/or virtual space where students and teachers explore, discover, and create new knowledge as a community of learners. The aim of our grant is to create innovative improvements in our existing teacher preparation program by enhancing coursework and student activities through transparent use of technology resources.

Throughout the two years of our grant, achievement of performance objectives have sustained a climate for Clarke College faculty, students, K-12 teachers and students to facilitate building collaborative models for exploring "learning how to learn" together through transparent use of information technologies. This poster session presents implementation strategies of PT3 program goals. Exemplary faculty and student learning projects and projects are showcased.

Grant goals to implement activities, training, and support for transforming teaching and learning environments are: 1) to create innovative improvements in our existing liberal arts and teacher preparation program by enhancing coursework and student activities through transparent use of technology resources, 2) to create a learning exchange to facilitate digital connections between and among Clarke College faculty and K-12 teachers in our Archdiocesan Catholic Schools, and 3) to create an online graduate Alternative Licensure Teacher preparation program for preparation of re-entry teachers, mid-career adults and out-of field teachers.

Project activities include the following:

1. providing a Technology Education Center equipped with state of the art technology tools for teaching and learning
2. providing a Technology Integration Specialist to offer one-to-many and one-to-one workshops for developing technology rich course projects
3. developing a Student Teaching Assistants Plus+ Program to provide students with technical training to support to faculty
4. strategizing support for liberal arts and education faculty to integrate technology into coursework through WebCT
5. providing training for integration of ISTE/NETS standards into course syllabi of teacher education courses to promote a seamless integration of technology into course objectives and activities
6. creating an online community where students and teachers share technology rich best practices with our K-12 Archdiocesan Partner schools
7. creating a telementoring program to support first-year teachers in the field
8. developing an online Alternative Teacher Preparation Program to meet the critical shortage of K-12 teachers in Iowa
9. developing a "telementoring program" as a vehicle to sustain support for first-year teachers during their critical first year of teaching
10. infusing Palm technologies and training into pre-service coursework, K-8 curriculum and teacher field observation experiences
11. redesigning of the current Master's Program in Educational Technology to include ISTE/NETS standards as well as the Technology School Standards for Administrators (TSSA), and
12. creating a Digital Learning Exchange website to facilitate connections between and among Clarke College faculty and K-12 teachers and students in our Archdiocesan Catholic Partner Schools, the Internet, and Clarke's Intranet.

A "change of mindset" toward new and emerging technology integration is evident throughout the Clarke College culture. As a result of this grant, technology tools have been placed in the hands of users, hardware and software is available for transparent infusion into class environments, and training is available "Anytime, Anywhere". These three components add up to an overall increase of powerful uses of technology contributing to increased achievement in learning extending to all communities involved in our PT3 Implementation grant.

Throughout the two years of our grant, achievement of performance objectives has sustained a climate for Clarke College faculty, students, K-12 teachers and students to facilitate building collaborative models for exploring "learning how to learn" together through transparent use of information technologies. This poster session showcases best learning outcomes resulting from implementation of our PT3 grant goals.

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Links to the Future: A PT3 Implementation Project

Linda Lisowski, PhD, Mercyhurst College, US
llisowsk@mercyhurst.edu

Diana Bohl, MS, Mercyhurst College, US
dgbohl@mercyhurst.edu

Joanne Carney, PhD, Mercyhurst College, United States
jcarney@mercyhurst.edu

Joseph Lisowski, PhD, Mercyhurst College—North East, United States
jlisowsk@mercyhurst.edu

Dawn Blasko, PhD, Penn State, Erie—The Behrend College, US
dawnblasko@psu.edu

Kim Skarupski, PhD, Penn State, Erie—The Behrend College, US
kas23@psu.edu

Michael Drabik, BA, Penn State, Erie—The Behrend College, US
mjd157@psu.edu

Abstract

Abstract: Links to the Future is designed to increase our ability to address systematically our use of technology in the teaching/learning process. We are primarily committed to issues of educational equity: we see the digital divide as part of a much larger social justice issue that results from socio-economic differences. We address the integration of technology along multiple strands: 1) the redesign of the education curriculum to meet national technology standards, 2) the integration of technology into core and education courses, and 3) the development of technology-enhanced partnerships with K-12 faculty.

Introduction

Links to the Future begins with several key beliefs. The primary belief driving our project is the importance of addressing educational equity issues. We see the digital divide as part of a much larger social justice issue that results from socio-economic differences. We strive to achieve the goals of our project in such a way that it enhances educational equity for those students who frequently are on the short end of the educational receiving line. Because of this, we find that our technology resources are limited—so we need to do more with less. In addition to limited hardware resources, we often work with limited human resources, i.e., tech support. Therefore, we have to seriously address the issue of expertise—who knows what we need to know and how can we find them? Since we don't have large numbers of "techies" to help us meet the goals of the project, we need to work in active learning communities where expertise is shared and leadership roles shift according to the task at hand. This "limitation" thus works to support participant (including student) ownership of the project, as well as another key belief that we hold: that the infusion of technology is only of value if it supports effective teaching practices. Therefore, we emphasize the use of active learning, student collaboration, and project-based teaching and learning. In addition, we believe that technology is best used when it increases students' engagement and success with intellectually complex tasks. Finally, we recognize that students usually teach in the ways that they have been taught, so Links to the Future takes a systematic approach to the preparation of tomorrow's teachers to use technology through three strands: 1) the redesign of the education curriculum to meet national technology standards, 2) the integration of technology into core and education courses, and 3) the development of technology-enhanced partnerships with K-12 faculty.

Redesigning the Education Curriculum—Linda Lisowski & Diana Bohl

Links to the Future has responded to the evidence showing that new teachers are not being adequately prepared to use technology by initiating a revision of our Teacher Education curriculum at Mercyhurst, ensuring that ISTE/NCATE standards for teachers are demonstrated through our preservice teachers' coursework, field experiences, and portfolio. We recognize that stand-alone courses on computer applications will not give our students the capacity to integrate technology into their teaching; it is necessary to increase the level of technology integration in college education courses. Preservice teachers need to see and experience models of teaching with technology in order to use it effectively in their own classrooms.

At the start of the project, a faculty self-assessment (using the Teacher Preparation STaR Chart, http://www.ceoforum.org/scde.cfm) indicated that our technology integration status was highly inconsistent. Because technology is a strand that runs throughout the curriculum, we found that most courses included some use of or instruction in technology. However, the extent to which technology was an integral tool supporting higher-order thinking and learning tasks varied. When we examined the ISTE/NCATE standards alongside course syllabi, we found that we already had in place the courses and learning outcomes necessary for our graduates to minimally meet the standards. What was missing was the consistent application of technology in the field. Our concerns now focus on exceeding the minimum standards and on providing high-quality field experiences where preservice teachers use technology not only to support their own productivity, but more importantly, to enhance the learning of their K-12 students.

We see several possible routes for exceeding the minimum competencies: 1) strengthening the technology component in *all* education courses; 2) strengthening the technology component in several key courses only, 3) encouraging that web-based course support be available for all education methods courses (e.g., BlackBoard); 4) requiring that students use e-mail and other electronic communications for all courses; and 5) requiring or supporting student completion of electronic portfolios. Each of these routes makes different demands on education faculty. A critical concern in the redesign of the curriculum is the capacity and willingness of faculty, who were hired for their very different areas of expertise, to provide high-quality instruction in technology and/or utilizing technology. Another issue here is the institutional capacity of a small, liberal arts college to handle significantly increased demands on the technology infrastructure. These are precisely the difficulties that face us as we focus on preservice teacher field experiences. The availability of mentoring teachers with pedagogical expertise is limited. When we also demand that mentoring teachers work in schools with an adequate technology infrastructure *and* demonstrate expertise in the integration of technology into the curriculum, we further limit the number of potential mentoring teachers to unacceptably low levels. In addition, we may limit ourselves to working with K-12 faculty in relatively well-off schools, rather than in the high-poverty schools that define our mission. Access to not only technological resources, but virtually all educational resources are impacted by ethnicity and class membership (Kozol 1991, Leigh 1999).

One way the project is addressing these concerns is through the development of active K-12 partnerships. Through project funds, K-12 teachers have the opportunity to take graduate courses in technology integration, borrow portable computers and peripheral equipment, receive mentoring support in their own classrooms from graduate assistants, and develop and participate in school-based technology seminars. Teachers who participate in the project agree to mentor preservice teachers in field experiences. IN addition, *Links to the Future* addresses the computer competence of college faculty through the provision of training and supports, including stipends for redesigning courses to incorporate the use of technology. Five core and education faculty members have been awarded stipends this winter; 5 more will be awarded stipends in the spring. All stipend award winners teach courses taken by preservice teachers. It is the expectation of the curriculum redesign committee that project work in these areas will help us to make better decisions regarding routes to curricular redesign.

Effectively Integrating Technology into Courses—Joanne Carney

Improving the Computer Competency of All Faculty

We consider three aspects of our program to improve the computer competency of all faculty to be worthy of note. First, we have linked our efforts with two other on-going College initiatives, a faculty professional development committee that presents monthly seminars and a program of computer skills training sponsored by the director of information technology at the College. Second, we have set out to create "pockets of change" within as many departments as possible through our use of stipends and release time for faculty to revise course syllabi and infuse technology. Michael Fullan (1994) has pointed out that pockets of change reflecting new behaviors are what eventually lead to more widespread change. We hope to make our new technology users models for other faculty in their departments. Finally, we are targeting faculty who are novices in technology use for particular assistance and inducements for change—for example, the core faculty representative on our management team is a self-described "Luddite."

Because we have focused upon faculty who have limited technology skills and real anxiety about using computers, we have had to devise special project features to support them. These supports include a personal technology mentor assigned to each faculty member and efforts to promote networking among the target group members. I will elaborate upon these features of the program and give some anecdotal evidence that testifies as to the effectiveness of our approach.

Technology Mentors

The one feature that has proven most effective in supporting target faculty as they learn new technologies is the Graduate Assistant (GA) mentor assigned to each. The GA-mentor can provide private tutorials or assistance in the classroom when the technology-enhanced lesson is implemented. Though faculty may arrange for meeting time with their mentor whenever they wish--most of the first group of five faculty stipend winners are meeting with their GA's on a regular basis, at least once a week. This regular meeting time has the effect of keeping the faculty member from forgetting what he or she has learned and minimizes the tendency for a busy professor to put all the technology work aside in the press of other responsibilities.

How effective has this GA technology mentoring been? In the words of one of our target faculty members: "You can keep the stipend money; I just want Chris!" For technology novices, the personal assistance and support of the GA mentor is crucial for learning. All of the faculty in our first target group have participated in various college technology workshops in the past; none were able to develop significant computer competencies on that basis alone. They need more personal assistance. Our Graduate Assistant mentors provide the support faculty technology novices need.

Networking

Another feature of our program is an active effort to promote networking among the five faculty members in our first group of stipend winners. Our core faculty representative (the "Luddite"), is one of the five; she is able to keep us informed about the needs of these neophytes and assist the others in a non-threatening way. Regular monthly meetings of the group give the stipend winners the opportunity both to share what they have learned with the others and get assistance from their peers.

Preliminary Results

How effective has our faculty development program been? Although this target group of faculty has only been engaged in course syllabi revision and technology instruction for two months, we already see signs of change in how these faculty members teach—technology is prompting a more student-centered, active learning pedagogy. In our last group meeting one faculty member shared what she termed a "marvelous experience.":

> I did not want to give them a traditional exam; I had instituted at the beginning of the term, a little 'techy' innovation I wanted to try. I gave them a list of about 10 different web sites…each day one of them was assigned to report something they learned …from the website; the websites gave them broader knowledge of both issues …and became for several a catalyst to "go deeper" so to speak. They even tracked some of these websites to help them respond creatively (i.e. two students wrote short stories dealing with justice issues; one wrote a poem)…Then they had to give a 5-7 minute (which usually went longer!) presentation on what they had discovered or created. I also gave them the option of working alone or with others; some chose the latter; others the former…It was a rich experience for them and for me. They knew it would be more work and they said they didn't care because they were learning so much and because they had the freedom to choose and shape how they expressed what they were learning.

Conclusion

Marjorie H. Dewert, former president of ISTE's SIG for Teacher Education spoke of the importance of providing professional development and support to *all* faculty who teach prospective teachers: "If I had to pick the area of work I believe to be most crucial to our success in ensuring that all new teachers are able to use technology effectively in their practice, it would be professional development and support for the teachers who teach the teachers (1999, p. 4). Mercyhurst College's *Links to the Future* has incorporated that work into our project.

The Pilot Year Project: Student Work—Joseph Lisowski & Linda Lisowski

In 1999, Mercyhurst College received a one-year PT3 capacity-building grant. The goals of that project were similar to the current *Links to the Future* goals. Education and core college faculty, and participating K-12 faculty worked together to effectively integrate technology into curriculum, using project-based learning to support intellectually complex learning and creating artifacts of student work. Two specific examples of student work completed during the pilot year include PowerPoint presentations created by students in a College Writing course who researched a component of local life; and barrier-free multi-media instructional units on CD-ROM created by graduate students in a special education methods course.

College Writing II

The first author worked to meet the project goals in his College Writing II course, taught at the branch campus. College policy requires all students who take College Writing II to complete several argumentative essays and an individual research paper. Whether a student matriculates at the main or the branch campus, the same standards and requirements apply. The differences between groups of students, however, are significant. On the main campus, students are "traditional," that is, young men and women from fairly affluent families, coming to college directly from high school. Their high school grades, rank in class, and SAT scores are above average. At the branch campus, on the other hand, are those students whose scores were not sufficiently high enough to win them admission to the main campus. These include many single-parent adult students, minorities, and re-entry women. In many cases, they have not done well in a "traditional" learning environment and harbor a distrust for the process of education. Significant attitudinal problems must be overcome; finding new, reliable learning strategies must be undertaken. In this regard, we considered what Paulo Freire (1999) has said: "to teach is *not to transfer knowledge* but to create the possibilities for the production or construction of knowledge." (p. 30)

After a high level of trust was established, the class turned its attention to research. Five groups of students were to research some very specific aspect of life in the college town. As is appropriate in constructivist classrooms, the students' interests and needs would be of primary concern in the development and evaluation of the project (Brooks & Brooks, 1993). Each group would decide what they wanted to know, how they would go about finding the information, how they would divide up the workload. The professor required that each group would publicly present their findings in a PowerPoint presentation utilizing graphics, sound, and text. After about ten minutes of distress, the class began to address the project constructively. Five students who had done PowerPoint previously felt comfortable being group leaders. Students determined to which group they wanted to belong with the stipulation that all groups needed 5-7 members. Class time was used to decide upon research topics.

Through PT3 grant resources, each group was able to borrow a digital camera for a "one day rental." The groups could "renew" the rental, if there wasn't a "hold" on it. Each week, groups reported their progress and used ten minutes of each scheduled class for group meetings. Although the computers on campus were inadequate for the tasks, in each group there was at least one student who had access to a computer adequate for the project needs. Within a month, each group was well on its way to producing a finished product; each was enthusiastic about what they were doing; and members of various groups often shared their "expertise" with others if they needed it. The class set a presentation date.

What remained was the determination of criteria to evaluate the end result. What specific items would be assessed? As a large group they brainstormed, coming up with about fifteen categories. Unanimous consent was required. No item would be part of the rubric unless everyone agreed on it. The class discussed and agreed upon 5 criteria—Clarity of Main Point (Focus); Composition—(Balance of text, graphics, & sound); Organization and Flow; Creativity; and Fitting Conclusion--to be accompanied by half a page of verbal comments. The two suggestions the professor made and put on the board for discussion were not accepted. Clearly, the students had taken full ownership of their work. To enhance their critical evaluation skills, all students would evaluate the other group presentations.

Student evaluations were used to determine a group project grade; however, the professor maintained final responsibility for the grading process.

As it turned out, the students' presentations were outstanding. The immediate effect of the project was that now each member of the class addressed the issue of research in a more personal and dynamic way. They had not been overcome by fear. They had used technology to take ownership of their learning, to commit themselves to an intellectually demanding and frustrating task, and to take justifiable pride in their efforts. They then were able to use this vital and interactive approach for the remaining classroom tasks.

Teaching Students with Physical Disabilities

The second author worked to meet the project goals in a required methods course for graduate special education and dual certification students. Teaching Students with Physical Disabilities is a course designed to insure that students who receive Pennsylvania's non-categorical special education certificate have experience and skills related to the needs of students with orthopedic and health impairments. The course uses Blackboard for posting course information and documents, linking to critical readings, and communicating among class members. At the time of this pilot project, the first author had a graduate assistant with a rare form of muscular dystrophy who served as a teaching assistant for the course. Because of her high level of independence and her limited movement abilities (she has use of 2 fingers in her right hand, along with adequate head control), this graduate assistant also provided the class members with a powerful example of the need for them to develop advanced computer skills if they were to teach young students with serious orthopedic impairments.

Students in the graduate program have widely varied backgrounds. They include certified special educators, certified elementary teachers, uncertified paraprofessionals in education and mental health fields, younger students straight from their undergraduate programs, and re-entry women with family and other work experiences. Planning and delivering instruction so that all students' strengths are utilized and all students' needs are met is often a significant challenge. Collaborative, project-based learning can be a way to utilize strengths and meet needs in this kind of diverse setting.

For their final project of the course, students were asked to work in self-selected small groups to develop either a web-based or PowerPoint instructional unit saved on a CD-ROM, and designed to meet the needs of students with average cognitive skills utilizing the principles of universal design. That is, the instructional unit needed to be barrier-free to meet the needs of students with physical impairments, but still had to be of interest to students with no visual, hearing, or physical impairments. The grading rubric included six areas upon which students work would be graded: 1) Learning objectives are clear, appropriate to the grade level and content area, and identified within the first two "pages" of the presentation; 2) Content is accurate and appropriately challenging; 3) Users can choose whether to access the unit visually and/or auditorily, and the unit is clear and cohesive in either modality; 4) There are at least 3-4 high-quality Internet links embedded in the unit; 5) The unit includes an assessment component that precisely matches learning objectives and content; and 6) The appearance and appeal of the unit are high. Students were free to select the grade level and content area of the unit. They were encouraged to work in groups in which at least one member had technological self-confidence and access to a good computer. However, *Links to the Future* provided two laptops for students to borrow (one PC and one Mac), if they needed. Students could also borrow portable zip drives (to facilitate working between computers), digital cameras and video cameras, microphones, and a rewritable CD burner. In addition, graduate assistants staffed a small lab that had two high performance computers, a scanner, and other peripheral equipment. The graduate assistants and professor were available to meet with students and provide technological support.

The major barrier to the successful completion of this project was attitudinal. It would not be too strong a statement to say that many students were horrified and angry when they first received the assignment. They had strong misgivings about their ability to complete the task, and many felt that it was an inappropriate task to be given in a non-computer course. However, they could clearly perceive that students with physical disabilities need excellent technology skills if they are to have access to educational resources and learning. The professor and graduate assistants listened carefully to student concerns and provided technological assistance. Nonetheless, during the time students were working on the assignment, there were many expressions of frustration and resistance; there were far fewer expressions of excitement and enthusiasm.

Students presented their projects during the final week of classes. They ranged from a simple math fact unit for first graders to an interactive intermediate grade unit on the Bill of Rights to a richly informative unit on Chinese life and culture. Some of the presentations were of outstanding quality—class members were astounded by the interesting presentations that the groups developed. In spite of the anxiety and dread the project engendered while students were working on it, the end result was unquestionably positive. Students who had complained the loudest commented on what a powerful and positive learning experience this assignment had provided them.

Evaluation of the Links to the Future Project's Effectiveness—Dawn Blasko, Kim Skarupski, & Michael Drabik

Penn State Erie's Center for Organizational Research & Evaluation (CORE) is serving as the independent evaluator for this project. Researchers at CORE are conducting both formative and summative evaluations of the project objectives. A formative evaluation examines how a program is being implemented with the purpose of providing feedback for program improvement (Rossi, Freeman & Lipsey, 1999). The formative phases of this evaluation are ongoing via CORE's continuous involvement on the executive team throughout the duration of the project. Summative evaluations are done at the conclusion of a project to determine its overall effectiveness (Rossi, et al., 1999). The first year project needs assessment will provide the baseline data to which subsequent improvements and project impacts will be compared. We used a combination of quantitative and qualitative methodologies to improve the validity and usefulness of our results (Berg, 1998).

The first step in meeting our objective was the development and implementation of a set of technology questionnaires for the three populations targeted in the grant: 1) K-12 teachers enrolled in a *Links to the Future* sponsored technology training course, 2) Mercyhurst College core faculty, and 3) Mercyhurst College education students. The instruments were designed to assess current technology utilization, technology knowledge, teaching characteristics, attitudes about computers, and other demographic characteristics. We decided to target the second-year students as the target student population, because they would be students during the entire three year PT3 project. CORE created an instrument tailored to each population and implemented it on a web site to simplify data collection and to enhance project sustainability in the future. The web site went on-line in October. Students were randomly assigned to receive either the online version or the paper and pencil version of the survey. Using a modified Dillman survey technique (Dillman, 2000) faculty and students received campus mail and e-mail reminders to improve response rates. Response rates for the K-12 teachers (100%), and students (87%), were quite high and the response rate for the faculty group was moderate (57%).

The surveys showed that the college faculty ranged widely in their use of technology. The percent of faculty who reported having computers at home was 90%. Twenty-four percent of faculty reported owning a Mackintosh computer verses 76% who owned a Window's based PC. Relatively few faculty (10%) reported the use of complex technologies in their teaching (e.g., creating websites or multimedia development), and most of these were in technical fields such as computer science. Many more faculty reported using e-mail (67%) and word processing software (92%) on at least a weekly basis. Faculty also reported several barriers to the use of technology college-wide. The major barrier that they reported was having sufficient time, followed by obtaining sufficient software, and getting instructional technology support.

The education students surveyed were second-year students involved in the education program at Mercyhurst. Students were recruited during second term registration and via e-mail and campus mail. Many students (96%) reported owning a computer and the vast majority (97%) of those owned a Windows based PC. Over 94% of students reported having Email at home. Overall, most students report some familiarity with computers and nearly all realized that technology was vital to a career in education.

Turning now to the K-12 teachers, we found that most used e-mail frequently and 91% reported having a computer at home. As frequently noted (e.g., Anastasi, 1988), self-report measures can have limited validity, especially in cases where there appears to be an evaluative component. Therefore, in addition to the self-report survey, we have developed an observational coding scheme to assess the current use of technology in the K-12 classrooms. Observers were trained using COR (Courseware for Observational Research), software developed at Penn State Erie to teach observational research techniques, including coding methods, sampling techniques, and reliability analyses (Blasko et al 1998) All of the teachers that were observed were enrolled in the Links to the Future sponsored seminar, EDSP31, Technology in the Curriculum. This course includes three 2-credit courses that take place across a total of 30 weeks. We have now collected observational data in all 17 classrooms for a minimum of 60 minutes per classroom. After the observations, teachers completed a post-observation form that provided an opportunity via open-ended questions for them to add qualitative information about the class and their experience using technology.

Initial results suggest that, with a few exceptions, the self-report survey generally mirrors the teacher's actual behavior. Most teachers reported positive attitudes about computers and relatively high innovativeness scores. This is not surprising, given the considerable commitment that the course required. Even at this early stage of the project, technology was used 51% of the total time in the classrooms. For this group of teachers, technology use was primarily restricted to using educational software, searching the Internet for information, and using word processing software to type assignments. The most frequently reported barriers to the use of technology included time for training and development and the lack of sufficient available hardware and software for teaching. Several teachers also mentioned that technical support in the schools was sometimes lacking. In some cases, the self-report survey did seem to overestimate the frequency of use of technology, for example teachers self-reported that they made heavy use of the Internet in their classes, but the classroom observations showed only 4% of the technology time was actually spent using the Internet, compared to the 16% of the time they used canned educational software. These data will serve as important baseline information for comparison to the observations collected in Spring 2002 at the end of the training course.

Another project objective was to redesign the education curriculum to integrate technology. At this point in the project, five faculty have been chosen to redesign courses and an additional five are being selected for the spring term. The faculty received funds that could be used for a course release or supplemental salary. Faculty were provided with consulting and technical support from the project team. Two weeks after the term, each faculty member will complete a project portfolio that will be the main source of evaluation data. It will include five sections: 1) New and old course syllabi, 2) Training efforts- What training have you gone to in the project period, on and off campus? 3) Sample project- a description and or demonstration of one learning project that you developed in the period of your course redesign. This can be on a CD, disk, video or the web, but must be available to the team to view. 4) Dissemination efforts- How have you shared your knowledge and skills with others, for example, though peer mentoring, conference presentations and publications, 5) Self-assessment- What did you learn? What do you still need to learn? What barriers did you identify to your integration of technology into your course? How might you overcome or cope with these barriers? How might we help and support your efforts? As a follow-up to the portfolio evaluation, classroom observations will be conducted the first time that the new course is offered.

The evaluation team is now planning for several upcoming project activities. We are fine-tuning our classroom observation techniques to simplify the criterion and improve reliability. We are developing an evaluation of the graduate students that were hired by the executive team to support the college faculty and K-12 teachers. Finally, plans are also underway for the development of a PT3 sponsored Links to the Future summer technology seminar.

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Building a National PT3 Online Learning Community

Betsy Lowry
Program Director for Online Learning and Distance Education
Center for Technology in Education
Johns Hopkins University
410-312-3831
lowry@jhu.edu

Background

PT3 has the distinction of touching most major teacher education programs across the country. PT3's national web site will serve a dissemination function, to share the wealth of research, program designs, evaluation findings, resources, and tools that are strengthening preservice teacher education through PT3 funds. To support the synergistic exchange between grantees, PT3 implemented a new intranet in August 2001 called the Electronic Learning Community (ELC), developed at Johns Hopkins University. This secure web space currently has over 800 registered members from the national teacher education community.

The ELC acts as a professional development resource for teacher educators by providing convenient channels of communication and increasing the opportunities for collaborative exchange of information and resources, improving the quality of interaction among community members. The structure of the ELC supports community involvement by integrating a decentralized approach to the development of site content, resulting in a web site that reflects the multitude of skills and expertise of the PT3 participant group. The ELC facilitates communication across geographic and professional boundaries, promoting continuous improvement and the generation of new knowledge. This web-based system enhances the learning and cohesiveness of the PT3 community by providing an open forum for the timely sharing of successes and a vehicle for "just in time, just for me" solutions.

Through a community-centered set of web-based tools and a strategic facilitation process, the ELC is being applied to meet the following needs identified by the PT3 community:

User Control

- Allow projects to contribute information regularly to the PT3 web site so that the increasing volume, depth, and sophistication of the program become evident over time.
- Provide a mechanism for all projects to share their products on the web site as they become available, with information about how the products can be accessed.
- Increase the opportunities for personal participation on the web site.
- Add an "upload" feature to allow all projects to continuously add new files and web sites ("artifacts") to share with the larger PT3 community.
- Provide web-based interaction tools that can be user-controlled to allow any configuration of participants to meet online as needed. Provide facilitation support or mentoring for these groups as needed.

Community Building Processes

- Provide projects an opportunity to participate in identifying "best" or "promising" practices, models, and innovations within the PT3 community, and highlight what is selected on the web site in a searchable format. Allow projects to see the ongoing evaluative feedback, and provide a forum for public recognition of product development and other achievements.
- Build the PT3 community by providing a forum that allows projects to make ideas and accomplishments visible, and to receive validation from their peer group. Create a sense that this is an important place to be "seen."
- Establish a mechanism to learn about learning communities from grantees who are doing work in this area.
- Establish a deliberate and effective mechanism for gathering information on the needs and wants of the PT3 community and other PT3 online presence clients continually.

Technical Integration

- Ensure that all interactive web-based systems that are a part of the PT3 program are smoothly integrated and seamless for users.
- Provide micro and macro spaces on the web for internal project work, for projects to move easily into larger program activities, and for cross-project collaboration.
- Provide a dynamic web-based calendar for users to record all project and program-related activities.
- Provide a mechanism for users to see what new content has been added to the site since their last visit.
- Offer an email alert system to draw users to the PT3 site when new content is added.

Purpose of the Poster Session

Multiple purposes will be achieved in this poster session:

1) PT3 grantees will have an opportunity to learn more about the Electronic Learning Community application, resources available through the ELC, its purposes and functions, and personal applicability. In addition, we can register anyone who has not yet become a member of the community.
2) We can use this face-to-face forum to foster collaborative exchange between and among PT3 grantees, and to encourage community members to participate in national PT3 initiatives currently facilitated through the ELC.
3) We can solicit feedback and input from PT3 grantees regarding the facilitation approaches used to grow and sustain this community, and effective strategies to make online community work.
4) Beyond the PT3 program we can discuss the role of online community in teacher education, sharing our experiences in applying this ELC web space and our facilitation strategies to over 50 communities of educators, and to three university-based preservice programs.

Comments Box on the Application:

We are supporting and facilitating the online community of all PT3 projects. A poster session will provide an opportunity to share the resources available on the Electronic Learning Community, discuss effective strategies for building and sustaining the community, and extend discussion to the role of online community in teacher education programs. However, it would be particularly beneficial to have a poster session type of presence throughout the conference, to engage more PT3 grantees in the discussion. We also want to ensure that all grantee participants are registered in the Electronic Learning Community. Is this a possibility?

Evaluating the Importance of Integrated Technology for Teaching and Learning Among Preservice Teachers

Dr. Linda Lynch
Department of Curriculum and Instruction
Southern Illinois University, Carbondale

Abstract

A valid and reliable instrument that measures the growing motivation to use integrated technology applications among preservice teachers was developed. Expectancy value theory provided the framework, for understanding the level of technology skill self-efficacy and value beliefs among preservice teachers.

Introduction

One major problem teacher educators face in an attempt to address the technology integration capability of preservice teachers, is measuring the level of motivation future teachers have to integrate technology in their future classrooms. Teacher educators want to know if the training and experiences they provide preservice teachers are ample enough to develop needed skills and a desire to use integrated technology as full-fledged teachers.

Preservice teachers experience a variety of opportunities to practice technology integrative activities in varying amounts. Given all the variables that occur in educating and training pre-service teachers, no two preservice teachers experience the same examples and practice associated with technology integration. By what method should preservice teachers be evaluated to give ample feedback to teacher educators, indicating success in the level of preparation to integrate technology given all the variation? Are preservice teachers motivated to use technology as teachers when they in fact graduate?

Instrument

The Technology Self-Assessment (Lynch, 2001) was developed to assist teacher development programs attempting to meet ISTE NETS standards to develop technology-using teachers. This valid and reliable instrument employs two meaningful constructs to demonstrate that preservice teachers are developing the motivation to use technology for learning and future teaching: technology skill self-efficacy and technology value beliefs. According to the expectancy value theory, motivation to take action is a result of the combination of skill self-efficacy and value-beliefs for the object of the motivation (Bandura,1996).

The Technology Self-Assessment features the 13 technology applications that are described in the ISTE NETS literature. Each application explores four graduated levels of skill self-efficacy and value for each of the 13 applications. Additionally the instrument includes items that explore the effects of past experience, and integrated usage in project-based situations on skill self-efficacy and value-beliefs for each technology application.

Some of the proposed advantages of using this instrument over other known instruments are:

- Specifically designed to represent the ISTE NETS standards for preservice teachers
- Supported by meaningful theories that are particularly valuable to demonstrate motivation to use various integrated technology applications preservice teachers
- Measure detailed technology skill self-efficacy of preservice teachers for a number of technology innovations
- Measures past experience and integrated usage of each technology application which is known to have affects on technology skill self-efficacy in preservice teachers
- Instrument was valid and reliable when used with two groups of preservice teachers

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- Instrument is well suited for longitudinal studies
- Instrument is well suited to provide information to assist teacher development programs in their self-evaluation
- Instrument is easy to administer.

Conclusion

It is important that preservice teacher institutions assist their graduates in acquiring needed skills, methods and motivation to use integrated technology in their learning and future classrooms upon graduating as teachers. Accurately measuring elevating technology skill self-efficacy and value-beliefs with a reliable instrument is also important to preservice teacher institutions who are developing future technology using teachers. The Technology Self-Assessment measures technology skill self-efficacy and value-beliefs, and should be a valuable aid in demonstrating the growing motivation to use integrated technology among future teachers.

Teaching with Technology

Kristi Maier
School of Education
St. Bonaventure Unversity
St. Bonaventure, NY 14778
maierkm@sbu.edu
716-373-7679

Abstract: "Are we going to use the computer?" This is what my students ask me all of the time. I am currently a senior elementary education major at St. Bonaventure University and concluding my student teaching. I am student teaching in a STTS -- Student Teaching Technology Site -- where I am required to incorporate technology into lesson plans and daily activities. This presentation will describe my efforts and successes. I will discuss the effects this program has on student teachers, children and K-12 cooperating teachers.

"This is great!"
"Wonderful!"
"Are we going to use the computer?"

These are just some of the quotes that I hear daily from second graders in my class and my cooperating teacher at Allegany Elementary School.

I am currently a senior elementary education major at St. Bonaventure University and concluding my student teaching. In conjunction with St. Bonaventure Unversity, Allegany Elementary School has a special program, which enables (and requires) student teachers to incorporate technology into lesson plans and daily activities. This is part of a new program at St. Bonaventure in which student teachers were selected to be placed in schools that have "technology tools" available and accessible. As the use of technology increases in schools, I could not miss the opportunity. As I finish my professional semester as a student teacher, I feel that being placed in this position is one of the best opportunities that an aspiring professional teacher can have.

I am currently teaching a unit on communities and neighborhoods. Throughout this unit, I have incorporated different types of technology to enhance student learning. One example of technology that I have utilized is a program called *Inspiration*. This program allows users to create a graphic organizer with colorful graphics and pictures. The particular *Inspiration* web that the students in my second grade class created was one that focused on "things that you may find in a neighborhood." I think that this was a really great way for the students to begin to grasp the concepts of communities and neighborhoods. Instead of just discussing the topic, it was interesting to have the students come up with suggestions and insert them into the *Inspiration* web. This was one of the very first technology projects that I introduced to the second graders and their faces just "lit up" as soon as they realized they were using the computer. Often, just setting up the computer and projector is an anticipatory set in itself. It "grabs the student's attention" and that is so very important in creating a classroom atmosphere that is effective and creative.

Another very effective use of technology that I have used in my teaching experience is the use of educational software. Educational software can be a very powerful and interactive tool that brings learning to children in a different way. Software allows children to explore opportunities and become familiar with current technology trends. In the communities and neighborhoods unit, I thought that it would be a positive learning experience to have the students create their own map of a neighborhood. With the technology equipment available, I chose to use a software program called *Neighborhood Map Machine*. This program allows students to create and design their own neighborhoods. As a class, the students developed their own neighborhood incorporating various aspects of neighborhoods and communities that we explored throughout the unit. The students really became interested and involved with the lesson and were learning while having fun at the same time. Each student participated in developing the neighborhood and as a result of teaching this lesson, the students were always eager to find out when they will be using the computer again and what other activities they can do with other technological equipment.

In conjunction with my cooperating teacher, I am in the process of developing a computer center in the classroom. Before I arrived at Allegany Elementary School the computers located in the classroom were not being used. Due to the fact that the students took such great interest in the technology that I have started incorporating into my teaching, I'm confident that it will be very beneficial for the students to have access to technology in the classroom everyday. In order to make this a success, I will choose software programs appropriate for my students. This will increase their development in technological skills as well as the subject matter.

With the help of St. Bonaventure University and Allegany Elementary School, I have been able to incorporate different types of technology to enhance student learning. I should also note that not only has the use of technology in the schools enhanced student learning, but also it has affected the student teachers and professional teachers that I have been working with. It is not uncommon for other teachers in the building to ask *me* how to use technology in different situations. Thus far, I have truly enjoyed using technology in a classroom situation and I feel that my abilities will be very effective and beneficial in future classes that I teach.

The Tech Mentor Project: Technology and the Student Teaching Experience

Susan Malone
Department of English
University of Southern Mississippi
United States
s.malone@usm.edu

Abstract: This presentation will share the results of three semesters of the Tech Mentor Project, one of the activities of USM's PT3 Initiative. Selected Tech Mentors work with student teacher volunteers on focused technology-related projects during the student teaching placement, connected through WebCT to a virtual community of other Tech Mentor teams and the PT3 team.

Introduction

As part of USM's PT3 project, student teachers are placed with trained Tech Mentors who have agreed to collaborate with the student teacher on technology projects during their placements. Tech Mentor teams participate in a virtual community supported by WebCT and collaborate to create a model lesson plan based on the NETS for Teachers and the NETS for Students, as well as appropriate state curriculum standards. Tech Mentors are recruited from among our regular pool of mentor teachers, focusing on those teachers who are already doing exemplary things with technology in their classroom or on teachers who are interested in learning more about using technology. For this second group, a special summer training session improves their technology skills and prepares them for their roles as Tech Mentors. Student teachers apply for the special designation of Tech Student Teacher. In the first year of the program, ten of our school district partners were involved in the Tech Mentor program; during the second year, we have expanded to include fourteen districts; next year, we will incorporate all nineteen of our PT3 consortium school district partners. In addition to working together on the model lesson plan and communicating regularly with other Tech Mentor teams on the WebCT bulletin board, Tech Mentor pairs work with the PT3 team to help develop strategies for extending the expectations of NETS for Teachers compliance to all student teacher placements at our University. Also, in Fall '01 we added an additional requirement for select teams who will develop and submit a portfolio of all the technology-related activities they completed during the placement. This presentation will share some of the results of the last three semesters of the Tech Mentor project. Student teachers and mentor teachers who have participated agree that the experience has improved their ability to use technology in their instruction and increased their students' learning. We will also share some of the challenges we have faced in developing and supporting this virtual community, which covers half of our state.

Over the three semesters we have conducted the Tech Mentor Project, 52 teams have participated, representing nine of our school district consortium partners. Our goal was to place Tech Mentor teams in ten districts during the first year of the project, in fourteen districts during the second year, and in all nineteen districts in our final year, with one elementary and one secondary team in the targeted districts each semester. Because of the difficulties involved in coordinating student teacher placements with our Office of Educational Field Experiences, their district contacts for student teaching placements, our district contacts for PT3 activities, student teacher applicants for the Tech Student Teacher slots, and the relatively short list of trained Tech Mentors, we have not always reached these target numbers. We hope to involve enough regular mentor teachers over the life of the three-year project to build up the pool of technologically-proficient mentors so that all student teachers will eventually have an opportunity to work with one during their placements.

Tech Mentors and Tech Student Teachers sign commitment forms agreeing to do the following: (1) attend two required meetings during the semester; (2) make weekly postings to the WebCT bulletin board discussions; (3) develop a model lesson plan correlated to the NETS for Students and Teachers and to the appropriate state content standards; (4) complete required surveys (two Profiler surveys on their perceived technology skill level and one end-of-term feedback survey); (5) work with the PT3 team to develop ways the new ISTE NETS for Teachers can be used in evaluating student teachers; and (6) after participation in the project, serve as district resources/trainers for other mentor teachers on the role of the NETS in student teacher evaluation.

Challenges of the Virtual Community

We use several of the WebCT tools to support this project. In the Course Content section, we provide links to extensive online resources, including relevant standards, ideas for using particular software (Inspiration, PowerPoint), support for the one-computer classroom, netiquette resources, software evaluation resources, web evaluation resources, free online tools (Filamentality, TrackStar, RubiStar, QuizStar, etc.), project-based learning resources, and web quest resources. We also provide project-specific information and forms, including the lesson plan template, the contract and commitment forms, reflection guidelines, and portfolio guidelines. We provide a direct link to our Profiler surveys, to make them easier for participants to access; we post specific discussion prompts, assignments, milestones, and due dates on the calendar tool, to help participants stay on track; and we use the private email and bulletin board tools.

Even though participants sign a contract saying they will participate regularly in the bulletin board discussions, we find that they often do not follow through on this. For most of the teachers, this is their first experience with WebCT, though more of the student teachers have been exposed to it. They have never participated in a virtual community like the one we have tried to develop and have difficulty making it a part of their routine. Based on the end-of-semester survey, 11% of the respondents said they never knew they were expected to post regularly (despite the contract and the discussion at the first meeting); only about 32% did regularly join in the conversation; 39% said they didn't have time; 11% said they didn't know what to say; and 7% said they forgot about that commitment. Most of us on the PT3 team have had great success using the WebCT bulletin board as supplements to our university classes; however, the participants in the Tech Mentor project meet each other only once, at the beginning of the semester, and do not have time to develop relationships that make the online discussions comfortable for them -- they never really feel like they are in conversation or in community. When asked if they would have preferred more face-to-face meetings, 89% said yes, suggesting they are more comfortable with the more familiar setting.

Tech Mentor Successes

Despite some disappointment in the online virtual community, our Tech Mentor project has proved successful. Though 40% said they would have used just as much technology in their instruction even if they had not participated in the project, 60% said they used more than they would have had they not been involved. Though a few (7%) participants reported that they had to strain to find ways to use technology, 74% found a natural fit between technology tools and the objectives of their curricula; 77% believed that their new technology lesson more effectively supported student learning than what they had done in the past (none thought it was less effective), and 95% said the use of technology improved students' motivation and engagement. District support and expectations regarding technology use will determine how likely 23% of the participants are to continue to use the strategies they developed during the project, but 77% reported that they were very likely to continue with their use of technology, because it had become integral to the way they think about teaching their subject matter.

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Integrating Technology Into Teacher Education Methods Courses: A Case Study

Steven Marx, Ph.D.
College of Education and Human Development
Eastern Washington University
United States
smarx@mail.ewu.edu

Cecile M. Arquette, Ph.D.
Department of Education
Eastern Washington University
United States
carquette@mail.ewu.edu

Abstract: This paper describes a project integrating technology into a reading methods course. Part of a faculty development program of a PT3 grant, this was a cooperative effort, where the class was co-taught by the Reading Faculty instructor and an Instructional Designer working with the grant. WebQuests were integrated into the regular curriculum, with groups of students creating a WebQuest as their major class project. The genesis, planning, implementation, and evaluation of this project are discussed. Successes included large percentages of participants approving of the integration of technology into the course and students who felt the technology was well integrated into the course. Many students saw limitations in this connection, and the time involved in the project was also seen as a negative by some students. Suggestions are offered for those working to integrate technology into the content and methods courses of their teacher education programs.

Introduction

Over the last 15 years, as computers and the Internet have become a greater part of schooling, criticism has been leveled at teacher education programs for failing to educate new teachers effectively in technology use (CEO Forum, 2000; Office of Technology Assessment, 1995). The continuing failure of our K-12 schools to use technology to increase student performance in a widespread way is one result of this failure. While much attention has been paid to the role of instructional technology classes in alleviating this problem, a much more problematic issue is the integration of technology into content area and methods courses. Until technology is an integrated and natural part of the whole teacher education program, it is likely to continue to be viewed as an add-on or separate subject. This paper looks at a recent effort to integrate technology into a reading methods course.

This effort came about as a result of several factors. The Department of Education at Eastern Washington University (EWU) received a PT3 grant in 2000. Part of this grant provides for faculty development in technology. The focus of the grant in this, its second year, is one-on-one mentoring for faculty, with stipends available for those with specific plans for integrating technology into their classes. This gave the co-author of this paper the incentive to begin integrating technology into one of her courses in the Fall of 2000, something she had been thinking about, but hadn't felt the support or self-skills to do so prior to that quarter.

The author was hired by the College of Education and Human Development, of which the Department of Education is a part, to help coordinate the various technology efforts of the college. A major aspect of his position was intended to assist faculty to be more effective users of technology both for themselves and in their courses. Serendipitously, more money became available through the PT3 grant for the year, and the author was formally assigned to work with the PT3 grant, assisting with their various efforts. As the author and co-author are husband and wife, it was natural for them to work together on these already existing plans.

Course Background

During the summer of 2001 the reading faculty at Eastern spent a week revisiting and updating the first three required classes for Reading majors in the department. While discussing the needs of the students, community and state requirements, it became clear that few of the faculty were integrating technology into these three courses. While two professors were using Blackboard to support class projects, when the co-author brought up the need for students to use technology for curriculum design, the general consensus was the classes had too much to cover, and that adding technology would be impossible.

Education 410, Student Centered Reading, the course which the authors selected to use for integration of technology, is the third core reading methods course for the reading major at EWU. This class was seen as a good place to try to integrate technology for several reasons. First, students majoring in reading compromise the largest group of students enrolled in the department, and as this is a required course, a large number of students could be introduced to the use of technology in the classroom in a hands-on way. Second, as EDUC 410 is the third core class, the students enrolled will already have been exposed to the broad range of topics offered in the first two readings methods courses. This background would give them a grounding in reading development, methods and materials as well as lesson planning and some field work in public school classrooms. Third, as the title of the course suggests, the content of the EDUC 410 focuses on student centered learning techniques. These techniques include such things as Literature Focus Groups, Literature Circles and Cooperative Learning. Thus, the development and use of WebQuests as discussed below, with their focus on the participatory nature of the students involved, worked well with the goals of this course.

Rationale for the use of Technology in Education 410

As we began planning the best way to integrate a technology component into the course, we had to look at several factors. These included a desire for technology to be an integrated component of the course and not an add-on, making the technology student-centered, and having the university students actively participate in using the technology as they or their students might in a K-12 classroom. Looking at these and other factors, we decided WebQuests would be a good and valuable way to integrate technology into the course.

WebQuests are an inquiry-orient, student-centered activity invented by Bernie Dodge and Tom March at San Diego State University (for more information on WebQuests see the San Diego State University WebQuest page at http://edweb.sdsu.edu/webquest/webquest.html). They are designed to use students' time well when they are on the Internet, rather than just having them spend unguided, and often unproductive, time surfing the web trying to find useful information. When designing a WebQuest, teachers find the appropriate web sites first, and design an activity using those sites and other resources. A well designed WebQuest enables students who use it to be active participants in their learning by making choices, working cooperatively and often creating one or more products as a result of their WebQuest activities.

WebQuests appeared to be a good technology project for this reading methods course for several reasons. First, the students would be active participants in designing a WebQuest. As a result of this course activity, they would learn web page creation skills in the context of developing reading curriculum rather than as separate skills. Second, WebQuests are focused on both content and process, thus modeling good classroom technology use rather than simply reading and talking about such use as is often seen in teacher preparation courses. Third, WebQuests encourage cooperative group work, again providing an opportunity for modeling in the university classroom the types of activities and behaviors we hope the future teachers will implement in the K-12 classroom. Finally, because the teaching of cooperative learning techniques was already a component of the course in which the WebQuest project was planned, this could be seen as an incorporation of technology into the course, rather than a time consuming add-on.

The Planning Phase

Once we had decided on WebQuests as our means of integrating technology into this course, we then needed to determine how best to implement the use of this technology into the existing course structure. While we had originally thought to focus on WebQuests during the second half of the class, we decided it made more sense to try and integrate the activities throughout the course. This was partly motivated by the knowledge that the students in the program, almost all elementary reading majors, had received little or no technology use in the classroom to this point in their program. Thus we planned to integrate technology activities and demonstrations into the class from the start. By using this approach, we hopped the students would not only get paced instruction in this area (alleviating 'technology frustration'), but would also come to understand that technology can and should be integrated into the curriculum. Therefore, we also planned whenever possible, for the technology activities to have connections to the other activities being done in class on any given week.

By following the outcomes of the course as mentioned in the *Course Background* section above, we maintained the objectives of the class while still being able to integrate, rather than 'add on' another component, thus avoiding a common complaint of university faculty: that the integration of technology into existing courses is too difficult, time consuming and results in the need to drop some course content in order to accommodate the technology component.

Before discussing the implementation and results of this project, some information on the setup of the classroom is important. This course was a night class which met once a week for four hours at the university's off campus downtown education center. No technology is available in the classrooms, although each has an Ethernet port for Internet access. The building also has an open lab available for student use. However, this lab cannot be used for teaching, thus without bringing in some outside technology, this project would have been difficult or impossible.

Fortunately, the Department of Education has a set of iBooks®, and we were able to check out six of them for the quarter. To maximize the available technology, a wireless Airport® network was set up in the classroom; each group had one iBook®, and all groups were able to share the single network connection and be online together. Additionally, a digital projector was brought in for teaching and student presentations. While the technology limitations presented some problems, (discussed later), this setup did allow at least the minimum necessary access for groups to work on their projects, and might be considered a reasonable model of what teachers might face in attempting a similar project in a K-12 setting.

Implementation of the Project

The technology activities in this class started the first night, with a brief introduction to WebQuests. The students were shown the San Diego State WebQuest site, given a handout with URLs designed to help them get started finding out about WebQuests, and a WebQuest treasure hunt worksheet. Finally, we went to the lab and our students were given basic instructions on lab use. Two weeks later, we went over the first assignment and began the next, which was having the students plan the outline of their WebQuests.

Because we had a large classroom with a divider, we were easily able to split the class into two groups for separate activities. On this evening, one half of the class worked on a hands-on book-making activity, based on the text reading for that week, while the other half began their WebQuest plan. By dividing the class in this way, more individualized assistance was provided that third week at the beginning of the planning phase. Final plans were evaluated and adjusted the next week. We reasoned that with a solid plan in place, groups would be able to work on their own WebQuests with an understanding of the basic parts of a WebQuest and the responsibilities of each group member.

In the fifth week, again splitting the class in two, students were able to not only work at various learning stations based on the text reading, but were able to devote half of the class time to learning the rudiments of web page creation. This included the fundamentals of creating and saving pages, putting graphics and links on the pages, and design issues such as use of color, white space, and the appropriate use and crediting of graphics. Because of the overwhelming amount of information in this one session, additional time was spent the next week on some of these components. After that, in-class WebQuest time was mostly devoted to having groups work on their projects, sometimes as a whole class, sometimes split and always with a chance for groups to work on their own. Finished WebQuests were upload to the College server and presented during the last two class sessions.

Data & Analysis

To determine the effectiveness of integrating technology into this course, we gave the students a separate evaluation in addition to the department course assessment. We asked how useful they found the technology component to be, whether they felt it connected well with the reading curriculum, and the relevance of the project to the reading program and their future teaching. They were also asked to discuss their other technology experiences at the university and whether they would like to see other classes implement similar technology projects. These questions were asked anonymously in an open-ended format, allowing students to raise other factors they felt to be relevant. Nineteen out of twenty-two students (86%) filled out the survey, given during the final class (two students were absent the final class night).

Coding of the surveys was done one respondent at a time, question by question. After a first reading when no coding was done, and initial set of codes was created and applied during the second reading. These codes were further refined and reapplied where appropriate, until all data were coded with one set of codes. Results were then put in a spreadsheet so the data could be viewed both by respondent and by question, to look for overall trends and to ensure that each individual's line of codes reflected their answers.

The first question asked students how well they felt the WebQuest project fit the course curriculum. Responses were coded into five categories ranging from a good fit to not fitting and students not liking the projects. Table 1 shows the results from this coding, with 8 of 18 (44%) students who responded saying the fit was good or moderate, 6 (33%) saying they liked the project but didn't see a good fit, and 4 (22%) students seeing no fit. The responses to Question 2, on whether the students felt the technology was a valuable addition to the course, sheds some additional light on this issue of the technology fit.

Question 1: Technology/Curriculum Fit	
Fit	3
Medium Fit	5
Liked but didn't fit	6
No fit	3
Didn't like, no fit	1
Total	18

Table 1: Technology/Curriculum Fit

Sixteen out of 19 (84%) students responded that they felt the technology was a valuable addition to the course. This included three students who felt there was no fit in Question 1. In responding to why they felt the technology was valuable, 8 students felt the skills they learned or were learning about WebQuests gave them valuable resources for the K-12 classroom. Five additional students saw learning and using the technology more generally as important for teachers. On the negative side, four students felt that the time spent on the WebQuests took away from time they would have preferred to spend on the reading curriculum. Thus while many students may not have seen the connection between the reading curriculum and the technology, an overwhelming majority did think the technology was a valuable addition to the class.

Question 3 asked students if they would like to see similar technology projects integrated into their other courses. Thirteen out of 19 (68 %) said yes, with one additional student answering both yes and no, with reasons given on each side. Three of the six students who answered no mentioned a lack of experience or skills with the computer as a factor in not wanting to see similar projects in other classes. Five students said that if similar projects were done, they should be better connected to the curriculum, echoing results from Question 1.

Question 5 asked students about their other technology experiences. This question was added because we knew that the university in general and the Education department specifically are somewhat weak in this area. Twelve out of 19 (63%) students said they had had few or no technology experiences at EWU, they had had a bad technology class or two, or they had a lack of computer experience. Again, this mirrored what we suspected, and implications of this will be discussed below.

Other comments that came up in Question 4 or throughout the survey included 5 students mentioning the use of iBooks® instead of PCs as an inhibiting factor, and 7 mentioning time as a factor making the integration of the technology difficult. The relatively low number of students complaining about the iBooks® was something of a surprise for us, as this was an issue that came up repeatedly in class.

Recommendations & Conclusions

We were frustrated with the number of students who saw little or no connection between the technology and the curriculum. Several possible factors may account for this. Responses indicated that two of the students may not have understood the purpose of the course as stated in the course objectives in the syllabus. Additionally, some students who liked the technology but saw no fit, gave responses that indicated that they did see some connection, if not in the course, at least in their future classroom practice.

But finally we must conclude that one suggestion for those integrating technology projects into methods courses is to make this connection explicit. In EDUC 410, student-centered reading methods were read about, discussed and modeled. While we would prefer to leave the students free to choose their own WebQuest topic, in the future we may instead require one of these methods be incorporated into their WebQuest plan.

In contrast to the responses to Question 1, we were heartened that so many students felt the technology was a valuable addition and would like to see similar projects integrated into other courses. However, for those instructors who know their students may be lacking in technology skills and experience, less intensive projects may be a better way to start. A WebQuest requires considerable time: learning about them, planning, researching appropriate sites, and learning web page creation skills. This is quite a lot to ask of students who may be barely computer literate.

Regarding time, a factor specific to this class was the quarter system that the university follows. Classes are only eleven weeks, and because of vacation and weather there were only 9 required meetings. In this light, the accomplishments of the students are even more impressive. We felt this was a valid project that related directly to the course goals and content, and feel the resulting WebQuests were in large measure very good first efforts given the time and technology constraints. However, student concerns over the time involved and the dominance this project took during the last part of the course must be taken into account in future planning.

While the students had mixed opinions on how well the technology fit with the course content, the authors felt this connection was made. Suggestions for others interested in implementing similar projects include gaining knowledge of the technology abilities of students, being aware of the time required for intensive, innovative technology projects, and making explicit connections between the course curriculum and the technology project.

Teacher education programs need to do a better job of preparing new teachers who can use technology in effective, innovative ways in their classrooms. For this to happen, the technology must be integrated into the methods courses teacher candidates take, so that they have practice using technology with the subject matter they will be teaching. By integrating the use and design of WebQuests into a reading methods course for elementary reading majors, the students in this class had the opportunity to learn technology, use technology for a specific educational purpose, and make a technology-based product that may be useful to them in the K-12 classroom.

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Change Continues as UAA School of Education Moves Forward

Ann McCoy, University of Alaska Anchorage, US

During the second year of a PT3 Implementation Grant, we are continuing our work with integration of technology into our teacher preparation programs. In addition, as a result of our Title II Partnership for Teacher Enhancement grant we have been redesigning our teacher education program. The PT3 grant support this effort. Big changes are occurring including the addition of new faculty, the development of several new teacher education programs, and the restructuring of our school.

Our PT3 grant addresses four specific goal areas: Program Development, Faculty Development, Student Development, and K-12 Partnerships. They are part of a systemic change in teacher education and linked to each other and to other projects and programs within the SOE. These are the goals of the PT3 grant.

STUDENT DEVELOPMENT: SOE GRADUATES will be well prepared, technology proficient educators.
FACULTY DEVELOPMENT: SCHOOL OF EDUCATION AND CONTENT AREA FACULTY will be knowledgeable about current practice related to the use of computers and technology and integrate them in their teaching and scholarship.
PROGRAM DEVELOPMENT: SCHOOL OF EDUCATION PRESERVICE TEACHER EDUCATION PROGRAMS will reflect best practice including the integration and modeling of technology in all courses, using distance technologies to erase the differences between urban campus-based and rural programs.
K-12 PARTNERSHIPS: SCHOOL DISTRICTS WILL BECOME FULL PARTNERS in new teacher preparation through mentor teachers modeling best practice supporting pre-service year-long internships and shared training activities.

Changes continue to occur at our university. New faculty are joining our ranks and new programs are being developed and implemented. A panel of university faculty will interact with the audience as they share their experiences on lessons learned and the continuous assessment that is occurring during this period of change.

Tech•Connect: Learning About and With Technology

Patricia McGee
Department of Interdisciplinary Studies and Curriculum & Instruction
College of Education and Human Development
The University of Texas at San Antonio
USA
pmcgee@utsa.edu

Wanda Hedrick
Department of Interdisciplinary Studies and Curriculum & Instruction
College of Education and Human Development
The University of Texas at San Antonio
USA
whedrick@utsa.edu

Leann Steinmetz
Department of Interdisciplinary Studies and Curriculum & Instruction
College of Education and Human Development
The University of Texas at San Antonio
USA
lsteinmetz@utsa.edu

Abstract. The University of Texas at San Antonio's Preparing Tomorrow's Teachers to Use Technology (PT3) project uses a collaborative approach designed to achieve systemic change resulting in an improved teacher preparation program. The Tech*Connect Project engages university faculty, pre-service teachers, and field-based supervisors in joint activities that deliberate issues related to teaching with and about technology. Most members of the target population are below the level of "early technology" proficiency. The project goal is to establish a fundamental level of understanding about appropriate practices in technology use across learning populations. This model program aligns the teacher certification curriculum with state-mandated content and technology standards and infuses technology into field-based experiences in partnership with local schools.

The increasingly presence and use of technology in PK-12 classrooms is in contradiction with teacher preparation programs that have historically provided insufficient training to enable practitioners to use technology effectively. Many teacher education programs tend to teach **about** technology rather than **with** technology. Such programs seldom provide many examples of faculty modeling how to teach with technology and give pre-service teachers little variety of technology experiences in their field experience classes. Often there is little quality control over the experiences they have because strategic planning for technology infusion has not occurred.

In response to these conditions, a recent study by the International Society for Technology in Education (ISTE), commissioned by the Milken Exchange (Moursand & Bielfeldt, 1999), recommends that: (1) technology should be integrated across the teacher preparation curriculum rather than limited to stand-alone courses; (2) institutional planning is required to integrate educational technology into teaching and learning; (3) increased opportunities should be provided for student teachers to use technology during field experiences; and (4) faculty should be given support and training so that they can model appropriate technology uses in their courses.

At the same time, evidence indicates that many university faculty members involved in teacher preparation have little proficiency in technology use themselves. Moore (1991) believes that a critical difference in the ability to adopt technology exists between those who know what technology can do and use it and those who do not like to take risks, but are willing to have someone or something prove to them that the risk is worthwhile. The "chasm" between these two groups, as Moore calls it, accurately describes differences in attitude expressed by many University of Texas at San Antonio (UTSA) teacher education faculty. Although they may acknowledge that they need to incorporate technology into their teaching, models for its use and incentives to use it have not been readily available. In addition, many faculty members are unaware of resources available to them and, given their busy schedules, do not find time to seek them out. The way to achieve successful technology adoption, according to Moore, is to combine faculty and pre-service teachers in situations designed to create an irresistible reason to adopt technology. He suggests that such situations should make learning easier, more productive, or more enjoyable.

Other studies show that getting faculty to use technology not only takes access, but also involves developing a variety of strategies to offer support for faculty while they are training to use it. Brown, Demao, Forsyth, Godwin-Jones, Keller, Pelfrey, Price, and Shumard have identified five components of successful professional development to achieve technology infusion, including:

- **Collaborative mentoring:** coordinating the development of small, cooperative learning networks centered around "early adopters" who will act as mentors;

- **Networking:** creating a network of interconnected faculty interested in teaching and technology through email and other technologies;
- **Structured training:** offering faculty specialized learning experiences that are carefully designed to fit their unique needs as learners;
- **Model projects:** supporting projects by faculty that will encourage the dissemination of technology innovations to less-skilled faculty;
- **Consultation:** offering specialized technical support to faculty on demand

Cooley and Johnson (2000) indicate that successful professional development must overcome barriers such as lack of support, incentives and rewards, and just-in-time training, as well as respond to faculty perceptions of infringement on academic freedom. The dynamic nature of technology development necessitates a culture that supports continual learning and provides immediate access to resources for improvement and a greater likelihood of success.

The 21st Century Workforce Commission concludes that the current and future health of America's 21st Century Economy depends directly on how broadly and deeply Americans reach a new level of literacy that includes strong academic skills, thinking, reasoning, teamwork skills, *and* proficiency in using technology. Both university faculty and pre-service teachers acknowledge the lack of systemic requirements to demonstrate technology proficiencies in teacher preparation programs. Willis (2001) notes that in efforts to reform programs effectively, all stakeholders must be engaged in determining needs and processes and strategies must reflect the nature of the populations to be served. In response to this need, the UTSA Tech•Connect project represents a systemic response to the national call by the U.S. Department of Education for increased technology training in teacher preparation programs.

Project Overview

The Tech•Connect project represents the combined resources of UTSA, corporate and nonprofit educational institutions, and three local school districts and will target pre-service teachers, and UTSA teacher education faculty members. The project seeks to help participants acquire the skills to build effective technology applications in PK-8 learning environments and model technology practices that augment learning.

Tech•Connect activities were derived from a needs assessment that indicated what the service populations both wanted and needed. Program activities are divided into four components: program improvement, training, support and communication and dissemination.

Program Improvement is a major project activity and is on-going. To ensure that all teachers certified through UTSA leave the program with appropriate technology skills, successful technology infusion must occur in all teacher preparation program areas. This process will be implemented by making structural changes to incorporate technology standards, beginning with the courses in the certification programs used to prepare teachers for positions in Early Childhood through grade 8 (monolingual and bilingual). The process of program improvement involves systematic analysis of existing course syllabi for (a) current applications of technology and (b) logical infusion of the Texas State Board of Educator Certification beginning teacher technology standards. Tech•Connect consultants who are knowledgeable in technology-based pedagogy work with each of the teacher preparation program areas: early childhood/elementary; instructional technology, secondary, and special education. The consultants analyze syllabi, interview instructors and make a variety of suggestions about how standards can most appropriately be integrated into specific courses. Program area facilitators then work with course instructors to devise most appropriate activities for content. Once standards have been assigned to all course and activities finalized, Tech•Connect staff work with individual faculty for one-on-one training and support as well as make themselves available for demonstrating and modeling technology in actual class meetings.

Training is the second and most pervasive project activity. Faculty profiles serve as a baseline for individual faculty development over the grant period and serve as a map for Tech•Connect initiatives. Training is offered in a variety of venues to provide a smorgasbord of choices that can best meet the needs and wants of the population being served.

A main training activity involves cohorts of preservice teachers, faculty and field-based supervisors as they participate in a year-long course based on Southwest Educational Laboratory's *Active Learning with Technology* curriculum. Preservice teachers are placed with field-based teachers for one year in their last semester of coursework followed by a semester of student teaching. Training is conducted in district computer labs and technology-supported classrooms to provide an authentic learning environment and trainees will be allowed to use campus equipment for the training. Since the training spans two semesters, participants have the opportunity to reflect upon, practice, and master the skills they have acquired in actual classroom situations.

There are many other opportunities for the project community to participate in training. Cutting edge technologies are demonstrated from sole source vendors such as Apple, Casio, LeapFrog, and Lexia. Additionally, project participants may attend videoconferences sessions on topics of relevance to courses, attend small group training sessions, or utilize Star Online tutorials. The UTSA Teaching and Learning Center offers sessions in which faculty from across the university demonstrate technology-assisted lessons, allowing COEHD faculty to experience what it is like to be learners in college level courses in which technology is effectively used. The session presenters are recruited from non-education disciplines, including art, math, science, humanities, and business.

A third program activity is Mentoring and Support. Tech•Connect provides just-in-time learning and optional support services to UTSA faculty and field-based supervisors. We know that without supports that provide one-on-one and timely services, educators are less likely to adopt technology into their practice. These activities will include: technology mentoring by undergraduate students, just-in-time support, inter-district activities and demonstrations, specialized training upon request, and Tech•Connect Technology Kits that can be checked out for use by project partners.

The final project activity is Communication and Dissemination. To support individualized learning through anywhere, anytime access to resources, the project provides 1) videoconferencing, and 2) a Web site designed to meet the specific needs of consortium members. The Tech•Connect Web Site is being developed in stages beginning with focus groups to discuss needs and wants for online resources and tools. Eventually, online resources will include a comprehensive database that will facilitate the location of resources of interest to preservice teachers, UTSA faculty, and field-based supervisors.

The first year of the Tech•Connect implementation has inspired much support and excitement in the project community. The project activities evolve when initial plans do not work out in reality as they were intended and with reflection and determination new strategies are uncovered. For example, project consultants "adopt-a-class" and work with faculty to analyze their current practices and devise effective ways to integrate technology supported student activities. Consultants and graduate students then attend class sessions and support technology activities or model appropriate practices. In this way, preservice teachers get hands-on experiences while faculty learn how and when to use technology within the context of their own classroom. Approaching technology training from the needs and wants of target populations promises success and sustained momentum for the continued development of a technology savvy group of educators.

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PT3 on the Move

Alysa McLachlan
Curriculum and Instruction
University of Houston
United States
amclachlan@prodigy.net

Tamika Ware
Curriculum and Instruction
University of Houston
United States
anjetti14@aol.com

Abstract: Currently, the main focus of PT3 funded projects across the country is the meaningful integration of technology into the teacher preparation classroom settings. One component of the PT3 grant project at the University of Houston is that pre-service teachers experience educational applications of technology through a series of three educational technology courses prior to entering the classroom. While we recognize that this step is necessary, we know we must look further to enrich our students' learning experiences. Allowing the PT3 team to use technology tools to bring the school experience to our on-campus students is a continuing building process. As part of this process, the PT3 team has established a Virtual Classroom (VC) committee. The sole purpose of the committee is to come up with various ways in which video cameras can be used to enhance learning.

Introduction

Pre-service teachers at University of Houston have many opportunities to utilize technology while they are completing their coursework; however it is difficult for these students to obtain a full understanding of how technology can realistically assist them in a classroom environment. An idea that piqued our interest was to videotape actual educators demonstrating exemplary integration of technology, using the applications that are included in the undergraduate educational technology courses. These are the same applications that the pre-service teachers are expected to explore as classroom tools. This idea is being explored by the PT3 Virtual Classroomcommittee at both the local and community level.

Local Beginnings

Before approaching the learning community outside the PT3 grant, the Virtual Classroom committee decided to take advantage of the resources already available on campus. While not representative of the k-12 student populations, the preservice technology classes provide a valid educational setting for exploring the potential of videotaped technology-rich lessons. In this learning-conducive environment, the VC committee set out to videotape technological interaction in our own pre-service classrooms. Technology-enhanced lessons were prepared by the tech fellows for each content area and demonstrated to the preservice students during the videotaping. Team members collaborated in the planning, videotaping, and final editing. The purpose of taping our own team was twofold: to create technology rich demonstration videotapes, and to go prototype the entire process before moving into local schools. We plan on extending the number of these university classroom examples as well as continuing with the plan for k-12 campus lessons to show exemplary integration to future pre-service teachers.

Community Plans

The main goal of this project is to provide students with a model of how to teach specific content area with technology rather than just how to use technology (Francis-Pelton, Farragher, & Riecken 2000). The first step is to acquire the assistance of community educators who are willing to demonstrate classroom techniques for videotaping. The VC team will conduct the videotaping in the teacher's regular classroom to preserve normal interaction, as much as possible. Teacher demonstration and student response will be included in the videotaping.

When all of the shooting for the video is completed on location in the schools, the VC team will then edit the video to an appropriate presentation length and format. Once they are integrated into our method courses, the videos will allow pre-service students to observe how integration of technological applications is actually being utilized by educators. In addition, pre-service teachers will note the difference between teachers who use computers in traditional ways and those that use it as a tool to solve problems or improve students' critical thinking (Yildirim, 2000). It will give the students a sense that they can make technology work when they move into the classroom.

Videotaping exemplary use of technological integration in a classroom setting will also provide a chance for pre-service students to examine samples of student involvement and reaction. Pre-service teachers will have an opportunity to view multiple tapes and can compare and contrast the differences that they see regarding student behavior. In addition, Preservice teachers also need opportunities to examine learning under different instructional conditions if they are to understand the relationships among teaching and learning (Neiderhauser, Salem, & Fields, 1999). Again, the videotapes will provide an opportunity for pre-service teachers to observe circumstances where students are engaged and learning is enhanced due to technology integration.

Conclusion

Through observations, students may be able to acquire some excellent strategies for use within their own classrooms when it is time for them to make the transition. The opportunity to view a variety of classroom integration techniques will provide a foundation for the effective use of technology in the classroom.

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PT3 - Project MIMIC Dissemination - Collaboration of the Americas

James D. Meinke
Baldwin-Wallace College, USA
jmeinke@bw.edu

Judson Elliott
Baldwin-Wallace College, USA
jselliot@bw.edu

Laura L. Joss
Baldwin-Wallace College, USA
ljoss@bw.edu

Abstract: This session describes the dissemination of PT3 Grant – Project Mimic on the Baldwin-Wallace College campus. The Collaboration of the Americas expands the MIMIC model through the use of desktop videoconferencing as well as into Internet 2 for distance mentoring….whether that is from within US (university to university) and/or in collaboration with foreign colleges and universities, (Argentina and Chile). This session will discuss the progressed made in the use of desktop videoconferencing, streaming of musical concerts, tutoring and the use of Internte2 for videoconferencing.

Introduction

The Collaboration of the Americas grew out of the original PT3 Project MIMIC grant. Project MIMIC's addresses the problem that only a small number of higher education faculty in this country actually model good practice integration of technology for pre-service teacher education. Few education students encounter experiences and role models that will prepare them to create and support technology -rich classrooms. To address this, the MIMIC Project provides technology mentoring for higher education faculty so faculty can, in-turn, and appropriately model current educational technology.

The Collaboration of the Americas expands the MIMIC model through the use of desktop videoconferencing as well as into Internet 2 for distance mentoring….whether that is from within US (university to university) and/or in collaboration with foreign colleges and universities, (Argentina and Chile).

Collaboration of the America's Project

The project has expanded into three sub-projects:

- One education faculty member is a MIMIC participant working in the area of early childhood teacher preparation. She will have a mentor who is a current 3rd grade teacher in a local school district. Her mentor is also finishing her Master's Degree in Educational Technology this spring. In addition to these two folks working together, a third tutor is being arranged at a distant University and the plan is to connect these people via Internet2 with distance videoconferencing. This professor works in the area of educational technology but is also interested in early childhood computer literacy. Most of this project will be involved with the software iVisit and NetMeeting.
- Two professors from the Instituto Superior de Formacion in Patagonia, Argentina, have formed a collaboration with Baldwin-Wallace College for Spanish audio files in exchange for technology skills for their teachers in training. Where videoconferencing will take place with this project the use of the software iVisit and NetMeeting will the software of choice. The goals of this project are:
    - to actively collaborate with other teachers in a distant environment via email, discussion board, virtual classroom and hopefully live teleconference (iVISIT and NetMeeting) on various teacher classroom methods. In the past the professors have used chatrooms with their students located throughout the country. We are planning the extension of these chatrooms to both audio and video (conferencing and streaming) file exchange.
    - to receive, from Argentina, Spanish audio files (male, female, teenager, different dialects) to assist our Spanish Department on the Baldwin-Wallace College campus in helping future Spanish K-12 teachers. (This is a problem we are experiencing on our campus with the PRAXIS II language test).
    - to actively assist the Argentina teachers in the English as a Second language classes in developing comfort in the use of educational technology in their classroom environment. This will include the use of all parts of Blackboard as well as some CALL (Computer Assisted Language Learning).
    - to achieve cross-cultural pollination of teaching methods and ideas as well as other cultural variations between our two countries.

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- A BW music education faculty member has been fortunate to be involved in three Artist Residencies sponsored through the Ohio Arts Council and the Chilean North American Cultural Institute in Chile, South America. Her target projects have been focused in the Chilean cities of Copiapo and La Serena.
    - Her work in Copiapo has been at the Liceo Experimental de Musica de Copiapo which is a grade three through twelve school of the arts in the middle of the Atacama Desert. The Chilean government has declared this Liceo as the model arts school for the country in the development of curriculum, scheduling and programming. Her residencies there have been multifaceted. In addition to guest conducting the bands, orchestras and choirs, she have been charged with assessing and evaluating all perspectives of the school from teacher and student performance in the classroom to scheduling, materials, teacher education, inventory and the coordination of the writing of the National Chilean Music Education Curriculum. It is her hope that the development of her technology skills will enable her to develop a web site that will support sharing web stream broadcasts of quality teaching and performance examples and professional development information. Through the use of video conferencing, she hopes to be able to maintain an ongoing dialogue throughout the year so that she is able to support her Chilean colleagues on a daily basis as they work to further music education in their country.
    - Her second project is in La Serena, Chile, at the Universidad de La Serena and Escuela Experimental de Musica "Jorge Pena Hen." This past August, she spent a week at the University de La Serena leading the "Encuentro de Directores de Bandes de Concierto Escuelas Artistics del Norte Chileno." This was a weeklong convention for all of the band directors in the north of Chile. She presented clinics on numerous subjects such as conducting, rehearsal techniques, repertoire, and singing in the instrumental classroom. This was the first time that an event of this type had been presented in Chile and the first time that these thirty music educators had ever met! It was an extraordinarily successful event that ended with a commitment on the part of the teachers to attend every year. The opportunity presented itself to start the very first Chilean Music Education Association. She is committed to working with these dedicated music educators to help them continue their professional growth through the year. She hopes to experiment with distance learning through the use of Internet2, video conferencing and web stream broadcasting to share what she can with her new colleagues.
    - Time during the visitation to the BW campus in January by the Universidad de La Serena and Escuela Experimental de Musica participants will be used to train them in desktop video teleconferencing software as well as in Real Producer and file transfer for streaming their future concerts. On Feb. 22nd BW will stream a live concert especially for these two intuitions. This is in preparation for their institution doing a stream back to BW. This maintains the dialogue of the instructors involved in the collaboration from the conferencing and the performance level.
    - Final exchange of dialogue and conferencing will take place this academic year over Internet 2. On October 2, 2001 the authors and this music educator participated in the Internet 2 Megaconference where we explained how Baldwin-Wallace would be using this technology to further enhance this cultural exchange experience. Questions we fielded from colleges and universities around the world on the approach to our campus wide approach to experimental foreign study.

We at Baldwin-Wallace College, Division of Education have attempted to disseminate the goals and object of Project MIMIC beyond the scope of the original grant. Our purpose is to further experiment with the new frontiers of Internet 2 and the use of desktop videoconferencing to enhance the tutorial process.

Supplemental Suggested Resources

IVisit

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Direction, Magnitude, and Constructive Chaos: Identifying the Vectors of Technological Change in a College of Education

Kathryn M. Moore
College of Education
NC State University
Raleigh, NC
United States
kay_moore@ncsu.edu

Marsha Alibrandi
Curriculum and Instruction, College of Education
NC State University
Raleigh, NC
United States
marsha_alibrandi@ncsu.edu

Candy Beal
Curriculum and Instruction, College of Education
NC State University
Raleigh, NC
United States
candy_beal@ncsu.edu

Lisa L. Grable
College of Education
NC State University
Raleigh, NC
United States
grable@unity.ncsu.edu

Hiller Spires
Curriculum and Instruction, College of Education
NC State University
Raleigh, NC
United States
haspires@unity.ncsu.edu

Eric Wiebe
Mathematics, Science, and Technology Education, College of Education
NC State University
Raleigh, NC
United States
wiebe@unity.ncsu.edu

Abstract: The faculty of the NC State College of Education (CED) is in the process of transforming its organizational culture to better support educators as they deal with a changing technological landscape. We are developing and refining a model for change that will help twenty-first century teachers understand both the use and the potential of instructional technologies. Our panel (comprised of the CED Dean, the IT Director, and four CED faculty members) will describe the creation of a fertile landscape for change within our college that has resulted, in part, from our PT3 Grant, *MentorNet*. We believe there is a direct relationship between identifying the force vectors of our model and building order out of what, at times, appears to be organizational chaos.

Introduction

Twenty-first century teachers face challenges that stretch beyond what was expected of their counterparts only a few decades ago. It is now necessary for teachers to develop a critical understanding of the use and potential of instructional technologies along with a lifelong capacity to refine that understanding in the face of ongoing technological innovations. Simultaneously, today's teachers must blend these innovations with rapidly changing class content. Finally, and perhaps most importantly, they must cultivate a similar capacity to accommodate to change in their students. With all of this in mind, the faculty of the NC State College of Education is transforming its organizational culture to better support teachers as they grapple with education's changing technological landscape. As we articulate our evolving model for change, we hope to turn a lens on ourselves to better examine what we are about so that we can provide experiential information to colleagues attempting similar transformations. We believe there is a direct relationship between identifying the force vectors of our model and building order out of what, at times, appears to be organizational chaos (Fullan, 2001). These vectors include relationships and collaborations, autonomy and individual degrees of freedom for programs and faculty in approaching our vision, participatory information interpretation and creation or the organization members, and openness to energy changes.

In an effort to describe the creation of a fertile landscape for change within the NC State College of Education (CED), we present the perspectives of the CED College Dean, the CED IT Director, and four of our CED faculty members. The creation of our new landscape is, in part, a result of our PT3 grant, *MentorNet* (Preparing Tomorrow's Teachers to Use Technology, U.S. Department of Education).

Leadership through Collaboration

The administration of a college of education must make choices about the leadership framework it will use. At NC State's CED, we have chosen a culture of collaboration that includes visioning, building organizational capacity, and sustaining strong yet flexible programs. First, we identified relationships as a force vector in our change model to be a source of strength in the midst of change. It is important to examine the structures that support these relationships. Relationships between faculty in the same departments, across departments, and within the wider university are key factors in the implementation of change. Collaboration releases excitement and energy that can be a primary source of creativity for new work. Our PT3 grant pushed us to work in teams of faculty from three of our college departments. Arts and science faculty joined with teacher preparation faculty from neighboring institutions to forge new ways of teaching in technology-enabled environments. For these partnerships and relationships to work and make sense we need information and interpretations to come from a wide group of constituents. These include recognized experts in technology and learning, research support, publications by our faculty, and invited presentations from professional associations (Berger, Casey, Belzer, & Voss, 1994; National Middle School Association, 2001).

Our second identified force vector is degrees of freedom in approaching the organization's vision. The vision for an organization focused on such relationships needs to involve everyone and be a strand (or force vector) that works throughout the college. The NC State CED vision states: "The College of Education is committed to being a leader and innovator in research, application and dissemination of effective strategies for teaching and learning through technology-enabled environments with the ultimate aim of preparing educators who foster high achievement for all students." This vision is aligned with issues facing both our state and our nation as we prepare for the opportunities inherent in an emerging knowledge-age economy. This vision must be available to everyone in our college, whether they are in Adult and Community College Education, Educational Research and Leadership and Counselor Education, Mathematics, Science and Technology Education, or Curriculum and Instruction. When we allow for individual freedom in ways of approaching the vision, the overall identity of our organization will be sustained.

Our change model includes a third force vector, information interpretation and creation. To build ownership of our vision and its implications for future practice, we must share the information creation process with the people who will implement the vision. We firmly believe that the best way to prepare our students, tomorrow's classroom teachers, is to create a climate that includes exemplary teaching with a variety of technologies and materials they will be expected to use when they graduate (Quinn & Valentine, 2001; Weller, 1996). This is a source of energy for doing work towards having all our faculty routinely work with cutting-edge technologies in their teaching and research.

The fourth force vector is openness to energy changes. We believe we have an opportunity to focus the power of current and emerging technologies to transform the way we teach and learn. But as Margaret Wheatley reminds us, the issues that trouble organizations most are chaos, order, control, autonomy, structure, information, participation, planning, and prediction (Wheatley, 1992). A college of education is not exempt from these issues. The NC State College of Education is setting forth on a path of change and transformation that will give our faculty the opportunity to innovate in the face of educational issues and challenges. By taking this opportunity to change, grow and remain open to energy changes, we plan to be a viable and dynamic system that will welcome the challenges of the future.

Capacity Building through Adaptation and Adoption

The introduction of technology into any organization -- whether it is business or education -- is directed in part by the dynamic forces of the potential of change through technology and the inertia of established practices (Bruce, 1993; Cuban, 1986). Successful integration of any new technology involves a number of changes (Casson et al., 1997). The process usually starts with a few early adopters who are willing to work on changing larger organizational attitudes towards the technology (Rogers, 1995). Change needs to happen in a number of ways to make this conversion successful. It means changes budgetary policy to make way for purchasing of the technology and setting up the infrastructure. It means budgetary and organizational change to make way for adequate service and support staff. And it means changes in work habits so that the technology is adapted and integrated into the mainstream activities of the organization. While businesses and educational institutions share this same basic evolutionary process, primary, secondary, and higher education all have unique characteristics that shape and influence the introduction of new technologies.

Through a slow evolution during the 1980's and 1990's, the College of Education at NC State University has grown from a single small lab of Apple IIe's to five labs each having between 15-25 student computers, computer-interfaced ('smart') marker boards, an instructor's computer, and a projector. These desktop computers -- both Macintosh and PCs -- are arranged in a variety of row configurations, with the instructor's computer at the front of the room. These labs are reserved for classes and otherwise available for open lab use. This computer resource model is not only typical of undergraduate education, it is also reflects the model used by many of the elementary and secondary schools in NC and the rest of the nation: classrooms with minimal computer infrastructure and a few (or one) fixed computer labs and media center.

Growth in computer facilities at the College of Education was hampered for many years by the lack of a continuing budget for computing resources. With computers treated as a capital expense, funding was low, uneven, and unreliable. The instituting of a university-wide student fee for computing meant both the establishment of a steady revenue stream and a larger change in organizational attitude that led to the funding of infrastructure improvements and paid support staff from other budgetary sources. Public schools in NC, however, continue to lack reliable funding sources in many counties, leading to uneven support for continued upgrades of computing technology and paid staff to maintain it.

Even with a generous level of funding for computer technology in the College of Education, integration into the core activities of the College continues to be an ongoing challenge. While administrative and research activities readily moved to the use of desktop computers for word processing, spreadsheet, and database management, integration into instructional activities has been slower. In institutions of higher education, the traditional lack of central authority means that this conversion typically happens one on one with individual faculty. There is the added fact that for most faculty there is no compelling and obvious reason why desktop computers would be particularly useful in a traditional classroom setting. Not surprisingly, the biggest use of the computer labs is by those instructors and curricula that were already heavily lab-based and teach activities centered on the development of computing skills. These same patterns can be seen played out in public schools for many of the same reasons.

Rapid advances in mobile computing technology has meant that laptop computers no longer are substantially more expensive with less computing power. Larger, higher quality screens, large hard drives and plug and play capabilities with numerous peripherals have made laptops near equal in quality to similarly priced desktop computers. Better battery life and wireless networking technology means that mobility no longer has significant disadvantages in these areas. While the technological hurdles for mobile computing has largely been overcome, the organizational barriers mentioned earlier are still there. Effective use of mobile computing means shifting from College-owned, fixed computer labs to student-owned, mobile computing. This shift means a change in budgeting that requires students to come to school owning their own computers. Current College funding would then go into increased staff support, enhanced wireless networking, and more specialized computing peripherals. While the technical barriers for bringing computers into a traditional classroom setting have been largely removed, there is still the need to develop compelling models for how computing can be used in instructional settings other than traditional labs (e.g., Griffioen, Seales & Lummp Jr., 1999). Public schools, which has never been able to fully fund traditional computer labs and an adequately trained staff, face stiff hurdles in adopting new mobile computing technologies. Unlike institutions of higher education, they cannot mandate that students purchase laptop computers. They also have weaker networking infrastructure to build upon and less paid technical staff available for support.

Many of these issues came into play in a pilot project with sophomore and senior science education students the author participated in. These classes made use of wireless networked laptop computers owned by the College and brought into the class on a daily basis on a specially designed cart. The students were instructed on how animated graphics could be used to support science instruction. Students then created their own animations using Flash software for use in clinical teaching experiences out in secondary schools.

Because the students did not own their own laptops, the process of bringing the laptop cart down to the classroom, setting it up and having students take and set up their computers used up valuable time in the classroom. The use of laptops without a full range of removable media options also added to the difficulties of transferring files to the computers at the beginning of class. While the instructors of the class had considerable experience in teaching in traditional computer labs, there were many lessons learned about the instructional possibilities when computers are no longer rigidly fixed and dominating the classroom environment. These changes altered the ebb and flow between whole class instruction and individual work and the interactions between instructors and individual students and pairs and triads of students working together.

When it came time for students to take their projects out to their sponsoring secondary school, there were a number of factors that complicated their novice teaching experiences (Parkinson, 1998). The lack of computing infrastructure at the sponsoring schools made it mandatory students bring the College's laptops out to the schools for their lesson. While many schools had a projector the students were supposed to be able to use, access issues often made it difficult for the sponsoring teacher to borrow the projector for the presentation. Students who were already nervous about teaching their lesson now had the added burden of setting up and troubleshooting a laptop and projector in a classroom where the sponsoring teacher often had little experience with this equipment. In some classrooms, there was the added difficulty that the sponsoring teacher was either indifferent or mildly hostile to the use of computing technology in his or her classroom.

As with desktop computing, the integration of mobile computing into institutions of higher education will be a long-term evolution (Carlson, 2001). While computing is well established in many aspects of college and university life, faculty will need to be convinced on a one-on-one basis that mobile computing can be an effective tool in both the classroom and the lab. Colleges of education have the added burden of helping to facilitate the integration and coordination of this technology into both its institution and in the primary and secondary schools. Reflection and lessons learned from the integration of desktop computing into organizations will provide valuable guidance as we move through the integration of this new generation of technology.

Creating a Collective Faculty Research Agenda

Research initiatives within the CED faculty are varied, reflecting a wide range of professional contributions and interests. Currently, approximately 35% of the faculty are engaged in research involving some aspect of the impact of instructional technology on education. These CED research agendas are aligned predominantly with specific discipline areas; however, collaborative, interdisciplinary research teams are emerging. For example, a team of faculty from three discipline areas, (i.e., social studies, science, and IT) within the College are studying the use of GIS on student learning. Additionally, a team of educators from three separate schools, (i.e., Computer Science, Design, and Education) are teaming to examine the effects of animated pedagogical agents on science and literacy learning. As our research agenda evolves and as we continue to build our College infrastructure for external funding, we anticipate that our capacity to support more complex interdisciplinary research agendas will increase.

In an attempt to recognize existing research on instructional technology within our College, we have synthesized particular lines of inquiry into the following broad-based questions.

- How can instructional technologies lead to students' understandings of math and science concepts? (Specific lines of inquiry include: scientific visualization, geometric and algebraic transformations, probability software, web tutorials for environmental science, animated pedagogical agents for botany concepts, technology beliefs and practices of math educators (Berger, et al, 1994; Weller, 1996).)

- How can instructional technologies enhance reading and language arts teaching and learning? (Specific lines of inquiry include: developing phonological awareness through computer software, technology infusion in LA methods classes and teacher prep programs, literacy and web-based instruction, animated pedagogical agents for narrative learning.)
- How can instructional technologies enhance the school counseling process? (Specific lines of inquiry include: research and development on *Career Key*, a web-based career counseling tool [English and Chinese translation]; IT and elementary and middle school counseling.)
- How do new IT pedagogies enhance the learning of culturally, economically, and academically diverse students?
- How can GIS affect student learning in social studies, science and IT?
- How can instructional technologies enhance Technology Education? (Specific lines of inquiry include: Internet learning systems, spatial visualizations, and computer-aided drawing and assessment.)
- How can middle school teaching and learning be augmented through a technology-enabled curriculum integration model (National Middle School Association, 2001)?

Synthesizing the current research within our College serves a twofold purpose: 1) to recognize, articulate, and validate strands of current and projected research interests, and 2) to use this existing research platform as a catalyst for developing a more synergistic community of researchers. We believe that moving from disparate, individual lines of inquiry to a unified, college-wide research agenda has the potential to enact a sense of collective human agency. Such agency through community building can create what Sergiovanni (1994) refers to as "a community mind," which exists when people feel connected to each other and work together for common goals.

Our goal is to create research-based models that lead to instructional practices that address both the efficacy of technology-enabled environments for teaching and learning and critically examine the impact of emerging technologies on contemporary educational practice. Ultimately, such a goal has the potential to yield a more equitable and excellent education for all children.

Facilitating Technological Change in the Classroom

Two CED faculty members have been caught up in the transformations that go along with technological innovations, changing class content, and change in students. We present their stories as examplars of reflective practice by faculty members within our changing organizational climate.

Middle School Teacher Preparation

At times my efforts to integrate technology in my own teaching career, infuse it in the courses that I teach in middle grades teacher education and balance its use with what I know to be good teaching and learning practices for students, has me flying by the seat of my pants. I seem to be always in a state of development, designing and implementing lessons and projects with my colleagues and students that finish with a BANG, after having grown like Topsy during implementation.

Teacher education in a technology enabled environment is dynamic, exciting and places you in a continuous state of flux. When you are in the thick of discovery you and the students move from one "Ah ha" moment to the next. Like any good teaching, you learn as much as you teach, that is if you can stop the action research long enough to do the necessary follow-up reflection. Ask me where I am going with my curriculum development and the signpost on the MASH television show springs to mind, arrows pointing in every direction. Recently, I paused to examine what my students, colleagues and I had accomplished. I knew we weren't off course, but we needed to determine which of the many courses we were on was proving to be the most valuable for our teaching and learning. Here's what I found:

- an early case study using my undergraduate Foundations of Middle Level Education class showed that students felt better about learning and using technology if a risk free environment existed in the classroom, if there was an abundance of user friendly technology support staff to trouble-shoot and help students and if the project in which they engaged was meaningful and allowed them to work in partner teams to develop collaborative websites.

- a service learning curriculum integration project replete with GIS, PowerPoint, internet research, spread sheets, streaming video and digital photography that was undertaken with preservice teachers and a team of eighth graders and their teachers was rich beyond belief because of the opportunities technology enabled. Students addressed important community issues, researched environmental problems, all while teachers orchestrated differentiated instruction opportunities that were a click away with the mouse. The project was showcased at a university symposium. Spit and polished eighth graders who were dressed for success "taught" an audience of doctorates and Deans how the bonds of class-bound lessons can be broken with the use of technology. Later, the project became a "how-to"model for using curriculum integration in a technology enabled environment. It was featured in a website built by graduate education students to promote curriculum integration as a teaching and learning approach that best meets the needs of early adolescents. Amazingly, by logging on to technology we had spiraled our curriculum work across two semesters and 130 learners.

- a virtual field trip lesson that started small as an after-the-fact website about a real trip to Russia, actually prompted a return trip during which student teachers journaled back in real time from Russia to their students and colleagues. This follow-up trip activity was so popular with scores of teachers and students, that the project has now grown into a technology enhanced year-long study of Russia. The project, dubbed Russia NC-6, will culminate with a virtual field trip for thousands who will be able to participate because technology will enable them to make the trip to Russia with us. Our traveling university research team will interview and gather research about questions asked by the sixth graders. We will send back information and digital pictures to supplement the sixth graders home-based research efforts. The research team will be examining the effectiveness of teaching using curriculum integration in a technology enabled environment.

These are a few of the examples that show that some of the best teaching and learning in a technology enabled environment demands flexibility, imagination and the ability to be a risk taker. My colleagues and I have found that you might not be able to always chart a straight course, but with technology you can go anywhere.

Social Studies Teacher Preparation

Driven by a new technology portfolio requirement for initial teacher licensure, methods classes for social studies—already pressed for time—now expanded to include a computer lab component.Over the three years that the requirement has been in effect, we have responded by creating a computer lab component in Social Studies Methods. Based in an undergraduate fall course divided into two main components; the first eight weeks of Methods and the second eight weeks of full time student teaching, a Friday computer lab has become an exciting component. I do not use the term exciting lightly—students are happily attending a 3:30-5:30 computer lab session. The hours are strange, but that was originally when the lab was free, and oddly enough, it's a time that has stuck and become very workable.

We designed modules and tutorials to set students onto tasks that were directly related to their student teaching practica. As a former Social Studies teacher who often used the computer lab (even in the 80s), this was not a foreign concept, and for future Social Studies teachers, computer integration cannot be. I describe this approach as expanding the landscapes of learning; that is, expanding to other parts of the school building, of the world (virtually) and into the greater community. The landscapes of teaching Social Studies should be broad, not isolated. The Internet helps to facilitate that expansion.

While I am expanding the landscapes, however, the time constraints remain the same, so the labs I designed had to be extremely time efficient. The syllabus includes: searching for lesson plans, WebQuests, Power Point, constructing class Web sites, and building a technology teaching portfolio. After the second week of the computer lab sessions, I asked students to reflect on their learning about instructional technology integration. Some of their comments are very telling about the level at which they had ever considered integrating technology into their teaching practice. This should be prefaced by the fact that this particular undergraduate program is housed not in the College of Education, but in the College of Humanities and Social Science. Students take their 'professional' education classes in our college, but for the most part are educated as History department majors. These comments come from a group of thirteen students, ten of whom were placed in practicum settings. Most of the students were unfamiliar with the concept of a Boolean search. Our first lesson was how to find teaching resources on the web to support Social Studies topics.

"Prior to this class I was still somewhat [computer] illiterate…I have learned how to set up a webquest, which is pretty amazing to me and is baffling to my parents…I have not seen a lesson that directly brought the kids into a lab [at my practicum site]"*

" I found out about lesson plans, student activities, role plays, simulations and webquests in my two lab sessions."

"I've only had one lab session so far, but already I came out of it with a little more confidence about where on the web I can find SS lesson plans, info, databases, etc…It's nice to know with google, PBS, etc that I can pull up opinion pieces or factual info ad nauseam. I also learned how to pull up two pages at the same time and how to cut and paste websites [URLs into a webquest]."

"I had no training in incorporating technology into a class…what have I learned? How to build a web page for a class."

"I've learned several good methods of searching for good activities & lesson plans on the net…The webquest using Filamentality really helped me get a strong idea of how to build a web page that will contain several web pages with the same major content area … The only SSIT that I have seen in my setting is the showing of a video." [x 6 students]*

"I feel I have learned so much about technology in the few sessions we have had so far. First, I never knew lesson plans could be found on the internet…The webquest was a new animal to me as well…This is wonderful because teachers can construct such great assignments using new technology."

These comments typify those from the remainder of the group. The two respondents * asterisked presented technology portfolio products to a group of professional IT educators in a partnership (MentorNet, PT3) workshop after five weeks of computer lab sessions. All of the students presented their technology portfolios at a reception at the end of their eight weeks of student teaching and each had implemented at least one of the products into their practice during those eight weeks.

Conclusion

We have explored solutions to complex challenges related to organizational and technological changes. This exploration and examination is an ongoing process. The vectors for technological change include the relationships and collaboration between faculty, the autonomy and individual degrees of freedom for programs and faculty in approaching our vision, participatory information and interpretation of the organization members, and openness to energy changes. Our leadership framework is based on a culture of collaboration that includes visioning, building organizational capacity, and sustaining strong yet flexible programs. We are continuing to build technological capacity through adaptation and adoption. Creating a collective research agenda will help create community and enhance the participatory nature of information in our organization. All of this cultural change will require faculty members who are open to energy changes in the system and will do the reflecting and growing necessary to build from the chaos.

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Electronic Mentoring of Career-change, Adult Learners in Pre-service Teacher Training

Maryanne Murach
Consultant & Lead Researcher
Upper Valley Teacher Institute
United States
Maryannem@mediaone.net

Abstract: This paper discusses whether electronic mentoring is a viable method of providing collegial support and guided reflection for career-change, adult learners during their pre-service teacher training internships. These interns spend the majority of their time isolated from their peers, their supervisors and their faculty as a result of program design and geography of the region.

The paper covers literature review, methodology, obstacles encountered, and project results.

Introduction

The Upper Valley Teacher Institute (UVTI) specializes in preparing mature, well-educated people from other professions to teach, and develops strong collegial support for teachers so that they will remain in the profession. UVTI reverses the percentage of time typically allotted to academic theory and classroom practice. In the pre-service training program, each intern works full-time in a classroom under the supervision of a 'best practice' professional teacher chosen from several states. This practical experience is reinforced by weekly seminars and support from UVTI supervisors, who are highly, experienced educators. At the end of the 10-month training period, graduates have demonstrated competency in all of the areas covered in conventional academic programs, and they have also acquired a full year of teaching experience. UVTI's geographical location and unique weather patterns make it very difficult for supervisors to meet with interns more than once every 10 days. Also, the internships are conducted at schools that span three states. The purpose of this study was to determine if electronic mentoring by supervisors and peers improves the practicum experience of career-change adult learners during their pre-service teacher training.

The literature review focused on three main areas: computer-mediated communication and email, teacher isolation and adult learning, and mentoring pre-service teachers. The conclusion was that technology now exists to facilitate communication across geographical distances. Even though adults may be intimidated initially, many are eager to learn these new methods of communication.

The methodology section covers how the supervisors were trained prior to being expected to use technology. It also covers some of the obstacles that needed to be overcome before a successful implementation could take place.

The results section focuses on positive aspects and developmental opportunities from the supervisor/mentor and the intern/mentee perspectives. This is followed by recommendations for next steps and overall conclusions regarding the appropriateness of technology use for teacher preparation.

Computer-mediated Communication and E-mail

According to Gresham (1994), the invisible college is a social network that operates informally through traditional methods of telephone conversations, postal mail, and print within an area of specialization, with contacts made through conferences and other forums. The informal network provides a forum for sharing new ideas and research through discussion and feedback. As a result of delays caused by publication processes in the formal presentation of ideas, these invisible colleges are frequently on the cutting edge of information in a given area of specialization. With the emergence of computers and the ease of networking, the invisible college moved to cyberspace through computer-mediated communication.

Computer mediated communication brings us a step closer to the interactivity of face-to-face communication with the added benefit of permanency through textual communication. Gresham (1994) noted that the textual basis for e-conferencing coupled with the speed and interactivity of electronic communication created a hybrid form of communication known as *media communication*. Email is an asynchronous form of computer conferencing in which messages are transmitted instantaneously but recipients can read and respond to the message at their convenience. Scholars participating in electronic conferences care most about the content of the discussion, and are less concerned with the technology that supports it. However; it is the computer technology that makes this type of communication possible.

Teacher Isolation and Adult Learning

Teachers have been the primary information source and the solitary supervisors of their classrooms. They usually work alone behind the closed doors of their classrooms with little interaction with other teachers to plan, teach or evaluate together. Very little time is allowed during the day for such activities. Even during pre - and in-service teacher training, the emphasis is on bringing new content and/or pedagogy to individual teachers, which tends to reinforce a main factor in resistance to change, teacher isolation (Tye, 1999). For hundreds of years, the school organization has been hierarchical by design. Those at the top of the pyramid are the privileged, with power, prestige and access to information; while those at the bottom, traditionally teachers, have low pay, little prestige, and no formal autonomy. Once they accept a position, teachers are relegated to their classroom where they are expected to conform to directives given by central offices and be content to use the tools of their trade. Common to most classrooms are the blackboard, the overhead projector, and the duplicating machine which help the teacher maintain their position as an information authority while alleviating writing to allow time for class management, arbitration and supervision (Hodas, 1993).

Cultural changes are causing changes in classroom practice. Until recently, there has been little incentive to change. Unlike most bureaucracies, school systems reward time -in-grade and academic credentials rather than performance. Teachers and administrators with a need for authority feel they must appear competent to their students, and in the case of administrators, to their subordinates (Hodas, 1993). The widespread student use of home Personal Computers (PCs) and the Internet is forcing teachers to be interested in the technology. Students who have been weaned on technology expect their teachers to be comfortable using computers, networks, and databases with the same facility as they now use textbooks, chalk and blackboards (Hodas, 1993). Other factors are also operating to bring about change.

In response to national and state initiatives regarding standards and technology integration, the roles of teachers are changing. In order to raise the perception of teacher from nonprofessional, bureaucratic worker to 'professional' status, the teacher is now expected to function as a member of a team (McGee & Boyd, 1995). New behaviors involving collaboration, problem-solving, inquiry and general sharing are required, and a different type of professional development is needed to promote these behaviors. There is much more information that needs to be grasped and shared. Working across disciplines, like combining math and science, is becoming the norm. Many of these changes require the implementation of technology as an integral part of the teacher's toolkit. However, many entry-level teachers are not comfortable using technology because they fear either their own or their students' inability to correct errors (Rein, 1995).

Adult learners have different needs and learning styles than children. Malcolm Knowles popularized the term 'androgogy' and presented the basic principles for teaching adults. His model included:

1. Setting the climate so the environment is conducive to learning;
2. Involving the learner in the following tasks: planning the course design and learning activities, diagnosing their own learning needs, formulating their own learning objectives, designing their learning plans, and evaluating their learning (Lee, 1998, p. 47).

Knowles felt that the major distinction between adult learners and children was that life experiences, not teachers, were the main resource for learning (Lee, 1998). To elaborate on this view and further define how adults learn, Mezirow (1997) described transformative learning as the process of changing one's frame of reference. In order to achieve that type of transformation, educators must establish objectives that promote critical reflection and provide opportunity for discourse. Experiences that meet those requirements and involve group deliberation and problem-solving are described as "learner-centered, participatory and interactive " (Mezirow, 1997, p.8). Computer technology, including the internet and computer-mediated communication, are conducive to these types of learning and experiences.

Research regarding technology use by older learners indicates that first and foremost, they need experiences that will help them build their self-confidence and feel good about the experience (Timmermann, 1998). Some barriers that need to be considered, but are often easily remedied, include computer anxiety, embarrassment, slower response time, dexterity and physical discomfort. Once these hurdles are overcome and the basics have been mastered, the adult learners become empowered, partially because they have conquered a domain thought to belong only to the young (Timmermann, 1998). The opportunity to bridge two wide gaps: intergenerational and geographical distance, is a great motivator for older learners to use technology. According to Timmermann (1998), using electronic forms of communication like e-mail allows contact with family and friends as frequently as the older adult learner would like, in their own time and at their own pace, without having to travel or incur large phone bills.

Mentoring Pre-service Teachers

Mentoring has successfully been used as an organizational and professional development tool to orient people to systems or cultures, provide leadership opportunities and support individual development. The origins of mentoring lie in Greek mythology, when Odysseus left his son's education to a friend and advisor named Mentor. Since that event over three thousand years ago, the concept has grown and flourished within academia (Janas, 1996). Mentoring in the United States has been used for quality improvement in both business and education for many years. Janas (1996) and Luna & Cullen (1995) indicate the all-around benefits that can be derived from successful mentoring programs. Mentors, proteges, staff developers and the organization benefit in many ways, both directly and indirectly, from successful mentoring programs.

Key to a program's success is planning, with the overall process resembling the model described by Knowles. According to Janas (1996), the physical environment and scheduling provide the foundation for supporting mentors and reducing isolation, as well as determining formal and informal contacts, identifying common tasks to be worked on and allowing for group interaction. The hallmark of effective mentoring programs is often the emotional and social aspects of the process, with the staff developer serving as the pathfinder on a personal and professional journey of discovery. An example of a successful program is the Peer Assistance and Review (PAR) mentoring program in Columbus, Ohio (Stedman & Stroot, 1998). The program purpose is to help the interns become effective teachers, and all interns are required to participate and pass the one-year program to have their contract renewed. Interns rate the program highly, citing emotional support, teaching guidance and professional development as indicators for the program's success. Through this program, the school district has been able to retain talented, enthusiastic and dedicated teachers (Stedman & Stroot, 1998).

Students in teacher preparation courses in many institutions of higher education are now required to integrate technology into their lesson plans, but many faculty members are still not technologically literate. Smith & O'Bannon (1999) cite many successful research projects that provided both technology training and mentor support to faculty during and following their training. Sometimes the mentors were faculty members, other times they were graduate students. Common elements of successful programs used the model: multiple session, demonstration, practice, critical feedback. Mentors provided the teachers/interns with ongoing support. Surprisingly, technical competency of the mentors was less important than the regularity of weekly contact and the collaborative environment where software was explored together (Smith & O'Bannon, 1999). Teaching the faculty with a demonstration-practice model provided them competence, self-confidence and an additional tool to use with their students.

Mentor teachers must reflect the ways of thinking and acting associated with new kinds of teaching, either leading reform or developing collaborative experiences where mentors and novices can explore new approaches together (Feiman-Nemser, 1996). Mentor teachers, as facilitators of learning, must have their own teaching characterized by practicing reflection, active learning and inquiry, in order to assist students in becoming active participants in their own intellectual growth (Wigle & White, 1998). In this way, they are more prepared to mentor collaboratively versus supportively. According to Evertson & Smithey (2000), mentors need to help new teachers more systematically, through dialogue and reflection, moving beyond merely providing emotional support.

When faculty focus on learning outcomes and presenting the learner with many opportunities to practice and improve, then encourage student reflection and self-evaluation, their role changes from coach to mentor. Mullen (2000) describes her model of collaborative mentoring as different from traditional mentoring. Typically, when dealing with university faculty and school faculty, the former is grounded in theory and the latter in practice. The collaborative model provided a process to integrate educational theory and practice by providing for secondary and peer mentors and facilitating team-oriented projects. Participants in general felt their lives had been enhanced; they learned from others, found their attitudes improved, and benefited from the continued professional development the project provided. In addition, they experienced an increased ability to rethink and solve classroom problems.

Methodology

Introduction

During the 2000/2001 school year, the supervisors at UVTI participated with other Preparing Tomorrow's Teachers in Technology (PT3) grant participants in several integration sessions sponsored by the New Hampshire Department of Education and Apple Computer. A typical session consisted of an introduction and demo of some technology piece, either software or hardware, followed by a practice period. Participants were often asked to work on a problem or situation typical of one they might encounter back in their schools. A representative from Apple would offer hands-on assistance, make recommendations and provide immediate feedback. The sessions started with simple presentations like an introduction to the PT3 Intranet site and logging on for email, then progressed to more complex assignments like creating a PowerPoint presentation and Inspiration diagrams. Following the practice period, there was a time for questions and a time to reflect on how the 'new' technology could be used back in the classroom

Implementation

In order to provide an immediate opportunity to practice using the Internet and email, UVTI decided to use a 'free' intranet option, for the short term, to create the UVTI web site. The UVTI site was modeled after the NH PT3 site and proved to be a familiar location for the supervisors. UVTI also investigated the feasibility of partnering with the Vermont Institute of Science, Math and Technology (another PT3 grant recipient), and use their site then being developed specifically for educators. Travel, health problems and weather, caused several months to pass before site visits and demos could be arranged. It was not until late spring that we had access to the National Institute for Community Involvement (NICI) site. Initially UVTI felt that since NICI provided 40 hours of technical support, and the 'free' intranet site would soon start charging a fee for use, that NICI was the way to go. However, it proved to be both difficult to get everyone's accounts established and cumbersome to move around the site. By the time everything was "up and running," there was little time for mentoring; however, the obstacles that we encountered during the process provided some important lessons Basically, implementation plans must factor-in time for unforeseen delays.

Results

Technology in general and the Internet specifically hold great promise for teaching. From anecdotal comments received about the process, the following trends were noted.

Supervisors/mentors enjoyed:

- Experiential aspect
- Potential of the medium
- Email as popular form of communication due to asynchronous nature: it was convenient, kept an electronic log of interactions, and provided samples of the interns writing skill
- Additional compensation made them feel like valued professionals

They also indicated that significant personal and professional growth and learning took place.

Developmental opportunities:

- Need more consistent and frequent use
- Need help in guided reflection format and expectations
- Need a mechanism on the site to clearly indicate when and what 'new' information is posted
- Need more support back at UVTI because several supervisors required individual sessions

Interns observations:

- This group more technically proficient than supervisors
- Several regularly checked intranet site and email
- Liked the asynchronous nature of the tool, so they could view presentations, information and mail at their own convenience
- See the potential for the technology to be used as a professional development tool

Developmental opportunities:

- Need more consistent participation by all: no dialogues took place on the threaded discussions because too few participated
- Need reasonable minimum hardware configurations defined: speed and capability make a difference

Those who were technologically literate became discouraged when so few participated in on-line interactions.

Next Steps

It appears that several changes are needed before the technology can make a significant difference. Administrative mentors need more time to practice and use the technology. Building the site use into everyday routine may give them a reason to consistently log-in and check for email, messages and 'new' information. Teachers who mentor also need to know about and practice using new technologies in their classrooms so the interns see its value beyond 'a professional development tool'. Mentors and interns need to set goals and establish minimum participation requirements that account for part of their grade so everyone uses the technology at a required level. Mentors also need to define reflection on practice for the interns, and share their own reflections with each other in order to experience the process and capitalize on the professional growth the role of 'mentor' provides.

Conclusion

The technology, in the form of the Internet and electronic conferencing methods, now exists to allow communication across geographical distances. Even though adults may initially be intimidated, many are eager to learn this new method of communication. Training should consist of basic instruction and time to practice, with technical support provided. Collaborative mentoring is a way of bridging the distance between educational theory and practice, provided the mentors focus on dialogue and reflection as opposed to merely providing emotional support to pre-service teachers.

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Laptops, Student Teachers, and Teachers-in-Residence: A PT3 Winning Combination

Pam Nicolle
PT.NET Grant Coordinator
College of Education
Louisiana State University
United States
nicolle@lsu.edu

Robert C. Lafayette, Ph.D.
Chair, Department of Curriculum & Instruction
College of Education
Louisiana State University
United States
rlafaye@lsu.edu

Abstract: Louisiana State University, Southern University, and the East Baton Rouge Parish Schools have developed a strong, cohesive partnership through their joint PT3 Implementation Grant, PT.NET (Pre-service Teachers Networking Environments Through Technology). Now in the third year, all grant activities have been directed toward teacher education program reform at both universities. Much has changed in regard to technology integration within both programs and several of the strongest components are highlighted and shared. Three specific initiatives are addressed as providing a "winning combination" for the grant participants: Student Teacher Laptop Loan Program, Student Teacher Technology Conferences and other training, and Teachers-in-Residence.

Introduction

Seeking to ensure that current and future educators are prepared to integrate technology into instructional methodologies, Louisiana State University's College of Education facilitates a multi-faceted program for faculty, classroom, and pre-service teachers. The comprehensive program, built upon the results of state grants and a PT3 Implementation Grant, assists in implementing a full-scale improved teacher education program benefiting PK-16 students and faculties. With the primary purpose of PT.NET being to assure that all elementary education graduates are competent and confident in integrating appropriate technologies in inclusive classrooms to improve children's achievement, the programmatic goals continue to guide the Colleges of Education in their quest for program strengthening, effect upon teaching and learning, and the nurturing of pre-service and faculty professional growth.

Objectives

Entering the third year of our PT3 Implementation Grant, PT.NET (Pre-service Teachers Networking Environments Through Technology), the College of Education has met and exceeded original expectations of the grant's four programmatic goals. A summary of the goals and indicators of goal completion provides a concise overview of the successes and subsequent strengthening of the College of Education.

Goal 1

University faculty in the arts and sciences and in professional education in both universities will model appropriate use of technology in their instruction.

The Colleges of Education and Arts & Sciences have strengthened their relationship through the auspices of several joint grant activities funded at both the state and national levels. As the participatory number of Arts & Sciences faculty members increases, the mutual respect between the colleges expands. In sharing a common goal of being "teachers of teachers", faculty members are drawn into this circle of scholars and the lines of communication widen. The ever-broadening effect of this camaraderie continues to encompass additional faculty from other disciplines across the university.

Goal 2

Post-secondary educators involved in elementary teacher education programs will engage in cross-disciplinary collaboration.

A variety of program implementations have contributed to the establishment of cross-disciplinary collaboration among the university teacher education faculty. With the defining of additional Professional Development Schools combined with the strong grant component of the Teacher-in-Residence program, the College is assuring that classroom teachers, university faculty and pre-service students are afforded opportunities for true collaboration and planning. These programs are foremost in the College of Education sustainability plan for positive systemic change.

Goal 3

Pre-service teachers will systematically integrate technology to support and enhance student learning and achievement.

In meeting this goal, the College strives to provide opportunities and support for the application of technology in culturally diverse classrooms. All student teachers have mandatory experiences in both high and low SES identified schools. With the expansion of our program focus, the College is sponsoring the first annual State Student Teacher Technology Conference and a subsequent New Teacher Workshop for those hired by the State of Louisiana. The anticipation of continued professional development and training opportunities for pre-service teachers abounds.

Goal 4

University faculty and pre-service teachers will participate in hands-on learning experiences with modern technology in elementary schools.

University faculty is provided technology-rich instruction in elementary school classrooms. Pre-service teachers are required to make use of technology-enhanced activities in classrooms with diverse learning needs are two strong aspects of this program. Primary technology integration training has taken place in the PT.NET Summer Institutes, which are designed to bring together faculty, teachers, and student teachers. Follow-up technology integration sessions are planned by the three Teachers-in-Residence during their weekly visits to their assigned schools. In-classroom mentoring has and is supporting the hands-on training experiences of both faculty and pre-service teachers.

Components

Through the auspices of several state and university technology grants within the LSU College of Education, thirty-six laptop computers have been purchased for use by the student teacher program. An application process allows student teachers to write a summary of personal technology skills, depth of preparation to use technology in the classroom, knowledge of technology integration activities, and intent of use of the laptop during the student teaching experience. The testimonials and documentation from laptop users from the last four semesters have provided affirming validation to the program and its continuance within the LSU College of Education Teacher Preparation Program.

Student teachers have been participants in a number of technology integration training opportunities. These include Laptop Orientation Workshops, Summer Institutes designed to place university faculty, classroom teachers, and student teachers within the same training experience, one-on-one assistance from the Teachers-in-Residence, and workshops for student teacher/supervising K-12 classroom teacher teams to train and plan together technology-rich lessons for their classrooms. Two hundred and fifty-two (252) classroom teachers, pre-service students, and university faculty members have received training and the opportunity for follow-up support since the inception of the Summer Institutes. Student teacher/faculty teams have presented the results of their technology integration efforts at the state LACUE Conference and the local Pre-service Teacher Conference held last year. The 2002 State Student Teacher Technology Conference will provide an additional means for faculty and students to offer professional presentations illustrating their skills and team approach to classroom planning. The design, implementation, and successes of these training opportunities will be shared with SITE International Conference participants.

The three Teachers-in-Residence, hired by PT.NET, work daily with university faculty members, classroom teachers who supervise student teachers, and with the student teachers themselves in planning and implementing standards-based technology integrated lessons. These master teachers work on a rotating and as-needed basis within their assigned schools and universities providing a successful mentoring experience for all involved.

The Teachers-in-Residence are a cohesive force within the technology thrust of the universities. They have proven to be an invaluable asset in establishing and maintaining a link between the university approach to teaching technology integration and the classroom implementation of these strategies. Realizing the importance of this phase of PT.NET, the grant partners are formulating sustainability plans for this and other "winning combination" programs.

Outcome

The Colleges of Education at Louisiana State University and Southern University are determined to continue building upon these successes, thus sustaining the key components to institutionalize changes necessary to integrate technology in teaching and learning. The foundational support of our PT3 grant and other College programs are contributing to the development and technological growth of K-12 students as the ultimate beneficiaries.

The inclusion of our PT3 Implementation Grant (one of four selected from 253 Implementation Grants nationwide) in the USDOE video, "The Challenge to Change", allowed LSU's College of Education to share successes in implementing change and program reform. Our PT.NET grant was also selected as one of eight to be included in a research case study sponsored by the USDOE highlighting successful programs forming strong partnerships and initiating teacher preparation program changes. This national attention, along with more than twenty (20) conference presentations, have provided a means for a spotlight, but more importantly, have provided a means for self-reflection on our goals, achievements, and future needs for the College of Education.

The College is determined to continue building upon these successes thus sustaining the key components to institutionalize the change necessary to integrate technology in teaching and learning. The foundational support of this grant and the other College programs are contributing to the development and technological growth of K-12 students as the ultimate beneficiaries. Louisiana State University seeks to continue its influence among current and future educators.

Faculty Development: Inter-Institutional Collaboration

Coral M. Noonan, Ph.D.
Technology Leadership Academy
The University of Texas at Austin
United States
coral_noonan@teachnet.edb.utexas.edu

Paul E. Resta, Ph.D.
Learning Technology Center
The University of Texas at Austin
United States
resta@mail.utexas.edu

Abstract: The Technology Leadership Academy has established an environment which fosters the sharing of innovative strategies and best practices in helping to prepare a new generation of teachers who are comfortable and competent in using the new technological tools for learning. This session will highlight the Academy's approach to developing this environment, including the following activities related to the Fall Institute, Regional Conferences, "Faculty Mentor," Consultants Database, Professional Development Task Force, and Digital Equity Task Group.

Introduction

The Technology Leadership Academy is a project funded by the U. S. Department of Education's Preparing Tomorrow's Teachers to Use Technology Initiative. The mission of the Academy is to develop a collegial network for the infusion of technology into teacher preparation programs within the four-state area of Kansas, New Mexico, Oklahoma, and Texas. Academy partners include the higher education community, state agencies involved in teacher education, and the corporate sector. This presentation will showcase online tutorials for faculty development, how the Academy has developed an online learning community for technology infusion, and how faculty members can create this collaborate environment at their universities and in their regional areas to elevate faculty teaching and improve adult learning.

The mission of the Technology Leadership Academy, a component of the Technology Leadership Institute, is to develop a learning community among teacher preparation programs. During the past year it has grown from an abstract concept to an organization with over 395 individual and 115 institutional members. From its inception, the goal was to build a collegial and collaborative organization to provide mutual support and sharing of resources in the challenging task of infusing technology into teacher preparation. The first organizational meeting, hosted by the University of Texas in January, 2000, was attended by key officials from universities and state educational agencies from the four states. Activities included: finalizing the Academy's organizational structure; establishing priorities; dividing into task groups (each concentrating on one aspect of the Academy's mission); nominating chairs of each Task Group (to serve on the Steering Committee and oversee the Task Group's functioning); and identifying a set of directives and recommendations for the Task Groups. The Steering Committee, comprised of deans, faculty and technology directors, provides direction and oversight of the Academy's activities and meets several times a year to reviewprogress and discuss future plans. There has been a shared responsibility in development of the Academy, even though the distance across these institutions makes this task even more challenging (and yet so rewarding).

Review of Related Literature

"The notions of classrooms as communities of learners is no longer restricted to the four walls of the classroom" (Norton & Wiburg, 1998, p. 210). The implications of this finding are twofold: (1) pre-service teacher educators should move beyond the walls of the classroom to prepare their students for the teaching field and (2) pre-service teacher educators should use this opportunity to explore online professional development opportunities which are outside the boundaries of their own campuses. One of the barriers for faculty members in finding online professional development resources is the time. There are so many resources on the Internet that faculty members may feel a sense of information overload. Faculty members may become overwhelmed with trying to find quality resources in a short time span. However, online tutorials offer a number of advantages. Faculty members are able to find tools that fit their specific needs. Also, time can be viewed as a benefit. Faculty members are able to find professional development opportunities on their own time—late at night, as soon as a question/problem arises, etc. Online professional development experiences offer faculty members across numerous institutions the opportunity to stay in frequent communication with one another. This sharing of expertise can facilitate a supportive environment in which faculty members can grow together as they build upon their technological abilities.

"The ability to use and teach with technology has become a requirement for pre-service teachers" (Davison, Burr, Eberlein, Fuchs, Saucedo, & Steffen, 2000, p. 11). Therefore, it is imperative that faculty members serve as role models for their pre-service educators in how to effectively infuse technology into the curriculum. Otherwise, our emerging teachers and the next generation of students may become victims of our technologically dynamic society.

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Academy Structure

As shown in Figure 1, the organizational structure of the Academy is designed to assure that it is responsive to the needs of the member institutions. The Steering Committee provides leadership for the Academy and consists of 14 individuals who represent the member post-secondary institutions. The Academy has nine task groups, and each task group is chaired by a Steering Committee member.

The Task Groups consist of volunteer faculty or staff from the member institutions and state educational agencies. Each Task Group is responsible for determining and coordinating its specific part of the Academy's functioning. Eight Task Groups emerged from the organizational meeting of the Academy. These include: Assessment and Planning, Academy Web Community, Consultants Database, Fall Institute, Policy and Leadership, Professional Development, Regional Conferences, and Technology Integration. Recently the Academy formed a ninth committee, the Digital Equity Task Group.

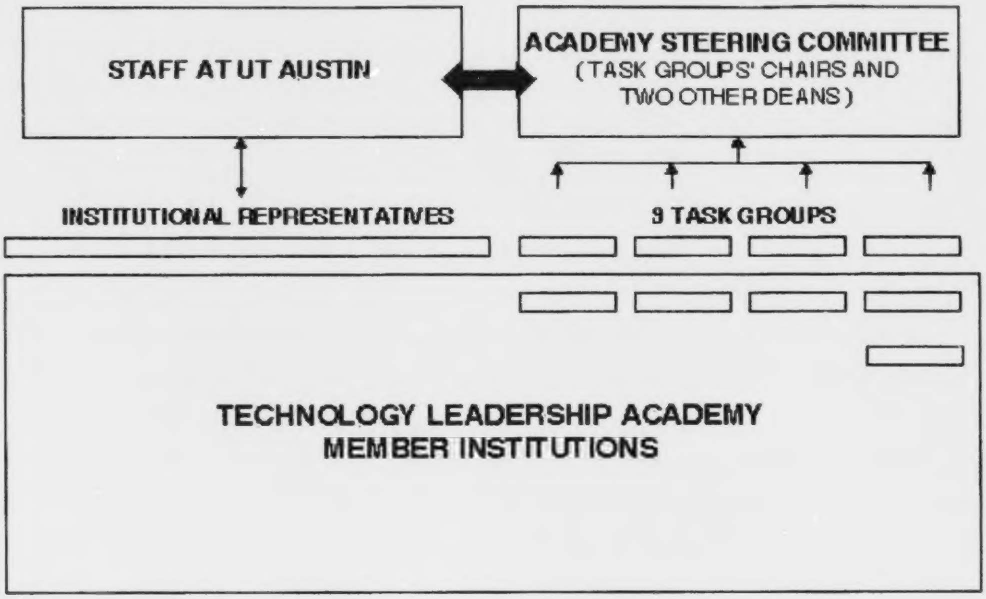

Figure 1. Academy Organization

Academy Activities

Online Tutorials

The Academy is facilitating an online tutorial process for faculty members in working with pre-service teachers to educate students of culturally and linguistically diverse backgrounds, given the changing social context. The Academy Web Community Task Group has developed a Faculty Mentor and Faculty Subject-Area Mentor. These projects are unique resources that use a question and answer format to allow faculty members access to relevant online faculty technology professional development resources, models, and research. The Faculty Subject-Area Mentor focuses on the following content areas: Math, Science, Social Studies, English-as-a-Second Language, and General Education Development.

Educational Technology Coordinating Council

Academy members are represented on the Educational Technology Coordinating Council to develop the State of Texas Master Plan for Educational Technology 2000-2003. The mission of the ETCC is to ensure the cooperation and coordination of the state's efforts to implement education technology initiatives. The State of Texas Master Plan for Educational Technology is aimed at pre-service and in-service training in technology integration for teachers and librarians. The Master Plan includes eight goals and objectives which identify the organizational infrastructure and data requirements necessary to measure successful implementation. Included in the goal descriptions are definitions, level of impact, lead agency and participating agency information, objectives, limitations, and due dates. One of the most significant sections in the Master Plan is focused on the 12 Recommendations which serve as an implementation plan for achieving statewide collaboration in educational technology.

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Fall Institute

Although competition within universities can be used in a positive manner, the focus of the Academy is to instill close, working relationships among and across institutions. The Fall Institute, the Academy's annual conference, is a strategy used to accomplish this goal. Teams of 3-5 individuals from member institutions participate in a 3-day conference focused on infusing technology into teacher preparation programs. Academy members also participate in organizing Regional Conferences on member campuses to strengthen the face-to-face component of the continued attempted by the Academy to provide a structure that fosters community and resource sharing within the four-state area. Written evaluations, collected at the end of the Fall Institute, have been compiled, analyzed, and available for review on our website. The data will be used to determine the thrust of future Fall Institutes and Regional Conferences.

Consultants Database

The Academy has devised a project to recognize outstanding faculty members who are infusing technology into the curriculum. The Chair of the Consultants Database is in consultation with the Institutional Representatives of all member institutions with the aim of developing a comprehensive listing of faculty with expertise in various areas who would agree to be featured on the Academy website in a biweekly segment and to be part of a database of resources.

Participant Outcomes

This session will be an interactive experience, whereby mutual benefit will exist between participants, between the participant and the presenter, and vice versa. The following are the objectives of this session: learn more about the PT3 program; become familiar with the mission, goals and objectives, and components of the Technology Leadership Academy; participate in a discussion about accountability issues involved in building an online learning community; learn about the process that the Academy took to develop this community—discuss benefits and challenges of certain strategies taken; contribute ideas on how the Academy can reach more faculty members. Our goal is for the participants to share ideas with the presenters on how to encourage more faculty members to become involved in the Academy and be held accountable for their participation.

Conclusion

The Academy has found that although virtual environments can powerfully support the development of learning communities, extensive face-to-face interaction and opportunities to participate are also essential. It is the membership and interactions within that membership that provide the definition, the direction, and the power of the community. The Academy is a learning community with potential to have significant impact on teacher education. Although it is the individuals from the member institutions that provide the talent and resources, these resources gain strength and vision through the collaboration and support within the learning community.

Please visit the Technology Leadership Academy website at http://www.edb.utexas.edu/academy

Facilitating Systematic Change in Teacher Education: A Model for Technology Infusion

Blanche O'Bannon, The University of Tennessee, US
Aileen Nonis, The University of Tennessee, US
Susan Skuda, The University of Tennessee, US
Kathy Puckett, The University of Tennessee, US

Teachers that are capable of preparing technology proficient students for the 21st century is notably one of the most critical needs in public schools today. This need has challenged teacher preparation programs to produce teachers that are able to infuse technology and curriculum. A recent response to this challenge is *Project ImPACT (Implementing Partnerships Across the Curriculum with Technology)*, an implementation project recently funded by the U.S. Department of Education, as part of the *Preparing Tomorrow's Teachers to Use Technology* Program. This project employs a team approach to facilitate the infusion of technology in the teacher education program at the University of Tennessee and K-8 curricula. The ultimate goal of *Project ImPACT* is to provide prospective teachers with the ability to use technology to enhance teaching and learning. To assist in the accomplishment of this goal, a model was developed which establishes collaborative teams of university faculty, mentor teachers, and preservice interns. This model, designed in keeping with research findings on effective technology training and implementation, is designed to facilitate the infusion of national technology standards for teachers in university classes and national technology standards for students in K-8 schools.

A panel that is representative of participants in Project ImPACT will present an overview of the project, snapshots of the training/implementation model used, curriculum restructure activities at the university level, and prospectives regarding resulting changes from university faculty, mentor teachers and preservice interns.

Experience Counts: Comparing Inservice and Preservice Teachers Technology-Integration Decisions

Joycelin Palacio-Cayetano, Ph.D.
IMMEX Project
UCLA School of Medicine
United States of America
E-mail: jcayetan@uclaedu

Stephanie Schmier
IMMEX Project
UCLA School of Medicine
United States of America
E-mail: stephster@hotmail.com

Sara Dexter, Ph.D.
Center for Applied Research and Educational Improvement
University of Minnesota
United States of America
E-mail: sdexter@umn.edu

Ron Stevens, Ph.D.
IMMEX Project
UCLA School of Medicine
United States of America
E-mail: immex_ron@hotmail.com

Abstract: A study of 67 preservice and 67 inservice teachers' performances on online classroom technology-integration simulations demonstrates how computer-based, decision-making scenarios with embedded assessment are utilized to identify key considerations preservice and inservice teachers use when infusing technology. Three major findings emerged from the analysis of computer-generated maps of teachers' step-by-step decisions and accompanying written essays: (1) Although inservice and preservice teachers accessed similar data, the teaching experiences of inservice teachers appeared to influence their perception of the simulations which is reflected in the differential quality of their written justifications. (2) Inservice teachers addressed significantly more key elements of educational technology integration and implementation principles in their essays. (3) In decision making, inservice teachers focused measurably more on the use of technology as a learning tool and the importance of professional development while preservice teachers emphasized neutral topics such as the ubiquitous nature of computers and access to hardware and software.

Introduction

Selecting the most effective instructional approach, including teaching with technology, is a challenging task for many teachers. A deeper understanding of how teachers prioritize issues and make decisions about their instructional programs is crucial in developing professional development in technology for classroom teachers and future teachers. This paper will present data on how experienced and novice teachers differentially make technology integration decisions. To enhance future teachers' conceptual foundations and decision-making skills on infusing technology into the curriculum, two PT^3 grant recipients have co-developed simulations of technology implementation scenarios commonly encountered in K-12 classrooms (http://www.immex.ucla.edu). These computer-based simulations span a range of technology infrastructure, curricular content, school systems and instructional issues. An opening scenario is first presented providing a problem context. Then teachers select menu items and analyze data to reach their decisions and concurrently the IMMEX problem-solving assessment system records each menu-item selection in chronological order. Additionally, the software generates a map that illustrates teachers' step-by-step problem-solving approach, which guide assessment and metacognitive development (Underdahl, Palacio-Cayetano, & Stevens, 2001). Upon completion, teachers compose a written justification online for their decision to integrate or not integrate technology. Teachers' essays are scored based on the number of *e*ducational *t*echnology *i*ntegration and *i*mplementation *p*rinciples—eTIPs—addressed (Dexter, 2002).

Purpose and Objectives

While the eTIPs-IMMEX simulations have been primarily used as an instructional aid in preservice curricula, we conducted a comparative analysis of preservice and inservice teachers' decision-making strategies on eTIPs computer-based simulations to examine the impact of experience on technology integration and implementation. The following two questions guided this investigation.

1. What are the primary considerations of both experienced and novice teachers when deciding whether or not, or to what extent, to integrate technology into instruction?
2. How do experienced and novice teachers differentially make technology integration decisions?

Theoretical Framework

While rapid advances in technology and the proliferation of computers in school have expanded pedagogical options for educators, teachers continue to struggle with how and when to integrate and implement technology effectively into instruction. According to Pierson (2001), schools are so eager to purchase and have teachers begin using technology, that they mistake simply having and turning on a computer as integration. However, merely knowing how to use a computer is not sufficient to ensure that teachers will effectively integrate technology into the learning curriculum. Instead, a teacher who effectively integrates technology is able to draw on extensive content knowledge and pedagogical knowledge, in combination with technological knowledge, when using technology in the classroom (Pierson, 2001).

One challenge facing teacher education programs today is preparing teachers to use technology effectively in schools (Wedman & Diggs, 2001). Using problem-solving scenarios such as the IMMEX software program can provide pre-service teachers with an appropriate context in which to construct knowledge about technology integration. The IMMEX scenarios allow students adequate opportunities to learn to teach with, not just operate, educational technology (Dexter, 2002). The eTIPs IMMEX-powered cases challenge teachers to apply their knowledge of the following six principles when integrating technology.

Educational Technology Integration and Implementation Principles: eTIPs

eTIP 1: Learning outcomes drive the selection of technology.

eTIP 2: Technology use provides added value to teaching and learning.

eTIP 3: Technology assists in the assessment of the learning outcomes.

eTIP 4: Ready access to supported hardware/software resources is provided.

eTIP 5: Professional development is targeted at successful technology integration.

eTIP 6: Teachers reflect on, discuss, and provide feedback about the role of and support for educational technology.

Data Sources

Data was collected from 134 written responses from a random sample of a combination of 67 credential candidates and 67 inservice teachers were analyzed. Preservice teachers solved the eTIPs cases as part of a Technology in Education course assignment at a university in California. Similarly, inservice teachers performed the eTIPs cases as a requirement for a 120-hour educational technology professional development program.

Methods

eTIPs IMMEX-Powered Cases

As part of a Department of Education grant, two PT^3 investigators have co-developed computer simulations of typical classroom technology implementation scenarios to enhance future teachers' conceptual foundations and decision-making skills on infusing technology into the curriculum. The eTIPs Cases IMMEX-based simulations are an expansion of the case-based problem solving in content-specific disciplines continuum developed at the UCLA School of Medicine in the mid 1980's (Stevens, Lopo, & Wang, 1996). The eTIPs IMMEX-powered cases span grade levels, curricular content, and technology readiness. Using online instructional cases can provide preservice teachers with an appropriate context in which to construct knowledge, providing multiple opportunities to practice their instructional decision making about technology integration. These simulations are meant to supplement, not supplant, teachers' classroom-based integration experiences. Using these scenarios as exercises provides a common point of experience that allows discussion about goals and approaches for technology integration. Intrinsic to IMMEX problem solving is the concurrent tracking of menu-item selections as users research data to solve problems posed in the prologue. Below is a representative sample of a prologue that introduces teachers to the technology integration dilemma.

"You are in your second year teaching English at West Bend Junior High School, a grade 7/8 school that features "looping." That is, you, and the other three members of your interdisciplinary team work with the same group of students during both of their years at the school. A special grant the school received has provided new technology resources for you and your students. You are in the process of planning units on persuasive writing and informative writing for second quarter and want to consider how this technology might best support teaching and learning in your classroom. For end of the unit assignments your students are expected to complete authentic writing projects that can demonstrate their progress toward the State's content standards. You need to make a decision this week about when and how, or even whether, to integrate educational technology resources into one or both of these two writing units. After you have used the menu items to explore the information provided in this case, state your decision about whether or not to integrate educational technology resources into your classroom in the "Solve" menu item. If your decision is to integrate, also describe how you would do so. Use information from the case to explain and justify the answer you submit. "

Scoring of Teachers' Essays

Teachers' essays were scored based on the number of *e*ducational *t*echnology *i*ntegration and *i*mplementation *p*rinciples—eTIPs—addressed (Dexter, 2002). We examined the quantity and quality of information written by the two groups of teachers. Each sentence in the essays was tagged for key elements of eTIPs incorporated. Depending on the depth of the answer, an essay can receive a maximum 12 points, receiving up to two points for each of the six eTIPs. We used the following criteria to determine the essay's score on each of the six eTIPs.

Zero– when the teacher makes no reference at all to the substance of the eTIP;

One– when the teacher makes a general reference to the substance of the eTIP, or implies consideration of the eTIP; and

Two– when the teacher discusses a specific eTIP comprehensively and provides supporting details from the information presented in the case.

The following is a sample essay written by a teacher that was assessed using the above scoring guide.

"The technology assignment to support the authentic writing English projects should be integrated starting in the Fall *(Technology Implementation/Planning = eTIP 1)*. The teachers have time in their schedules to implement the program. They also have enough technology *(Hardware Access = eTIP 4)* shared or otherwise to support the English project. Furthermore, the students seem well prepared to focus their assignment on the computer. All students have had computer software and training since seventh grade *(Prerequisite Skills = eTIP*

2). This will ensure a first year success on the project in the classroom. Next, administration, colleagues, teachers, and the community really seem to support the technology assignment. *(Administrative Support = eTIP 4)* In-services, activities, and mentor programs are all available to new and veteran teachers *(Professional Development = eTIP 5).* Last, the resource information supports the standards component for integrating technology into the English curriculum *(Standards = eTIP 1).* Research findings, complex reasoning, mind tools, and software reviews are all available to lend a helping hand to new programs that these English teachers may want to integrate *(Reflective Teaching = eTIP 6).* I say yes to the integration. I say have a meeting in the summer before school starts and get this curriculum up and running."

This essay was assigned a score of *ten*. The teacher addressed eTIPs one, two, four, five and six that are indicated in parentheses. Since the teacher included one key element for five eTIPs and provided supporting details from data presented in the simulation, the teacher was awarded the full two points for five out of six eTIPs. However, like most teachers, this teacher did not address the use of technology for assessment, eTIP three.

Results

IMMEX-generated maps of decision-making strategies by preservice and inservice educators indicated that most teachers examined the majority of the information in the problem space and most appeared to do so in a sequential manner through the menus. While there were few item-selection differences between the groups, inservice teachers addressed significantly ($p < .05$) more eTIPs in their essays than preservice teachers. Preservice teachers were also more likely to mention more neutral topics such as the ubiquitous nature of computers, impact of technology on teaching, etc., than were inservice teachers. There was an equal frequency of mention of hardware, software and standards. The listing of most frequently mentioned issues collected from the essays is shown in Table 1. These data indicate that although the two groups accessed the same data from the simulations, the experiences of the inservice teachers influenced the perception of the simulations and the decision justifications.

eTIPs Key Elements	Number of Times Mentioned by Teachers	
	Preservice	Inservice
Technology Implementation Planning/Curriculum	11	35
Computer as Learning Tool	14	28
Prerequisite Skills	14	20
Cooperative Learning	10	20
Professional Development	4	12
Technical Support	8	15
Linking Curriculum to Technology	0	6

Table 1: Preservice vs. Inservice Teachers Differential Emphases on Key Elements of eTIPs

Importance of the Study

Despite the significant investment in technology and professional development in recent years, it is still uncertain how teachers make the decision to integrate technology or not and to what extent (Zhao & Cziko, (2001). What are the primary considerations experienced and novice teachers use when deciding whether or not, or to what extent, to integrate technology into instruction? We pursued this question by examining experienced and future teachers' written reflective analyses of decision making in conjunction with IMMEX search-path maps of step-by-step decision-making approaches on computer-based simulations that span a range of classroom scenarios. The observation that preservice teachers are inclined to focus on access to technology and marginally consider crucial dimensions of learning with technology such as technology implementation planning, prerequisite skills, and characteristics of learners suggests curricular areas in need of increased emphases in educational technology curricula. Instructors can utilize data attained from teachers' performances on eTIPs IMMEX-powered cases to design instructional interventions and refine curricular content for future educational technology courses.

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Inventing New Strategies for Integrating Technology into Education

Anthony Petrosino, The University of Texas, US
Jere Confrey, The University of Texas, US
Paul Resta, The University of Texas, US
Melissa Tothero, Project INSITE, US

The purpose of the PT3 grant *Inventing New Strategies for Integrating Technology into Education (INSITE)* is to develop a scalable model of a technology-infused educational program for the next generation of middle and high school teachers of mathematics and science. *INSITE* brings together key players from the core content courses, professional sequence courses, and field experiences; facilitates collaboration among these key players; and provides the technology-related expertise they need to model exemplary educational technology in science and mathematics. The graduates of the program have internalized a vision of mathematics and science education in which technology is an integral part of the teaching and learning process. They have seen the critical role technology can have in shaping all aspects of scientific and mathematical thinking: its conduct, methods, records, evidence, collaboration and dissemination. *INSITE* represents a commitment to systemic change, initiated by a consortium from the Colleges of Education and Natural Sciences of the University of Texas and the Austin Independent School District (AISD).

Research shows that cw teachers will not be able to initiative or sustain the use of technologies in schools unless it is a critical and enduring part of their preparation (President's Committee of Advisors on Science and Technology, 1997; Office of Technology Assessment, 1995). They will not develop critical capacities to evaluate effective and ineffective uses, nor to learn efficient techniques of integration, unless their university experience integrates in all aspects of their preparation. They will not understand the pernicious effects of the Digital Divide on access to technological careers, unless the witness effective programs to be the needs of the children of the working poor. To meet these challenges, INSITE has partnered with UTeach (http://www.uteach.utexas.edu), a highly successful secondary preparation program, to create a seamless teacher preparation program to span all four years of the students' undergraduate experience. It will include the implementation of a digital portfolio assessment and institution of an annual evaluation and planning cycle by a Technology Leadership Team.

The UTeach program has been immensely successful. Currently there are 230 students in the UTeach Program, with an overall retention rate of 72.6%. In Fall 1999, 40 new students entered the UTeach Program. Of these new students, 80% continued on to the next courses in the program for Spring 2000. The first cohort of 28 students was selected for UTeach in the fall semester, 1997. By the spring of 2000, UTeach enrollment has grown to more than 200 with 40-60 new students being accepted into the program each semester. Retention rates for UTeach students have been far better than for their undergraduate peer group in the College of Natural Sciences. This success is due to aggressive recruitment of students at all levels, financial benefits, pervasive field experiences, one-on-one interactions with master and mentor teachers and a revised, enhanced sequence of education courses directed at math and science teaching. We expect UTeach to grow to 500 students by the 2002-2003 academic year.

Although the UTeach program has experienced marked success, its integration of technology was not originally as effective or ubiquitous as desired. We have been hampered in finding school-based sites that reliably use a broad array of technologies in creative and resourceful ways. Faculty in the sciences still question technologies use in developing basic concepts with students and thus use it sporadically. While technology has been integrated in the initial pedagogical courses, growth in the program has threatened the continued and enhanced use of technology as it is embedded in curricular initiatives. Because these courses and student teaching depend on field components, prospective teachers must be given the opportunity to observe and to practice integrated technology in their field experience. These sites of practice must include contrasting types of schools to ensure that technological disparities do not continue among poorer children.

To this end, INSITE has provided support for faculty in the colleges together with cooperating teachers to plan a technology-rich teacher preparation program. With the assistance of PT3, UTeach has become an exemplary model program of teacher preparation in science and mathematics. UTeach is now poised to have a major impact for the country.

INSITE has four major goals to help facilitate technology infusion within an exemplary teachers development program:

1. To intensify, extend and enrich the use of technology as a modeling, visualization, data representation, symbol manipulation and collaborative tool in introductory courses for mathematics and science majors.
2. To institutionalize and fully implement the integration of technology in the three mathematics and science education professional development courses

3. To establish an expanding cadre of mentor teachers who can provide our students access and experience in multiple sites of best practice using exemplary technology, particularly with urban and rural populations
4. To establish an intensive collaborative Technology Leadership Learning Community among all teacher-educators in the UTeach program, to plan for technology infusion, establish an integrated program, and share expertise.

Evaluation

The evaluation plan for the INSITE project is based on the Goals and Objectives of the total scope of the project. A brief description of the Evaluation Design as it relates to each of the project goals. Full results will be presented at the Conference Meeting.

Goal I: *To intensify, extend and enrich the use of technology as a modeling, visualization, data representation, symbol manipulation and collaborative tool in introductory courses for mathematics and science majors*

The course syllabi for every content and methods course in the teacher-preparation sequence will be examined as a means of documenting instructional and course activities and requirements for technology integration. Student products will also be examined to determine if students are learning to integrate technology with the teaching and learning process. Both completion of projects and types of technology featured in the projects will be monitored. Formative and summative course evaluations by students will provide additional data.

Every preservice teacher candidate will have a Student Portfolio in digital format. These portfolios will examined to ensure each contains designated technology components. A panel of experts comprised of Methods and Content Instructors and Technology Integration Specialists from both UT and AISD will use a Delphi-voting process to reach consensus on the content of a performance-based student assessment drawing from the NETS, TEKS, and SBEC requirements for preservice

Goal II: *To institutionalize and fully implement the integration of technology in the three mathematics and science education professional development courses*

The influence of course instructors on their students will be measured by how well preservice teacher candidates perform on the Student Teacher Final Evaluation process on the section related to technology integration. Also, by the end of the Professional Development Sequence, preservice teachers will be required to complete technology-enhanced lesson plans. Completion of these and their descriptions will be documented in the Student Portfolios (digital format).

Goal III: *To establish an expanding cadre of mentor teachers who can provide our students access and experience in multiple sites of best practice using exemplary technology, particularly with urban and rural populations*

Focus groups of mentor teachers will be formed to aid in the development of a top-quality teacher preparation program in integration technology. School district records will also be kept and monitored to document the number of mentor teachers prepared and the number of teacher candidates being served. Evaluation data will be collected from semi-structured interviews with mentor teachers, UT faculty, student-teaching supervisor, and the students themselves. As a means of providing follow-up information about these teacher candidates and whether they continue to use technology integration in their teaching, an electronic survey will be conducted via the on-line conferencing system. The quality of the Units of Practice and the structure of the portfolio design and assessment will provide additional data.

Goal IV: *To establish an intensive collaborative Technology Leadership Learning Community among all teacher-educators in the UTeach program, to plan for technology infusion, establish an integrated program, and share expertise.*

Outside reviewers will examine samples of student portfolios blindly and compare their evaluations. A rubric, currently under development, will be utilized to incorporate aspects of content domain, educational technology and learning theory in order to provide needed feedback to the students. The portfolios will become objects of reflection and revision by the participating UTeach students as they receive feedback from UTeach faculty and staff. The portfolio will serve both a formative as well as summative assessment component. We will make the rubric available at our proposed website in order to assist other universities in assessing their own use of multimedia portfolios.

Our intent is to present the results of project INSITE through the Fall 2001 semester. In addition to the four goals we will also present the results of extensive clinical interviews with our PT3 Fellows as they engage in their first full semester of incorporating technology into their existing practice.

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Transforming Activities with Technology: Professional Development in Preservice Education

Joseph L. Polman
College of Education
University of Missouri-St. Louis
United States
polman@umsl.edu

Jan Mastin
College of Education
University of Missouri-St. Louis
United States
Jan_Mastin@umsl.edu

Katherine Beyer
Educational Visions
United States
kmbeyer@att.net

Abstract: In professional development work with preservice teacher educators at the university, we have tried to take seriously the constructivist notion of beginning from where the faculty are, and building towards more and more sophisticated and elaborate possibilities for integrating technology. The teaching practices and activities faculty have been using represent important aspects of their knowledge and capabilities, as well as a tangible foundation on which to build. Focusing on the activities and practices with which faculty begin offers us the opportunity to develop new practices that those faculty take ownership of, while transforming the activities to include technology as a tool. In this paper, we focus on productive processes of change from our faculty's existing teaching and learning activities and practices toward activities enhanced by technology. These models of the transformation of teaching practice are meant as examples of how meaningful change can successfully be undertaken.

Educators generally agree with the constructivist notion that schoolchildren learn through the active construction of knowledge, based on their present understandings, rather than simply absorbing whole ideas transmitted to them. Too often, professional development efforts with faculty of education ignore this truism. In the Preparing Tomorrow's Teachers to Use Technology (PT3) project at the University of Missouri-St. Louis, we have tried to take seriously the notion of beginning from where the faculty are, and building towards more and more sophisticated and elaborate possibilities for integrating technology.

Researchers in the cognitive and learning sciences differ to some degree in their ideas about the mechanisms of learning, but a common recommendation to foster learning is a process of inquiry, including planning, action, and reflection (e.g., Bransford, Brown, & Cocking, 1999; Bruer, 1993; Polman, 2000). Researchers in the sociocultural tradition (e.g., Wertsch, 1998) built upon the work of Vygotsky (e.g., 1978) and Bakhtin (1981) have stressed the notion that learning occurs through action carried out in the world, with the social support of other individuals and the support of cultural tools such as language, the practices that have been handed down, and other mediating artifacts like books and computers. In our professional development work with preservice teacher educators, the teaching practices and activities they have been using represent important aspects of their knowledge and capabilities, as well as a tangible foundation on which to build. Focusing on the activities and practices with which faculty begin offers us the opportunity to develop new practices that those faculty take ownership of, while transforming the activities to include technology as a tool.

During an early meeting in the 1999-2000 school year, our first group of participating full-time and adjunct university faculty began developing a "Technology Integration Menu" with the support of PT3 staff. In the group meeting, examples of activities and practices incorporating technology were brainstormed. A set of five broad emergent categories of activities was determined from the brainstoming, and after the meeting a written checklist of activities was created for use by each faculty member in the project. The written menu has been modified and expanded over the past two and a half years, but the basic structure has remained. Table 1 summarizes the categories and gives an example from each:

"Menu" category	**Example "menu" item**
A. Electronic communications	Discussions on the university-provided course web space (a version of Blackboard)
B. Electronic publishing	Posting a syllabus online
C. Integrating technology	Asking students questions that require them to look at instructor-provided websites or CD-ROMs
D. Electronic assignments for students	My students will create a PowerPoint presentation
E. Faculty projects that use technology	I will research the internet for web sites for my students to use

Table 1: Summary of "Technology Integration Menu"

In subsequent individual meetings, PT3 staff used the technology integration menu as a starting point for discussions with faculty members on ways they could take what they are already doing and, by using technology, enhance it. That process has continued with new groups of 5 to 9 participating full-time and adjunct faculty joining us as a cadre each fall and winter semester. Each semester, we have several meetings with the participating faculty, including some opportunity to check in on progress and share ideas.

Table 2 summarizes a number of the possibilities for the transformation of existing practices of our university faculty to technology-enhanced practice. Some of the items, including putting syllabi online (Table 2, item 3) and converting lecture overheads to a computer-based medium (Table 2, item 1), are relatively easy for faculty to undertake, and relatively common. They result in little substantive change in opportunities for the learning of students, although they do provide a context for some faculty to familiarize themselves with a technology they have never used, and a flexibility in access to information for students in the class. A few instructors who take these steps are uncomfortable or unwilling to move beyond them to more ambitious change.

		Previous Practice	**Technology-enhanced practice**
A.	1	Lectures with overheads	Lectures with PowerPoint
	2	Face-to-face group discussions during class	Online discussion boards or email listserves between class meetings
B.	3	Paper syllabus handed out first day of class, and assignments later	Syllabus and assignments posted online
C.	4	Paper multiple choice tests given during class	Online multiple choice tests given outside of class
	5	Lesson plan development	Lesson plan development incorporating web resources and/or PowerPoint template to scaffold student learning
D.	6	Multiple, separate, activities in a PE class	An integrated, scenario-based WebQuest incorporating web resources
	7	In class, group, oral review	Individual review to create PowerPoint summarizing class, followed by class presentation and discussion
	8	Separate papers and written assignments on school philosophy, school setting investigation, and school curriculum	An integrated WebQuest in which students act in the role of a committee starting a new charter school

	9	Group project on developmental psych topic, resulting in a paper	Group project on developmental psych topic, resulting in an annotated web site and resource for others
	10	Local history project resulting in a paper	Local history project incorporating digital camera photos taken by students, posted on the web by instructors.

Table 2: Transformations of practice

The instructor who has replaced multiple choice tests given during class time with equivalent online tests (Table 2, item 4) has not changed that pedagogical event itself drastically, but his purpose in doing so is to free up class meeting time in an introductory course for more active learning strategies.

> My students won't be doing anything but online testing from now on. I'm trying to move lower level information to technology so I have more time in class. The tests are timed . . . honor system . . . over several chapters at once. (The program) draws from a pool of questions so every student gets a random set of different questions.
>
> (Evaluator notes, Fall PT3 Faculty mtg., 2001)

Online discussions taking place *between* class meeting times (Table 2, item 2) have taken a number of specific forms within our faculty, but have a number of attractive features in common. In contrast to in-class face-to-face discussion, the asynchronous nature of online discussion allows for greater participation by *all* members of the class. One faculty member commented that students are less inhibited and more direct and honest in their questioning online, echoing the findings from communications research (e.g., Sproull & Kiesler, 1991). Several instructors use class time after the online discussion to summarize the ideas presented, and address any issues that might need clarification. Despite the overall popularity of online discussions, several of our more reluctant faculty, particularly those with large classes, had concerns with keeping track of online discussions. Other faculty in large classes chose to limit the requirements for numbers of posts by rotating student involvement, and also devised means of students monitoring one another and reporting back to the instructor, rather than requiring in depth monitoring of all posts by faculty.

The PE instructor (Table 2, item 6) became interested in using online resources after our Director sent her a number of URLs of sites directly pertaining to her field of expertise. Some of those sites included WebQuests and units from a web site called "Filamentality." At a PT3 meeting soon after, some of our technology-using partner teachers from 4-6 classrooms talked about WebQuests and suggested that each instructor and preservice teacher should write one. These 4-6 classroom teachers were sold on the use and effectiveness of WebQuests and they passed on their enthusiasm to our faculty members at the meeting. That little push was all the instructor needed. She wrote a WebQuest that incorporated a number of activities that her students used to do out of context, into an interesting, scenario-based WebQuest.

Another instructor (Table 2, item 7) presented oral reviews and held class discussions toward the end of each semester to serve as a semester review. She decided that her students would retain more information if she had them create their own reviews in PowerPoint. The students prepare their presentation outside of the classroom, thoughtfully and actively processing information from the semester. They return to class and share their presentations with the rest of the students, teaching them what they have learned, thus making the information their own. A discussion ensues. Students also have an artifact that they have produced which could become part of their portfolio.

> It is a culminating activity which they synthesize in a powerpoint presentation (what they have learned). Even novices seem to be able to do this in about three hours of work. Students have surpassed the teacher. One student has a clip for cultural diversity. To me it is magic. Very nice and very professional.
>
> (Evaluator notes, Fall PT3 Faculty mtg., 2001

One instructor (Table 2, item 8) inherited a class that previously had students compose papers on school philosophy, investigate a school setting and study the issues surrounding a school's curriculum. This instructor decided to write a WebQuest to incorporate all those things. Now, instead of having a number of somewhat disjointed assignments, the students are approaching a problem as if they were on a committee coming together to start a new charter school. All of the above mentioned issues are addressed in the WebQuest, in an interesting, real-world approach to school site issues and philosophy. These ideas found their origin in a fall PT3 faculty meeting after an initial discussion with one of the PT3 staff.

> 1st Instructor: I could do "Designing A School" (WebQuest), in a social reconstructivist manner. (The program) could approach each of the core philosophies and how would you approach this from an existentialist perspective or . . .
> 2nd Instructor: Each group could do a different one . . . use the PBS series for informing school design or curriculum . . .
> 1st Instructor: They use Ed Week, NEA abd AFT sites, and the ASCD site . . . Is it possible to design a WebQuest that could be done simultaneously with different levels of students? It would be a neat group portfolio piece.
> (Evaluator notes, Fall, 2001)

Several instructors enhanced assignments by providing the opportunity for publishing the resources. The instructor of the developmental psychology class (Table 2, item 9) transformed a paper assignment written for grading by the instructor into a web research assignment resulting in a networked resource for the students own and others' future use. The secondary social studies methods instructor (Table 2, item 10) enhanced a local history project with digital photography as well as the opportunity to post materials online for later reference and use.

Finally, a number of instructors (Table 2, item 5) in advanced courses have students develop lesson and unit plans, and increasingly these must include web resources. These may be further enhanced by technological scaffolding built into document and presentation templates.

> Best experiences so far have been to go onto the internet and find a good lesson plan and find a unit with lesson plans. They were shocked at what they found. They found incoherent units and lesson plans. This was a good experience because they are always looking for an easy answer.
> (Evaluator notes, PT3 Faculty Mtg., Spring 2001)

In previous work presented at SITE (Polman, Mastin, Beyer, & Navarro, 2001), we described our efforts at systemic reform to support technology integration by preservice teacher educators. In this paper, we focus more specifically on productive processes of change from our faculty's existing teaching and learning activities and practices toward activities enhanced by technology. These models of the transformation of teaching practice are meant as examples of how meaningful change can successfully be undertaken.

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A Different Approach to Professional Development: Teacher Education Faculty Meaningfully Engaged in a Pre-service Technology Course

J. Aaron Popham
Dean's Office, McKay School of Education
Brigham Young University
United States
aaron_popham@byu.edu

Rebecca H. Rocque
Department of Instructional Psychology and Technology
Brigham Young University
Unites States
rocquere@mstar2.net

Abstract: This study looks at a different approach to professional development of higher education faculty. Faculty members were asked to participate in a preservice technology course. Forty-nine faculty members accepted the invitation and took the course during Fall Semester 2001 or will take the course during Winter Semester 2002. Interviews and focus groups were used to find the impact participation in this technology course had on the faculty members' attitudes toward technology integration in teacher preparation courses as well as their use of technology in their own teacher preparation courses. Our preliminary study found that faculty members are accepting of and will excel in this model of professional development.

Introduction

This pilot study reports on one component of a larger PT3 grant project focused on the integration of technology into the teacher education program at a large western university. One goal of the PT3 grant is to help teacher education faculty develop skills in technology use, model the proper use of those skills to preservice teachers, and implement technology assignments in their courses. Over the past year, as the faculty worked together on committees, participated in workshops or talked informally, the topic of technology integration became a common conversation. Faculty wanted to know what their students knew, what technology skills they had, how to gain these skills themselves, how to change their curriculum and how to create meaningful assignments that used technology. Over and over again, the instructors for the IP&T 286 course were approached with questions, suggestions, and requests for help. On a whim, one instructor said, "I think everyone should take the technology course along with the students." As we thought about this idea and discussed the possible ramifications, it seemed like a great possibility. With the support of the IP&T 286 course instructors, the PT3 project directors, and with minor adjustments to the course curriculum the idea blossomed into a viable plan. As part of their professional development faculty were invited to complete the technology course required for all pre-service teachers. Participants agreed to:

- Complete course assignments and develop "products" for use in the pre-service courses they teach.
- Model the use of these "products" in pre-service courses.
- Create assignments for their students in their pre-service courses during Winter Semester 2002 that use the skills gained in the technology course.
- Participate in focus groups to share their experiences in learning and then in using technology in their courses.

Data Collection

The data collection for this pilot study has been qualitative in nature. Focus group interviews, classroom observations, and examination of course syllabi were used as tools. Comments to PT3 grant leaders from the faculty during the course have been reviewed and reported. While the larger study is focused on the process of change for the entire teacher education program, this study reports on the faculty who volunteered to complete the technology course required for all preservice teachers in the current program. The primary research questions include:

I. Is the faculty-as-student taking the technology service course model effective for professional development of higher education faculty in a teacher preparation program?

II. Does it promote change in the use of technology in participants' course syllabi and assignments?

III. Is this model more effective than traditional workshops and seminars in helping faculty integrate technology into their courses?

The following is a list of questions developed for the focus group and individual interviews.

Group A: Questions Regarding the Technology Course Curriculum

1. What are your feelings and observations regarding the curriculum in the IPT 286, preservice technology course?
2. What are some of your successes with the content/curriculum?
3. What are some of your failures/frustrations with the content/curriculum?
4. Are the skills taught/gained relevant to the McKay School of Education pre-service teacher preparation program?
5. Are the skills taught/gained relevant to your course(s)?

Group B: Questions Regarding Personal Change

1. How have your ideas/thought processes regarding the use of technology changed due to your experiences in IP&T 286?
2. Are you or have you changed your teaching and content delivery methods in any way because of your IP&T 286 experiences?
3. Has being in the same classroom as your students allowed you to better relate to them?
4. Has having the shared IP&T 286 experience started new conversations between you and your colleagues?
5. Have you worked with other colleagues while completing assignments?
6. Are you discussing curricular and/or program changes?
7. What have you learned together?

Group C: Questions Regarding Curricular Changes

1. Do you feel you can change your curriculum to use the skills/knowledge/understanding you have gained?
2. Are you going to change your curriculum to use the skills/knowledge/understanding you have gained?
3. What are you or have you changed in your curriculum and/or assignments because of your IP&T 286 experiences?
4. Do you feel you better know what you can expect from your students in their use of technology?

Group D: Questions Regarding Program Changes and the Faculty-as-Students Model

1. Do you see the potential for program changes based on your IP&T 286 experiences?
2. What kind of program changes would you propose based on your IP&T 286 experiences?
3. Do you think that the faculty-as-students taking the technology services course model is a good one?
4. If you participated in last years traditional workshop training, compare and contrast the differences.
5. Is the faculty-as-students taking the technology service course model better? Why?
6. Is the traditional workshop model better? Why?
7. Why do you feel one is better that the other?
8. Which do you feel you learned the most in? Why?

9. Which has had or do you think will have a greater impact on your teaching methods and curriculum?

Group E: Questions Regarding Miscellaneous Ideas

1. What were you hoping to learn? And have you?
2. What were you expecting the course to be like? And was it?
3. What roadblocks have you run up against? What were your greatest successes?
4. What kind of preparation do you recommend for faculty-as-students prior to taking IP&T 286?

Results

Forty-nine faculty members have agreed to complete the technology course; 28 Fall Semester, 14 with a possibility of 4 more Winter Semester for a total of 18, and 3 more have committed for later semesters. Seven percent of the faculty members who enrolled Fall Semester have dropped from the program; one left the faculty and returned to the K-12 arena full-time and the second retires in a year and felt the work was not worth his time. Sixty-one percent of the faculty members, who enrolled Fall Semester, have completed the course with 25-30 percent completing the assignment on time. Thirty-two percent of the faculty have felt a time crunch and are spreading the course over the duration of both Fall Semester 2001 and Winter Semesters 2002. From the interviews and focus groups it was found that 64 percent of the faculty felt that the course should be spread over a period of two semesters for faculty. The course work was too demanding with their existing teaching and research responsibilities. The faculty members suggested that having an optional weekly seminar would be helpful. This would allow them to meet with the course instructor or a teaching assistant to ask questions and get additional help with assignments. This would also create an atmosphere of communication and collaboration with the group. A natural peer lead support system would also be created.

Results of the Focus Group and Individual Interviews:
Twenty-two of the 28 faculty members enrolled in Fall Semester participated in an interview or focus group. One faculty member missed her focus group, the two that dropped opted not to participate, and the last three didn't have enough of an experience to warrant comment.

Group A:
From this group of questions the focus was on questions four and five that concentrate on the relevance of the technology course's curriculum to the pre-service preparation program and the faculty member's course in general. The feeling was that the course has great relevance as a whole. There was concern regarding two of the modules; those being HTML coding and HyperStudio. Many faculty members didn't feel there was any relevance for HTML coding to their courses in particular. Of the 22 interviewed 17 struggled with the HTML module to the point of wanting to give up the project. On the other hand all 22 found the Microsoft Office module extremely relevant, most particularly PowerPoint.

Group B:
From this group of questions the focus was on questions one and two that concentrate on the changes in individual faculty members' thought processes regarding the use of technology and their teaching methods. It was found that most of the faculty had already begun to rethink their uses of technology in their courses prior to this experience. However, participation in this course solidified their resolve to make changes to their own courses. It also gave them the confidence and the needed technology skills to make the desired changes. Sixteen of the 22 plan on adding or expanding the use of PowerPoint in their course, either for personal use or as assignments for their students. The entire group is considering some type of electronic communication.

Group C:
The primary focus in this group of questions was on whether or not the faculty members better understood the knowledge and skills their students brought to their courses. This was a resounding yes. All of the faculty felt they could hold their students to a higher standard and ask more of them with regards to technology use and integration. They felt they could include more technology requirements in various assignments. Many didn't feel that they would change their present curriculum significantly to better take advantage of their newfound skills nor the skills the students bring to the table.

Group D:
This group of questions received a lot of time in the interviews and focus groups and was thoroughly explored. Twenty of the 22 felt participation in the pre-service technology course was an excellent form of professional development. Over all, this was an extremely positive experience for the faculty with very few frustrations.

The faculty were asked to compare this experience with other traditional workshops/seminars they had participated in. They felt that the traditional model (workshop/seminars) heightened their awareness of available technologies and possible uses but didn't allow them the time to learn the skills needed to incorporate the use of these products into their courses. Many times following a traditional workshop/seminar they felt frustrated as they returned to their offices to try and use what they had seen. For most, they couldn't make the technology work as they had seen it demonstrated. Many of them abandoned trying to use technology because they didn't have the time nor the patience to figure it out.

The faculty found participation in the pre-service technology course a wonderful experience because they could learn at their own pace with the guided tutorials and help from computer lab assistants. The tutorials gave them something to refer back to and they had constant teaching assistant help when questions or problems arose. They have been able to generalize the skills gained to their everyday lives. One faculty member learned how to use several software packages that he had at home and had no idea previously how to use them. Learning how to use them made him extremely happy. The faculty member had bought the computer so he could work from home but was unable to use the technology; now he has the skills and confidence to succeed.

Group E:
This group of questions concentrated on the learning desires of the participants and whether or not they were met. The first and foremost goal of all the faculty members was to better understand the technology skills their students would bring to their course. They wanted to know if they could make changes to their courses and if the students could meet the expectations of those changes. They all feel they now know what to expect from their students. They can now say, "I know what is taught in the technology course and you can do this assignment." Some feel that they could make many small changes to assignments because they know their students should be able to do the work. From there the learning desires greatly deviated by individual. Power Point was the most desired technology skill wanted. The PowerPoint module gave them a basic knowledge, but some felt they needed more advanced applications to better use this tool. The greatest disappointment came for those seeking web design skills. Many felt the HTML coding module was too difficult and had no relevance because there are so many web-editors available for use.

Some comments made to the PT3 project director(s) and/or IP&T 286 class instructors as email messages are:

- The class has been very interesting and beneficial for me. (I have substituted many of the lab assignments to meet my personal interests and needs - but the lab assistants have no way of signing off on these - any suggestions?) Yes, it is difficult to be a student again especially meeting deadlines. (I haven't done so well here - certainly I wouldn't get an "A"!)

- I've been grateful for the accommodations Becky (the instructor) has made for us. She's allowed us to put HyperStudio on our laptops, which will be a great blessing as we're off campus for four weeks during the time those assignments are due. The lab aides have been very polite in my experience with them.

- Thanks for helping set this up for the faculty. (I think it would be helpful if the deadlines could be adjusted for faculty—possibly extending through two semesters rather than one. I know Roger has felt overwhelmed, but would be able to succeed if the time constraints weren't a factor.)

- I'm slowly making progress -- I just need time, doesn't everyone? I heard we could have HyperStudio put on our laptop -- so we can work at home. Who do I talk to about that?

- I have learned a bunch and want to finish up Winter. I would like to learn all that the course has to offer. I will be in touch with you after the first of the year. Thanks for the opportunity.

- Enjoyed the class on Wednesday. The timeline was great. The first assignments are helpful. I look forward to the rest.

- Thank you for your wonderful class. I have loved learning from you. I feel like you have become my treasured and respected friend. I can't believe how much I have learned in such a short time.

- I have some concerns about being able to finish this in one semester. Is it possible to extend it through next semester or do I need to just suck in up and finish it this semester?

- Well, I will tell you that I've decided not to do the class. From the packet and zip that was given to me, it seems that the information is presented for Apple/Mac, but I am a PC person, so I'm not doing the assignments. I admit that I did not take the time to find out if the assignments were also written for PC platforms. The reasons I didn't do this was most of the things that were part of the syllabus I already know how to do--I am very competent with word processing, clipart, word art, tables, formatting, etc.; I can use spreadsheets and databases, I can merge; I use PowerPoint for every class I teach; I've scanned documents; my family Christmas newsletter includes multiple columns, photos, clip art, calendar, etc.; so, I'm pretty technologically with it. I was hoping to learn about video editing and html--but not with a Mac. So, again, it might sound like I am whining and complaining--and in fact I might be. But the course is not going so well for me.

After receiving the last email above, a project member sat down with the faculty member and discussed her concerns. She was about to be the first dropout. The project member, with permission from the course instructor, restructured the assignments to better meet the needs of the faculty member. She was shown how to use the existing tutorials and class materials with her PC technology, which completely changed her outlook. The faculty member will focus on HTML and video editing. She will start producing her own class web site, which will take advantage of effective teaching videos she has produced with her video editing skills.

Conclusion

We have found in this pilot study that the faculty-as-students taking the technology service course model is an effective form of professional development for higher education faculty in a teacher preparation program. The faculty has found that they have been able to better learn the technology skills presented to them and that they have found ways to better generalize those skills to their own courses and research. The traditional conference/workshop model opens their eyes to possible uses of technology, while the faculty-as-student model gives them the skills needed to produce technology enhanced products, model those products, and write meaningful assignments for their students. Twenty of the 22 participants in focus group and individual interviews recommended the continual use of this model and would recommend the model for use at other institutions of higher learning. Some modest changes have been planned for Winter Semester courses and assignments by faculty who participated in the technology course. One of the most valuable outcomes of this project has been the open communication between faculty members across several departments. As they have worked on assignments together and met with the course instructors, students, and each other many barriers have been removed and they look forward to a continuation of learning and working together. The IP&T 286 course instructors as well as the teaching and learning support center director and teaching assistants are more open to faculty suggestions and the faculty are more willing to try new technology in their own courses. More time will be needed to measure the extent of the impact this experience will have on the faculty members as they continue to revise their curriculum and assignments to include technology. The positive response to the faculty-as-students model shows the need for further research in this area and further development of this model for faculty development.

Infusing Technology into Preservice Teacher Education:
An Evolution in Methodology

Margaret A. Price, College of Education, Texas Tech University, USA, Peggie.price@ttu.edu

Patricia Herrera, PT3 Technology Specialist, Texas Tech University, USA, Patricia.Herrera@ttu.edu

Abstract: A teacher educator and technology specialist explore different methods of infusing technology into a secondary teacher education program over a four-semester time frame. They hoped to determine an effective methodology for infusing technology into the regular program and to determine if preservice teachers' self-awareness of classroom computer application was raised and if strategies of how they might apply technology skills within their future classrooms were valued. They found preservice teachers had varying levels of technological competency and their level of value for the strategies introduced in their teacher education course differed according to their self-identified competency levels. Implications for practice included implementing technology components on-site at technology rich public schools and allowing preservice teachers to apply computer application skills within the classroom.

Introduction

Technology and its classroom use has been a primary focus of education reform. National technology goals have been developed and continuously revised to meet accountability standards of various federal, state, and local governing groups (NCATE (1997), ITSE (2000), Texas Education Agency (1995), and others). As states and local districts implement standards-based initiatives to bring veteran teachers into the information age, future teachers must be able to show evidence of their technological skills.

Teacher preparation programs address the call for instructional technology in various ways. Whether requiring stand-alone courses within programs or infusion of use throughout regular course work, teacher educators are obligated to prepare students for classrooms they will soon enter. (Gillingham & Topper (1999), NCATE (1997), TEA (1995).

The Problem

Texas secondary teacher preparation programs are limited in the number of education classes required by the state governing board (Texas Higher Education Coordinating Board, 2000); therefore, many variations of "technology" coursework are accepted as meeting program requirements. In essence, secondary preparation students fulfill university technology criteria prior to entering certification programs. Students' experience of computer usage focuses on fulfilling course work requirements within their major college and rarely on applications classroom use.

The Purpose

Primarily the purpose of this study was formulation and implementation of an infused technology component into secondary teacher preparation courses. We also hoped to determine if preservice teachers' self-awareness of classroom computer application was raised and if strategies of how they might apply technology skills within their future classrooms were valued. The research questions guiding the study were:

1. What was the level of self-claimed educational technology competency of preservice teachers at the beginning of the semester?
2. How might the teaching team formulate lessons and activities, which might heighten preservice teachers' awareness of various technology usage as a planning/instructional tool?
3. How did the technology component within the class influence how preservice teachers might use technology in future classroom situations?
4. What was the level of self-perceived educational technology competency of the preservice teachers at the end of semester?

Contextual Setting

Over four semesters the teaching team (the teacher educator and technology specialist) conducted various activities with preservice teachers. The technology specialist designed and conducted a pre-test of self-perceived technology competencies. Throughout each semester the teaching team taught three to five technology lessons (hands-on, interactive instruction). Course requirements identified the submission of technology-informational and instructional activities for evaluation and inclusion on class web sites. The technology specialist conducted a post-test of self- perceived technology competencies. The teacher educator asked each class participant to address the value/non-value and possible future applications of the technology component in the students' final self-assessment of the class.

Methodology and Data Sources

The teaching team used a mixed methodology to analyze data collected from four semesters in which the technology component was infused into preservice teacher education classes (Miller & Crabtree, 2000). Simple descriptive statistics were used to analyze the demographic, pre and post-test data, as well as prescribed proficiencies on technology related assignments. Qualitative methodswere used to derive emerging themes of individuals' perceptions of value/non-value of the technology component within the framework of the teacher education class.

Pre- and post tests on self-perceived computer skills were taken each semester. Computer skill activities were designated as part of course curriculum and competency was assessed by the teaching team. Students were also asked to specifically address aspects of the technology component, which they deemed valuable/non-valuable in their final self-assessment of the course.

Results

Collectively, the demographic data revealed a typical population of preservice teachers: a majority were Anglo, female, middle class, and from within local geographic rural, urban areas (Lortie, 1975; Howey & Zimpher, 1989; Darling-Hammond, 1990). On the pre-test, 75% of the students identified their level of competency as computer literate, 11.2% selected "true beginners", 2.9% identified themselves "experts"; and 10.2% were unsure of their ability level. Post-test results saw a slight increase in self-perceived upper levels of competency, with a decrease in the "true beginner" category. Of the 68 students participating in the study, 54.4% did not participate in any field experiences 13.2% had 40 or more hours, and 32.3% had less than 25 hours.

From the preliminary qualitative data analyses, several predominant themes emerged. Flexibility for individual students and classes and a difference in perceived needs between students and the teaching team emerged as a strong theme for consideration. Changes were made to address needs of

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preservice teachers and to better utilize available technology resources within the university. We made adjustments in the curriculum to be more open for preservice teacher input of particular needs, eliminating some activities and adding others.

The teaching team identified themes of value/non-value which were particular to the self-perceived computer abilities of the preservice teachers. Of those who categorized themselves *as computer "experts"* the technology component had two reactions: non-value and less than valuable in terms of skills, yet valuable in terms of educational application. Of those who identified themselves as *computer literate*, the theme of awareness emerged of how technology can be used in the classroom. Frustration, gratitude and application knowledge emerged as preliminary themes from *the true beginners.*

Implications and Suggestions for Our Own Practice

One obvious implication gleaned from the preliminary data is modification of expectations and requirements for a heterogeneous classroom, where differing levels of competency require differing levels of assignments. Secondly, we must provide opportunities in the field for preservice teachers to experiment with, explore options, and apply the lessons and activities they are asked to complete. Perhaps what the teaching team has actually done is create a "stand-alone" set of lessons infused within a course. While the preservice teachers profess to "see" the need for and use of technology within the classroom, they will not entirely value it until it they can apply it.

Preliminary data will guide and direct the development of an instructional plan to present the ITPTE model (Infusing Technology into Preservice Teacher Education). In spring 2002 a cohort of undergraduates will be placed at a technology-rich middle school for blocked methods classes and 30 hours of observation, teaching and classroom interaction. The availability of adequate technology resources for instruction, plus the possible opportunity to implement technology applications within field experiences may give us a clearer direction on how better to infuse technology into teacher preparation classes.

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Results of a Study on Developing Learner-Centered Technology Assignments with Student Teachers

Joyce A. Rademacher, Jane B. Pemberton, & Tandra Tyler-Wood

Carefully designed infusion of technology into field experiences for preservice teachers can provide a formal teaching and learning approach that encourages future teachers to demonstrate and model proficiency in technology applications and usage. Thus, novice teachers will develop the ability to use available technology as a tool to enhance the learner's experience.

Ideally, appropriate technology infusion should give preservice teachers the opportunity to learn how to structure lessons, student projects, and student activities that are motivational, involve active participation, permit collaboration, emphasize content mastery, and individualize instruction. As these teachers enter the profession, they will have a unique set of skills and technology-related experiences that will empower them to be adept in their classroom environment. Additionally, these new teachers will know how to plan the equitable use of technology-related resources and build a dynamically networked learning community based on curricular needs and goals.

Using technology to enhance pedagogy is necessary in a Professional Development School (PDS) model where universities and school district personnel work in partnership to prepare technology-competent teachers. Learning how to infuse technology into lessons and assignments that will meet the needs of all members of the learning community requires explicit planning in order to be effective. Nothing can be more important for the student teaching experience than mutually shared goals between university faculty and district practitioners in regard to technology-related experiences that will benefit public school students.

As a result of a Preparing Tomorrow's Teachers in Technology grant (The Millennium Project ,1999), a district team teacher worked with university faculty in a PDS partnership to assist student teachers in the development of learner-centered assignments.
A learner-centered assignment is defined as an assignment that ensures equity in excellence for all learners (Texas State Board of Education, 1994) by including the characteristics of a high-quality assignment that is respectful of the needs of all learners while encouraging the use of their skills and talents (Rademacher, J.A., Deshler, D.D., Schumaker, J.B., & Lenz, B.K. (1998).

Team teacher planning and development activities that facilitated successful completion of assignments by the student teachers and their students were as follows: (1) The team teacher consulted faculty who taught content courses and helped them locate high-quality lesson plan sites, identify technology resources in the schools, and design the assignment completion guidelines the student teachers were expected to follow; and (2) Planning guidelines for the assignment were explained in the curriculum class and student teachers were taught how to use two planning forms entitled the Student Intern Planning Sheet and Approval Form and the Self-Evaluation of Student Choice Assignment form. These guidelines helped the student teachers design their assignments check their final product for quality.

Team teacher support activities that ensured student teachers were successful in the design and implementation of assignments with their students were as follows: (1) Student teachers were instructed to consult their mentor teachers for ideas and approval of assignments that were relevant to their particular student teaching setting; (2) District curriculum coordinators were invited to share ideas and resources with the student teachers; (3) Two days of "hands on" technology training was provided in the district technology lab to brainstorm project ideas; and (4) The team teacher provided ongoing assistance to the student teachers as needed while they developed their assignments. Student teachers were required to share their assignments during the last student teaching seminar.

Types of assignments varied according to student/mentor needs and interests. Example assignments included web pages, power-point presentations, Internet research projects, learning center assignments, brochures, and pet care guides. Student teachers and mentor teachers were very pleased with the final products and attributed their assignment completion success to the support provided to them by the team teacher. Students in mentor teachers' classrooms were also quite pleased with what they had learned as a result of the student teachers' assignment planning and implementation process.

A survey based on technology standards as defined by The International Society for Technology in Education (ISTE) was administered to these 31 preservice teachers three times over the course of the student teaching year. One part of the survey, Stages of Adoption of Technology (Christensen, 1997), asked student teachers to circle the stage that best described where they were in their use of technology at the beginning of the year before they completed their student teaching assignments. They were also asked to complete the survey mid-way through the year, and again at the end of the yea after they had used technology in their student teaching placements. The scale was as follows: Stage 1 = Awareness; Stage 2 = Learning the Process; Stage 3 = Understanding and application of the process; Stage 4 = Familiarity ; Stage 5 = Adaptation to other contexts; and, Stage 6 = Creative application to new contexts

Results were analyzed to determine if there was a change in the student teachers' attitudes toward technology and their level of confidence in using technology to enhance teaching and learning for their students. Survey results indicated that student teachers' felt more confident at the end of the student teaching year in contrast to the beginning of the year as to their level of confidence in adopting technology. Mean scores were calculated to show how perceptions had changed from the beginning of the year to the end of the year as follows. The differences in mean scores and how they changed from the beginning to the end of the year are as follows: Stage 1 Awareness = 4.0 to 6.0; Stage 2 Learning Processes = 4.4 to 4.8; Stage 3 Understanding and application of the process = 4.3 to 5.0; Stage 5 Adaptation to other contexts = 2.9 to 4.5; and, Stage 6 Creative application to new contexts = 3.3 to 4.5.

Conclusions from this research are as follows: (1) Opportunities for enriching technology experiences are possible for everyone during a PDS experience; (2) The assignment completion planning forms were helpful in designing and evaluating the components of a learner-centered assignment; (3) District support is needed and necessary in order to facilitate rich technology assignments for student teachers; and (4) Team teacher support should be expanded to increase technology integration opportunities for both faculty and students in the field.

Note: For a detailed explanation of the methods, procedures, and planning forms employed to develop and implement learner-centered technology assignments in a field-based setting, see the following reference: Rademacher, J, Tyler-Wood, T, Doclar, J., & Pemberton, J. (2001). Developing learner-centered technology assignments with student teachers, *Journal of computing in teacher education*. *17*(3), 18-25.

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Laptops in the Classroom: Mediating Power Between Students and Their Teacher

Judy Radigan
Department of Education
University of Houston
United States
jradigan@swbell.net

Donna Smith
Department of Education
University of Houston
United States
odlsmith@uh.edu

Tim Rosas
Department of Curriculum and Instruction
University of Houston
United States
tcrosas@hotmail.com

Abstract: This paper explores the work of a unique graduate math methods class that used its difficult start with laptop computers as an opportunity to develop teacher-student relationships that were supportive and collaborative. This teacher dropped the role of all-knowing lecturer to move among the students asking questions that drew multiple ways to express theories from students in a Sketchpad program. Instead of isolated work at computer stations, students carried their computers to each other's table to share this tool for knowledge building and the conceptual understanding of geometry. Observations in this classroom and two others found students sharing their developing skills, discoveries and experience with each other and their professors in an atmosphere that sometimes left the observers wondering who was the teacher and who was the student.

Introduction

This examination of the use of laptop computers in the college classroom began with a class that made clear why faculty members in many universities do not model use of technology (Mousand & Bielefeldt, 1999; Wetzel, 1993). The teacher's discomfort with the wayward touchpad curser on the laptop, the disappearing projected screen, and a challenging software program seemed to prove through their failure the truth of Groves and Zimmel's (2000) assertion that professors want computers and a software program that are easy to use and instructional technology (IT) support that makes their job in the classroom look easy. The students' distress with the roaming curser on their laptops' touchpads was equaled by their own unfamiliarity with the new software program. To these observers it seemed to be an example of a disastrous first lesson.

However, this instructor and her students turned their initial turmoil with the laptop computer and a new software program into an equalizing learning experience. They demonstrated the truth of Smaldino and Muffoletto's (1999) claim that students first gain understanding of applications through an in-depth examination of the way the program works in the classroom. This paper explores the work of a unique class that used its difficult start not as an obstacle but as an opportunity to develop teacher-student relationships that were supportive and collaborative. As the students' role in the decision-making process grew in the classroom, the roles of teacher and student became equalized (Holland, 1994).

Laptops as Power Mediators

Learning in schools is marked by a basic, concrete division between powerful teachers and the powerless students (Giroux & Penna, 1981). As students gained opportunities to problem solve and initiate activities, the powerful teacher as lecturer role shifted to one of teacher as mediator in the graduate methods class on geometry. After two class periods, the laptop computer forced the professor to move among the students asking questions that turned student's initial line segments into radii of circles, sides of parallelograms and angles, and angle bisectors. Students were constructing, labeling, and measuring geometric forms with the aid of Sketchpad and discussing how these forms combined isolated theorems into theory. This graduate class of classroom teachers and teaching consultants were using the laptop and a software program, Sketchpad, as another manipulative tool in their conceptual approach to teaching geometry and linking geometric concepts to algebra.

The professor and her students continued to evaluate ways of exploring geometric concepts with Sketchpad and other reinforcing manipulatives during each class period of the semester. Students were free to complete class tests with the assistance of Sketchpad and the laptops or with other classroom manipulatives. The final six hours of class found students in the class offering collaborative lessons with the laptops and the Sketchpad software. Interviews with teachers and teaching consultants in this class made clear that they were aware of the way they have begun to work as equals in the room co-constructing knowledge. Discoveries came fast as geometric forms could easily be removed and restructured with the Sketchpad software. Instead of being isolated at computer stations students carried their computers to each other's table to show their work and share this tool for knowledge building and the conceptual teaching of geometry.

As members of the Preparing Tomorrow's Teachers for Technology (PT3) team, we followed the work of this class and two other classes this semester to chronicle the relationship of the teacher, students, and laptop computers and to lend assistance when needed. The students shared their developing skills, discoveries and experience with each other and their professors in an atmosphere that sometimes left the observers wondering who was the teacher and who was the student.

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Listservs Facilitate a Cross-Sectional Study of an Instructional Technology Class for Preservice Teachers

Judy Radigan
Department of Educational Psychology
University of Houston
United States
jradigan@swbell.net

Mary Thompson
Department of Curriculum and Instruction
University of Houston
United States
marythompson@pioneer.coe.uh.edu

Abstract: The University of Houston's Preparing Tomorrow's Teachers for Technology (PT3) team has found an unexpected tool for the evaluation of the effectiveness of its restructured instructional technology class. The individual listservs offered with the three new three-semester, one-hour labs that replaced the original three-hour single course provided a cross-sectional study of student progress through the labs. This satellite view of the three semester lab restructuring suggested that despite a disorienting first semester, preservice teachers progressed toward the incorporation of technology in the classroom culminating with authentic lesson integration for their students.

Introduction

As a major part of its Preparing Tomorrow's Teachers for Technology (PT3) grant, the University of Houston PT3 team has restructured the instructional technology class for its pre-service teachers. The original three-hour class was reorganized into three one-hour labs taken over three semesters beginning in the pre-service teacher's junior year. The goal has been to employ a constructivist approach to facilitating the integration of technology into the methods of instruction these students are learning in their education courses, a goal encouraged by Leggett and Persichette (1998). The long-term goal is to encourage the use of appropriate technology in the future K-12 population taught by these graduates. This year a cross-sectional study of the effectiveness of the three labs was facilitated by the postings of students in their individual listservs or hypergroups.

The listservs supplement the labs by expanding social and knowledge networks (Harasim, 1993) with the other sections taking their course and with the team of Technology Fellows that facilitate the lab. The listservs are examples of Baym's (2000) "communities of practice" with both a virtual and real time class life for these students.

A Chronicle of Student Progress

For the PT3 team, the listservs also provide a satellite view of the progress of the students through this series of three labs. The beginning students in the first semester lab were still adjusting to constructivist nature of the class as the following two students explain in their early postings.

Student 1: *It has been very difficult for me, considering I have never had a computer class since high school. I am not sure of what the exact expectations are, and what the process is of turning them in. Is there tutoring, or someone who could write out the steps for me to follow? Thank you!*

Student 2: *I'm very confused about this class as a whole. It seems like most of the learning I have to do on my own.*

As these students are asked to hone their technology skills as part of their co-construction of knowledge for integrating technology into teaching methods in the classroom, they are often overwhelmed because they find themselves to be the architects of their own learning.

Students began to think for themselves in the second semester. Note a student's early response to the new vocabulary that describes the students' work accountability system as it shifts from the standards set by the International Society for Technology in Education (ISTE) standards to skill proofs and knowledge proofs.

> Student 3: *I think I am finally grasping the concept of having knowledge proofs and skill proofs instead of ISTE's. Knowledge proofs are an explanation--in a preservice teacher type manner--of the knowledge gained, and skill proofs are a very short explanation of what I did with that particular skill.*

Even though these students in the second semester of lab work were beginning to think like pre-service teachers, they were still missing the application in the classroom as practicing teachers that the students in the final semester were experiencing. Notice the contrast in the responses of students 4 and 5 to Internet sources for teachers.

> Student 4: *A useful website for the classroom that have reviews of software for the classroom is http://www.superkids.com. This website has education articles and educational tools that every teacher can use in his or her classroom.*

> Student 5: *My 5th graders are studying the founding of Jamestown in Social Studies. EDSITEment has a link that contains maps, labor contracts, court records, public records, newspaper clippings, ... all about the founding of the Jamestown Colony. ... My kids can use this site to help "build a new settlement." I've bookmarked this site for future use when I have my own class.*

Although Student 5 was not yet teaching on her own, she was in the classroom every day and had found a way to integrate technology into a lesson now and in her future role as a teacher on her own. Student 4 in the second semester of her technology lab was still referring to her teaching experience in the third person.

The students in the third semester were also learning about the discrepancy between having computers in the elementary school classroom and using or being trained to use the computer in the university classroom as students 6 and 7 explain in their postings.

> Student 6: *The computers in my class are all brand new Dell computers. They have windows 2000, Accelerated Reader, School House Rock, Grammar Crunch, Internet. They have all kinds of games and software discs that the children can use.*

> Student 7: *I have not seen a tremendous amount of technology in any of my methods classes. My math methods prof has used technology in our classroom in meaningful ways, from videos, to a power's of 10 exercise that was great. My other methods classes have had discussions about the use and importance of technology integration, but have not had actual technology present. I look forward to visits from the tech fellows in our methods classes in order to enrich our learning and the learning of our future students.*

The students in the final semester were surprised and pleased to see computers in their classrooms. They were also surprised that their methods teachers were not actively using technology in their teaching. However, the students did find ways to integrate technology into their practice teaching and appreciated the technology lessons the tech fellows would bring to their methods class.

This satellite view of the three semester lab restructuring suggests that despite the early disorientation for the first semester students, the payoff for the technology lab students develops as they reach the classroom and finally get to practice what they have been learning. Student 8 offered a similar conclusion in her last posting on the listserv.

> Student 8: *I learned a great deal the last three semesters about integrating technology into the classroom. ... Children need to be stimulated and challenged in the schools and I value the importance of technology in helping me to do that.*

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EDENStandards: Standards for Digital and Education Equity

Kevin Rocap
J. David Ramirez
KimOanh Nguyen-Lam
Yolanda Ronquillo

Along with Standards for challenging content and discipline-specific teaching methods, we need Standards for equity, inclusion and diversity-responsiveness in K-12 teaching and learning and teacher preparation. If we neglect the imperative to address historic inequities with regard to underserved learners even as we work to integrate emerging technologies into teaching, learning and teacher preparation we can expect to exacerbate Digital, Education and Opportunity Divides. Panelists for this presentation are colleagues from the Center for Language Minority Education and Research (CLMER) at California State University, Long Beach. The Equity through Distributed Education Network (EDEN) a PT3 Catalyst grant for which CLMER serves as lead agency has worked with diverse educators to develop EDENStandards for meaningful, diversity-responsive approaches to technology-enhanced teaching and learning. We will share our EDENStandards, discuss their implications and share a number of teaching and learning, teacher preparation, professional development, community-building and policy approaches that flow from attention to these EDENStandards.

Panel Participants and Presentations

Panelists will focus on key diversity and equity issues addressed in the framework of the EDENStandards. This discussion will include proposing an equity vision for 21st century learners, addressing key elements of education reform from an equity perspective and sharing the use of CLMER "equity lenses" of: Language, Critical Pedagogy, Anti-Racist Education, Community Learning Theory, Standards and Technology Fluency. Panelists will describe how these lenses are operationalized in approaches to professional development, teacher preparation, policy work and work with schools, districts and communities.

Kevin Rocap, Director of the PT3 EDEN Project, will describe the process of developing the EDENStandards and the key practices of the Center that reflect these standards, sharing strategies, resources and lessons learned. These will include sharing information and strategies regarding an innovative professional development approach for developing communities of practice among teachers, administrators, parents, pre-service teachers, teacher education faculty and others to develop equitable, diversity-responsive K-12 learning projects and supportive cross-role community approaches to equitable education reform.

J. David Ramirez, Executive Director of CLMER, will discuss "making the invisible visible," diversity-responsive approaches to assessment and accountability designed to address both Education and Digital Divides. Dr. Ramirez will address specific issues of educational equity with regard to English Language Learners, girls, religious minorities, children of color, low-income children and children with special needs. A framework for assessment and evaluation that draws on critical multicultural and anti-racist theories and practices will be shared, along with examples of the application of the framework to projects and K-12 practices.

KimOanh Nguyen-Lam, Director of an Alternative Bilingual Teacher Preparation project and a policy forum leader, will describe the development and work, over the last several years, of a national network of Southeast Asian and Pacific Islander educators and community leaders (the APA Forum). Dr. Nguyen-Lam will discuss the myth of the model minority and share the priority issues and action agenda of the APA Forum and related organizations committed to addressing the needs of underserved Southeast Asian communities. Further, she will share her work creating distributed learning courses that address the CLMER vision of a multilingual, multicultural 21st century learner. Courses will be discussed for their capacity to support K-12 Two-Way Bilingual Immersion programs and the integration of technology-enhanced, performance-based assessments in the development of high-quality, diversity-responsive teaching and learning practices.

Yolanda Ronquillo will describe the work of CLMER in facilitating the development of Community Learning and Technology Centers that link K-12 learning and community-based learning, and that level the playing field for diverse, underserved learners. Further, Ms. Ronquillo will share uses of image, metaphor and storytelling in adult learning and as a support to cross-cultural community building and action planning in K-12 education reform. The promotion of digital equity will be discussed as a significant outcome of work across several school communities in the Hawaiian Islands.

All panelists will invite participants to consider ways to apply EDENStandards and related equity frameworks within their own situated practices and communities.

Global Learning Networks in K-12 and Teacher Pre-Service

Kevin Rocap, CLMER/CSULB, US
Kristin Brown, CLMER/CSULB, US
Carla B. de Herrera, CLMER/CSULB, US

Global Learning Network projects provide excellent opportunities for domestic and international K-12 collaborations that are multilingual, multicultural and academically challenging. Further, they can promote cross-cultural understanding, a commitment to social justice and provide challenging content and pedagogy for traditionally underserved learners. This workshop describes K-12 Global Learning Network projects and new learning projects that link pre-service teachers, teacher educators and K-12 classrooms. The Center for Language Minority Education and Research (CLMER) has facilitated and co-sponsored K-12 Global Learning Network projects since 1996 in collaboration with I*EARN and "De Orilla a Orilla." As part of the Equity through Distributed Education Network (EDEN) PT3 Catalyst grant CLMER has enhanced and extended these projects significantly to include teacher education faculty and pre-service teachers. These projects are performance-based additions to teacher preparation coursework and field experiences, with great potential for providing a meaningful, multilingual and multicultural enhancement to teacher preparation.

Workshop Purpose

This workshop engages participants in understanding the power of Global Learning Network projects not only as K-12 learning projects, but as powerful tools for in-service and pre-service teacher professional development. This workshop will address the following objectives:

(1) Provide a model for the design and implementation of academically challenging, social justice-oriented Global Learning Network projects.

(2) Engage participants in examination and discussion of successful projects.

(3) Share innovative uses of Global Learning Networks for Teacher Professional development and Teacher Education.

(4) Engage participants in action-planning around potential participation in Global Learning Network projects.

Workshop Methods

Presentation and discussion of a critical pedagogy framework used in the design of Global Learning Network projects will be facilitated, with discussion among participants and use of a graphic organizer for participants in pairs or threes to brainstorm use of the framework on content of their own choosing. Logistics permitting, three presentation stations will be set-up so that participants can rotate through three presentations of different Global Learning Network projects including two that have been used to link pre-service teacher educators with K-12 classrooms and to other pre-service educators for bilingual study of learning theories. If this format is impractical, ppresentations will be done from the front of the room with small group processing and discussion between presentations. We will facilitate dialogue on the power of Global Learning Networks, the protocols for participation, cross-cultural issues and how to deepen projects with social action outcomes for addressing issues of diversity, equity and international education. Also, we will facilitate discussion regarding the professional development and pre-service value of Global Learning Network projects for creating motivated, international communities of practice. Small group work will be facilitated for action planning and next steps regarding participation in projects.

Technology Rich Lessons from the Field

Cindy Ross, Bowling Green State University, US
Rachel Vannatta, Bowling Green State University, US
Mike Duplay, Bowling Green State University, US

This poster will present numerous examples and samples from children, teachers, university students, and university faculty demonstrating their growth and current practices of technology use in the classroom. These projects represent a variety of age levels as well as curricular areas. In addition, lesson plans from classroom teachers and university faculty will be presented as examples of the infusion of technology into the classroom. This collection of technology enhanced lessons will be demonstrated from the project website that is available to others as a way to share information. Each of these lesson plans not only demonstrates the infusion of technology into the classroom but each also includes the identification of the ISTE standard(s) facilitated in the lesson. The participants have included elementary, secondary, special education students, teachers, preservice teachers and university faculty. The university faculty represents regular education and special education methods as well as faculty from arts and sciences.

The materials that will be displayed represent a variety of software programs that have been used in the classrooms; they include Kidpix, PowerPoint, Inspiration, Kidspiration, "Work Appleworks, etc. These products also represent a variety of ability levels as well as growth by the teachers and the students. University faculty has been working to develop their skills to begin to or further infusion of technology in instruction and assignments in their classrooms.

A scavenger hunt was developed to have teachers and faculty identifies ISTE Standards within lessons and from poster board presentation to facility the understanding of these standards. This will also be shared. Student products will demonstrate how technology has been infused into a variety of themes and content areas.

Individuals representing the project directorship, university faculty, trainers, and preservice teachers will be apart of the poster/demonstration to explain the materials prepared by the project participants.

Faculty Development Training Time: 96 is Not Enough!

Tweed Ross, Kansas State University, US
Rusty Taylor, Kansas State University, US

As part of a United States Department of Education Preparing Tomorrow's Teachers to Use Technology (PT3) project faculty from College of Education, Arts and Sciences, Community Colleges and local school districts participated in yearlong intensive academies. The guiding philosophy behind these academies is that "Teachers will teach as they were taught." Unless we change the habits and practices of the professoriate and clinical instructors who work with future teachers,little progress will be made in changing the teaching methods of preservice teachers about to enter the profession. To bring about the needed change in teaching practice on the part of those charged with preparing future teachers, the College of Education set about creating intensive academies for faculty and teachers to integrate technology into the classroom. The intensive academies for faculty identified many factors necessary to successfully modify teaching habits of university faculty and clinical instructors. Some of these factors were anticipated. Others came as a revelation. All came about because of an intensive review and evaluation process developed to assist this effort.

This paper will discuss the review process that was maintained throughout the academies and used to guide in an on-going, nearly real-time manner the activities of the academy. Also, this paper will cover the many interested findings from these evaluation activities and discuss possible reasons and necessary modifications that future technology leaders will need to address in their design of technology and pedagogy development for university faculty and clinical instructors. Among these are:

Initial partnership creation
Required infrastructure
Successes and barriers
Tailor the program to a diverse audience.
Making a win-win partnership
Long-term implications for success

The Right Hand Helping the Left: Tech Savvy Students Assisting Classroom Teachers

Tweed Ross, Kansas State University, US
Sue Maes, Kansas State University, US

This presentation will cover a newly launched initiative as part of a Preparing Tomorrow's Teacher's to Use Technology (PT3) grant project. It is based on two premises. First, that some students entering the teaching profession possess advanced technology skills before they are admitted to the College of Education (e.g. good high school preparation or personal motivation). These students are not challenged by the basic technology course in the college. This project will allow these student an opportunity to advance their skills and gain practical experience. Secondly, many College of Education Methods faculty and K-12 teachers find that the development time necessary to accomplish technology enriched instructional activities is limited in their already crowded day. They may need extra help in initiating or finishing a technology-based instructional unit. A hands-on experience developing and using software applications, directed by an educational professional, is a powerful model for a teacher candidate.

Research studies from The Office of Technology Assessment (OTA) and the International Society for Technology in Education (ISTE) both confirm that the majority of education faculty do not model technology use to accomplish teaching objectives nor do they teach students entering the teaching profession to use information technologies for instruction. The public school educator is also critical in providing the real day to day capstone experiences preservice teachers need prior to entering the teaching profession. Students do not learn from technology per se, but from creative teachers who have knowledge of technology options and model technology through the use of curriculum enriched experiences and activities.

In an effort to address these needs, sixty-one (61) faculty and public school educators have participated in a Preparing Tomorrow's Teacher's to Use Technology (PT3) grant opportunity designed to integrate and model appropriate technology applications in the classroom environment over the past two years. The PT3 focus was on the guiding philosophy that "teachers teach as they have been taught" and through curricular revision, advice from well known consultants, assistance from peer and technical mentors, plus on-site hands-on technology workshops, participants developed a mediated project using appropriate technologies to enhance student learning.

Extensive evaluation and frequent reality checks revealed that participants in this project felt empowered and were enthused to use technology in their classroom(s), but lacked the necessary development time to build additional mediated learning experiences after completing the scheduled workshops. Therefore, in this third year of the PT3 project, this new initiative allows qualified preservice students an opportunity to take some accelerated coursework/training and be paired with a practicing teacher (one of the sixty-one PT3 Alumni) to help facilitate the development of instructional-based units for the classroom.

A win-win partnership!

You Can't Do it Alone: Requirements for Preservice Teacher

Tweed Ross, Kansas State University, US

Preparing Tomorrow's Teachers to use Technology (PT3) at one College of Education was a unique experience in forming collaborative teams across several educational levels. This PT3 Grant was closely interwoven with another United States Department of Education Improving Instruction grant effort aligned with a College of Education and its associated Professional Development K-12 Schools, College of Arts & Science faculty and Community Colleges. One of the real challenges in Preparing Tomorrow's Teachers to use Technology effectively in class in an effort to improve student learning is building collaborations between the College of Education (COE)--- which ultimately provides the methods and pedagogical experiences for pre-service teachers—and the many departments and colleges that are allied with the COE through undergraduate experiences. These other stakeholders provide the formative and capstone experiences for teachers about to enter he profession. A typical learning path found COE teacher candidates engaging in learning experiences with community colleges, college of arts and sciences, and school districts. Each of these institutions has fundamental differences in organizational mission and outlook toward education. All are directed toward developing young people who are involved in the teaching and learning process. Developing effective collaborations, particularly in implementing technology, is one of the key components of getting the These collaborations are not hastily built to meet immediate demands. They take years of compromise, minor collaborations and trust building before the grant is written and the technology components are added. Once technology is added to the mix of skills that future educators must master for the classrooms of tomorrow, these collaborations involve extensive communication at the administrative level, technology support level, technology training level, and supervised teacher level. Another critical highlight of this work was the integration of technology and the vertical integration of instructional improvement. This project resolutely refused to simply teach the technology applications. Instead the project required participants to do three steps: 1) identify a difficult or repetitious teaching/learning concept from their curriculum, 2) identify learning objectives, and 3) select appropriate technology enhancements that would further student learning. This presentation will review the efforts that resulted in this successful collaboration in several parts.
Initiation
Vision of the Programs
Diverse Partners and Required Commitments
Support Research
Specific Goals and Projects Steps Taken to Accomplish Goals and
Complete Projects Evaluation Components
Selected Findings, Barriers, Successes and Frustrations.

Assessing Program Alignment With Technology Standards

Regina Royer
Department of Education
Salisbury University
United States
rdroyer@salisbury.edu

Abstract: The faculty in the elementary education program at Salisbury University utilized a database to gather data regarding their integration of technology in course objectives, learning activities, and instructor modeling. An examination of their use revealed that faculty used technology with students primarily to access information and to communicate. Fewer faculty modeled the use of technology to support learning activities within the classroom. Greater access to technology in the classroom and continued faculty development are necessary if faculty are to use technology as a tool for teaching.

The Study

The study posed the following question: In what ways is technology being used in the elementary education program at Salisbury University?

Method

Background

Through Salisbury University's PT3 Capacity and Implementation PT3 grants, faculty were participating in professional development in the area of technology and were beginning to utilize technology in their courses. With the release of Maryland's Teacher Technology Standards, the faculty needed data to determine if students in the elementary education program were having learning experiences that enabled them to meet these technology standards. Further, the faculty needed to determine if students in all sections of a single course were getting the same experiences with technology. The faculty needed a way to examine current practice and developed a database to provide the necessary data.

Data Collection and Analysis

Based on the Maryland Teacher Technology Standards (MSDE, 2001), the database provided a checklist of technology indicators within three areas: technology objectives, technology rich learning activities, and instructor modeling of technology-based teaching strategies. During the Fall 2001 semester, elementary education program faculty, using course syllabi as guides, entered data into the database, indicating which of the indicators were addressed in their courses.

Findings

The data revealed that the Maryland Teacher Technology Standards were being addressed in the elementary education program. The most frequent reference to technology in course objectives, occurring in 61% of the program syllabi, was in the area of information access. The next section of the survey examined the use of technology in learning activities for each course in the program. Again, the program was strong in using technology to access information. For example, 79% of the faculty indicated that they required students to research a topic using an electronic source of information. Sixty-one percent of the faculty required students to use email to communicate. Using email (88%) and providing students with Internet resources (82%) dominated instructor modeling of technology-based teaching strategies as well. Additionally, many faculty were using web resources to provide students with online syllabi (45%) and web based discussion areas (36%). Fifty-two of the faculty indicated that they use PowerPoint to convey information to the class.

Conclusions

An examination of the data revealed how and where technology was being used and for what purposes. On the whole, there was minimal reference to technology in program course objectives. Faculty used technology as a tool to meet content area objectives and for the most part did not indicate the use of technology as a primary outcome of their courses.

Examination of the faculty's use of technology in learning activities revealed a pattern of usage. Technology was primarily used as a tool to access and organize information and to communicate. For example, most faculty were requiring students to access information on the Internet (79%) and to use email to communicate (61%). Technology integration was addressed primarily through assignments. Forty-two percent of elementary program faculty indicated that they required students to develop a lesson, unit plan, or learning center that incorporated best practices for technology integration. The second most common integration activity (36%) was to require students to examine educational software. No other indicator for technology integration was addressed by more than 15% of program courses.

Elementary education faculty frequently modeled the use of technology for information access and communication. Many of them provided lists of Internet resources that were pertinent to their content areas and even more used email to maintain contact with their students. Almost half of the faculty had their course syllabi online. Faculty, however, were not yet modeling many of those strategies that utilize technology to facilitate learning. Thus, while faculty were using technology to support their courses and while students were using technology to support their learning, in many cases neither were experiencing those strategies for integrating technology that are more appropriate for the K-12 classroom. Currently, teachers in the K-12 setting rarely communicate with their students through web based syllabi, discussion boards, or email. However this seemed to be one of the most prevalent strategies for integration in the elementary education program at Salisbury University. Computers were not yet commonly used as tools to enable students to develop understandings within content areas. Computer programs that can help shape and construct student understandings such as databases, spreadsheets, concept maps, WebQuests, multimedia production, scientific probes, and simulations were not widely used. In the elementary education program, technology was primarily a tool to access information and communicate.

Implications for Practice

The data analysis revealed that faculty were indeed including technology within their courses. In the area of technology integration, however, faculty were primarily instructing *about* technology by assigning students to create lessons that used technology instead of teaching *with* technology. Schools of education need to continue to provide professional development to assist faculty with integration strategies. Additionally, education departments need to continue to provide increased access to technology. When completing the survey, several faculty mentioned access as an impediment to integration. At SU not all classrooms are equipped with technology. While the department does have a computer lab and a mobile laptop cart, reservations must be limited because of the large number of faculty who must share these resources. Under these conditions, it is difficult for faculty to teach with technology on a regular basis. There must be ready access to technology before it will become a seamless part of teacher education.

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Making It Work: Sharing Technology With the Masses

Charles M. Savitt
Assistant Professor of Instructional Technology
Virginia Commonwealth University
United States
cmsavitt@vcu.edu

Abstract: As part of second year initiatives under our PT3 grant, significant changes to instructional technology facilities and increased training opportunities are providing faculty, pre-service teachers, and classroom teachers with significant technology support. We have increased our efforts to ensure that educators at all levels receive training on the use, operation, and integration of technology into their respective curriculum areas. Through these initiatives, we have learned many lessons in reference to "what works" and what "doesn't work". This paper and presentation will highlight lessons learned as we continue to experiment with methods to help university faculty, practicing and pre-service teachers increase their knowledge about technology and enhance their ability to successfully integrate it into their teaching.

Introduction

A historically white public institution and a small historically black private institution have partnered in their faculty development efforts as part of a PT3 Implementation grant. Through this grant, two diverse universities have jointly implemented a series of initiatives to transform their respective teacher preparation programs. Specific initiatives include: 1) providing release time for faculty to develop and infuse instructional technology into their courses and to serve as leaders in their respective disciplines; 2) increased opportunities for university faculty, practicing and pre-service teachers to receive individualized technology assistance by creating an "Infusio" Laboratory that provides "hands-on" assistance to incorporate technology into classroom instruction, and 3) offer workshops and technology discussions geared for educators at all levels to provide opportunities to share ideas and technological innovations with peers.

This paper highlights lessons learned as we continue to implement our PT3 grant, evaluate our progress, and seek solutions to technology and pedagogical problems as they arise.

Lesson Number One: Time

Typically, faculty at VCU teach a nine-hour course load each semester. Through our PT3 grant, several faculty each semester are provided a course release (three hours) which allows them to partake in technology training sessions. These sessions provide instruction on the use and integration of technology into their respective content areas. Through our observations, we have found that faculty who successfully implement new technology into their courses (i.e. the use of a course management system, such as Blackboard Course Info) must commit a large amount of time to learning how to use these new tools. Faculty report that often they are just starting to gain confidence with a new technology tool just as their course release time is about to end.

To provide faculty members with more time to hone their skills and develop appropriate technology activities that match their course objectives, we are providing each faculty member who obtains a course release during the academic year with a summer stipend to continue their technology exploration. Several technology training sessions are offered during the summer. Faculty comment that they appreciate the opportunity to explore technology on their own during a slower paced time of year. As one faculty member stated: "*Having time in the summer allows me to get to know a program in-depth. I can explore technology resources and really think about what I want to use with my class, and more importantly – decide what I don't want to use with my class. Technology blends into what I am doing!*"

Lesson Number Two: Technology Savvy Faculty and Limited Resources

Both VCU and VUU have come a long way in expanding available technology resources for both students and faculty. VCU has a state of the art technology-teaching lab, and is in the process of hard wiring several classrooms in the education building. These classrooms will contain a mounted projector, which easily allows software programs and Internet tools to be shown to students. VUU has enhanced their wireless network, which allows faculty to access the Internet and VUU's network from a variety of classrooms.

As faculty become more technology savvy, we have found that they want to provide hands-on technology experiences to their students during class time. When interviewed, one faculty member reported: *"I'm grateful for the opportunity to learn about such wonderful technology, in some ways the more I learn the more I become frustrated about our current state of affairs....my opportunity to use [technology] in my instruction is hampered by the lack of technology in our own classrooms...how am I to model the use of technology for my students?"*

The PT3 project coordinators at both universities are attempting to address this problem. At VCU, we are investigating the purchase of wireless notebook networks which can easily be used in classrooms. As new laptops are purchased, we are mandating that they have built in wireless capability. As the demand for "hands-on" learning grows, we are also examining our current physical space and determining if we can create another technology teaching lab in an existing classroom. We have also facilitated discussions with colleagues in other buildings across our campus to determine whether they may have technology rich classrooms that we may use on a limited basis. Additionally, we are informing the technology officers of the university of our needs. Our thinking is that if we require more technology rich teaching environments, our colleagues throughout the university must also have these needs. At VUU, staff there are expanding their wireless network and are in the process of updating their computer lab.

Lesson Number Three: More Learning, More Training

We have been delighted that faculty have taken advantage of the many training opportunities provided to them in the School of Education and throughout the university. While faculty learn much at these training sessions, we have found that often they require some one-on-one assistance or a review of material covered during a training session. We have been able to provide this support through the Infusio lab which is housed at VCU.

The Infusio Lab, which is partially funded by PT3 funds is a staffed facility which contains several computer workstations and a variety of equipment. The lab houses a two-way video-conferencing distance education classroom, interactive whiteboards, Mimeos, and a variety of scanners and digital cameras. Due to increased use, we have hired a lab director who oversees the day-to-day operation of this facility and supervises several graduate students who work with faculty. As faculty and their students learn more about the uses and applications of technology, we have found that there is an increased demand for assistance in the Infusio Lab. Therefore, we have expanded the days of operation to five days a week and have also extended the hours of the lab til 8 P.M. to accommodate the schedules of university faculty and student teachers.

While Infusio staff are available to provide assistance to faculty and students, we have recently started to create "job aids" which provide clear directions on how to use a variety of equipment and software which both universities use. These aids are useful to faculty who need step-by-step guidance when using a new piece of hardware or software. The lab has also purchased CDs which provide instruction on a variety of software programs. These CDs can be checked out, and also allow faculty to learn at their own pace.

Conclusion

As university faculty and pre-service teachers use and learn more about technology, we are finding that we must examine how we best train and provide technology opportunities for members of the university community. We are in our second year of our PT3 grant, and are quite pleased with the progress we have seen in the areas of technology integration. Having to rethink policy and change established practices shows us that we are making significant progress in the use and integration of technology into our respective School's of Education.

Enhancing Student Centered Classrooms with Technology

Lorraine Schmertzing
Education Center
Valdosta State University
GA, United States
lschmert@valdosta.edu

Deborah Summers-Walsh
Education Center
Valdosta State University
GA, United States
dmsummers@valdosta.edu

Art Recesso
amrecess@valdosta.edu

Marti Venn
mlvenn@valdosta.edu

Abstract: This paper is a report on training provided for in-service teachers through a PT3 grant at a regional university in the south US. Teachers were trained using a new instructional design model that focuses on learning on a continuum and shifts activities from teacher-centered to student-centered. Technology was integrated at all levels of learning and multiple resources were made available to the teachers. Learning Units were created and implemented in local classrooms. Videotapes were obtained of portions of the implementation of the learning units and students response was positive, enthusiastic, and showed strong interest in having more lessons that used the computer.

Introduction

Valdosta State University is the recipient of a three-year, US Department of Education grant entitled, "Preparing Tomorrow's Teachers to Use Technology." One of the components of the grant project is to work with local teachers to develop interactive learning activities using various technologies. The method chosen to train practicing teachers to develop learning units, utilize technology, and implement the units in their classrooms was workshops. Teachers were offered stipends for products they created and substitute teachers were paid for when teachers needed to miss class to work on their products.

The Project

Participants were required to attend 6 face-to-face sessions at Valdosta State University (VSU), use online discussion boards for collaboration with peers and colleagues, and communicate with instructors via email. Furthermore, participants contracted to design and develop technology integrated learning units, implement the learning units in their schools during the upcoming term, allow observation and evaluation by a PT3 team member during the unit in their school, as well as have the unit used by another teacher and obtain formative evaluation of the unit. Once evaluation occurred the unit was refined and submitted for final approval and publication in the Virtual Learning Resource Bank (VLRB), an online resource created for teachers through VSU's PT3 grant project.

The workshop is designed to introduce teachers to creative ways of integrating technology at every level of learning. An instructional design model was developed to provide the framework for the workshops. The model is based on the principle that learning occurs on a continuum, and with appropriate planning, teachers can accomplish objectives that are directly related to grade-specific (K-12) state standards. The learning units follow a theoretical model that ties objectives, instructional strategies, technology, and assessment together to form activities that promote success for learners in every grade.

Participants are introduced to a vast number of resources during the workshop. WebQuests, Xcursions, Virtual Field Trips, and Virtual Reality worlds are among a few of the Internet based resources that teachers are introduced to. For some, these resources become an important part of their teaching. One teacher said, "For me, the most valuable part of the PT3 experience has been learning about WebQuests and the vast number of relevant web sites for teachers. I also came away with a great learning unit that was valuable to my students."

Lessons Learned

Data were collected throughout the workshops and include surveys, interviews, observations, videotapes, and workshop artifacts. Qualitative data indicate that workshops have been quite successful. Participants frequently comment on the use of the model in designing their instruction. One teacher said, "I have thoroughly enjoyed today's session. New techniques were learned and I especially enjoyed seeing the model. The model is one that should be used by all teachers in all grade levels." Another commented "By planning my learning unit according to the workshop model I was able to closely plan my unit to the QCC's [Quality Core Curriculum, Georgia's state standards] and integrate technology in new ways."

The workshop has been administered multiple times throughout the previous two years and will continue to be offered through 2002. Several things were discovered during the first workshop that inspired change in formatting for the workshops that followed. Teachers who participated in the workshop had an average of over 16 years teaching in the field and were essentially unfamiliar with the process of creating instruction that tied to state standards. Not only were we surprised at the inexperience with attending to standards, but also we were quite disturbed by the inability of teachers to write the type of learning objectives that we were boking for in the units that were to be published on the web. Discussions with workshop participants led us to conclude that many of them had been teaching for so long that much of what they did was second nature, in their heads, and rarely transmitted to paper. Therefore, when they were asked to articulate these ideas clearly in a way that others could use them, many teachers were neither comfortable nor confident in their ability. Although later workshops spent more time teaching these skills, teachers still continued to come to the workshop in need of such instruction. However, in those workshops there was a significant increase in comments like the one by a science middle school teacher who said, "By planning my learning unit according to this model it made teaching the unit easier. I was able to see what QCC's were covered for each lesson."

Conclusions

A great deal of data has been gathered as a result of this project and in the future we believe there will be much to offer the academy in the way of lessons learned. However, currently what is important is that the PT3 grant that VSU is administering seems to be making a positive difference in the learning experiences of children in rural South Georgia, as well as spreading enthusiasm among teachers for the potential of integrating technology into their classrooms. Evidence of this is clear in the response of one participate to the survey question, "What happened as a result of having another teacher use your unit?" The response was, "The seventh grade teacher who used the unit for his class wants me to help him come up with a unit in his class using the Internet and computers. He does not like the computer but he said that his students were highly excited about the learning on the computer and that he would like to incorporate the computer lessons in his usual teaching lessons. This was a successful workshop for me and I want to thank you PT3!!!

Handheld Technology in Field Based Reporting

Peggy Benton, PhD
peggyb@sfsu.edu
PT3 Grant, San Francisco State University, Instructional Technologies Department; USA

Mercedes del Rosario
merce7@sfsu.edu
PT3 Grant, San Francisco State University, Instructional Technologies Department, USA

Yen-Ling Shen
yshen@sfsu.edu
PT3 Grant, San Francisco State University, Instructional Technologies Department, USA

Abstract: This is an exploratory paper on the uses and applications of handheld technology in field based reporting. It focuses on the adoption of handheld devices by student-teacher supervisors and department chairs in their day-to-day observation and documentation functions. In this paper, handheld devices are defined as portable and personal data assistants carrying among others, word processing capabilities using a Microsoft Word translator. Initial observations indicate a favorable perception of the use of handhelds as a portable word processing computer. However, the Graffiti® writing system and the reliance on paper forms for field-based reporting present a few obstacles in adopting handheld technology in field-based reporting.

Background

Personal data assistants (PDA) are no longer solely used as address and appointment keepers. They have become small-scale computers that offer tremendous portability and connectivity. In the palm of your hand, you can access multiple educational as well as word processing programs. The handheld device can be used as a note-taking medium to document meeting notes and personal memos. To facilitate the note taking process, a Microsoft Word translator and a portable keyboard are introduced in this paper. Several Microsoft Office translators are available on the market namely "Documents-to-Go®", "install buddy", "Quickword" and others. The third party software programs enable Microsoft Word files to be viewed, edited and created on the Palm OS handheld. The keyboard is integrated in this application since it allows for rapid data input.

Handhelds in Education

In this paper we are surveying the possible uses of handhelds by student-teacher supervisors and department chairs. Many teachers supervise student-teachers in the field and the task requires them to travel to school sites and write reports about their observations. This process could be completed using a handheld device and a portable keyboard. This alternative method of documentation ensures the information is backed up on the handheld and on a personal computer. Likewise, department chairs who commonly attend and preside over numerous meetings, could also benefit from the documentation possibilities of PDAs. For this latter group, meeting notes can be inputted and registered on the handheld.

The observations presented on this paper were based on the experiences of the student-teacher supervisors and department chairs at the College of Education, San Francisco State University. In training the said audience, the basic Palm operating system features such as Graffiti®[1] writing, beaming[2] and the operating system's main menu which includes the preferences, phone book, appointment book and memo pad were first introduced. Afterwards, the content was customized to each individual's needs. During the follow up meetings, the participants individually described their job and the elements they could use help in. Some expressed the need to facilitate appointment scheduling while others wished to set alarm reminders for their appointments. The majority foresaw using their handheld as a note-taking device.

Results

With the combination of a handheld, a Word translator and keyboard, supervisors and department chairs alike can easily take notes during meetings or field based observation visits. Files created on the handheld can be copied to the personal computer through the 'HotSync®' process. This process allows for files created or modified on the handheld to be transferred to the personal computer. Likewise, files created or modified on the personal computer can also be transferred to the handheld.

Moreover, the observations underscore the weakness in using Graffiti® to input data into the handheld. Graffiti® writing is often slow and some find it difficult to learn. The addition of a portable keyboard to the handheld greatly enhances the data input process. In the case of field-based reporting and meeting note taking, where there is intensive writing, it is important to have the help of a keyboard to expedite the process.

The Word translator, which in the study is Documents-to-Go®, greatly enhances the use of handhelds in field-based reporting and meeting documentation. The portability of Microsoft Word documents appeals to the participants who see the advantages of being able to use their handheld as a small-scale computer.

Overall, the use of handheld devices in field-based reporting offers promising possibilities. It boasts a paperless process where files are created and stored in digital format on personal computers. Observation comments can easily be e-mailed to student-teachers. However, the general educational system is still paper based. The student-teacher observation process is reliant on carbon copy based forms. The advantage of using the standard carbon copy form lies in the fact that supervisors can give student-teachers a copy of the observation feedback on the spot. Moreover, supervisors are used to this paper format and it may be difficult for some to adopt this new method to document information.

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[1] Graffiti® writing is a unique way to write alphanumeric characters so that it could be recognized on the handheld.

[2] Beaming refers to sending information from one handheld to the other using infrared sensors.

Effecting Pedagogical Change through an Action Research Process

Donna Odle Smith
Department of Curriculum and Instruction
University of Houston
United States
odlsmith@uh.edu

Sara McNeil
Department of Curriculum and Instruction
University of Houston
United States
smcneil@uh.edu

Ernest Stringer
Curtin University of Technology,
Western Australia

Grace Lin
Department of Curriculum and Instruction
University of Houston
United States

Abstract: This paper will describe a PT3 implementation grant that is based on a dual-approach collaborative development model grounded in an action research process. Action research involves constant change and therefore is the appropriate methodology to meet the goals of this project. This model provides a concentrated effort on developing personal and professional technology expertise of both faculty and students in a preservice teacher program in a university setting. Action research provides the foundation for this project, but it is also the process for all interactions that occur throughout the grant implementation involving both the team and stakeholders.

Project Overview

The University of Houston PT3 implementation grant is based on a dual-approach collaborative development model grounded in an action research process. One half of our development model is comprised of our work with our teacher education faculty. Our project Curriculum Specialists meet first with each faculty member, including professors and adjunct instructors, to establish a collaborative relationship and to identify skill levels, instructional needs, and comfort with technology. After this initial relationship building, each curriculum specialist brings in a Technology Fellow to work one-on-one with the faculty member, building on the existing knowledge base and progressing from that point. If personal technology skills need to be established, the technology fellow works weekly with that faculty member to facilitate teaching technology skills acquisition. The more technologically advanced faculty members may need only occasional assistance on specific topics or skills of interest. In addition to mentoring, Technology Fellows are available to assist with set up and operation of necessary technology, equipment checkout, and whole class presentations. This individual attention allows faculty to grow at their own pace and to receive assistance when and where they need it. Our team meets faculty members in their offices, their homes, and even in local coffee shops. Our use of individual technology fellow mentors truly allows for meaningful and consistent relationships to be formed between our team and our faculty. Although our action research is flexible, a well-formed infrastructure is essential for faculty engagement (Groves, & Zemel, 2000).

In addition to being the main contact for faculty, Technology Fellows are also the main contacts for students, accessible in campus-based methods courses, during weekly one-hour lab workshops, and electronically via e-mail. To provide an environment in which our future teachers can visualize the appropriate and exemplary use of technology in education, we have implemented structural changes to our technology course. We have restructured the existing three-credit hour required technology in education course into three one-credit-hour sections that are taken over the three-semesters immediately prior to the student teaching experience. Thus far, we have taught the first two of those three sections. Campus-based students attend a one-hour weekly lab session with optional open lab times available. Technology Fellows are the most knowledgeable about the progress and commitment of faculty as well as the most aware of student needs for technology-rich environment through which to demonstrate their technology proficiency. This two-sided collaborative effort forms the heart of our program and has already proven successful in bringing together faculty and students in the creation of a strong technology-rich program. Action research involves constant change and therefore is the appropriate methodology to meet the goals of this project.

Action Research as a Design and Development Process

Action research derives from the perspective that a problem experienced by any person does not exist in isolation, but is indivisibly linked to and grounded in a set of interactions, relationships and social worlds that are part of the ongoing history of experience of the individual concerned. Research seeks to discover the particular ways in which it might be possible for people to understand the problems and to creatively engage in ways of resolving features of the situation that have become problematic. The first questions in research, therefore, are "What is the issue?" "Who is primarily effected by the issue?" and "Whose research, therefore, is it?" Answers to those questions provide the overarching agendas driving the procedures outlined below.

Further issues arise when these questions have been answered, since the purpose of inquiry is to extend people's understanding, taking them through and past existing definitions of the situation-their current ways of defining or explaining what is happening-to the new ways of envisaging the problem or situation resulting from processes of investigation. Providing people with this frame of reference requires them to position themselves quite differently in relation to people and events, requiring them to take a stance of inquiry and to be able to work productively alongside people they may see as "enemies", "outsiders" or "experts". The processes presented below suggest, first, some fundamental working principles guiding these processes, then provide a set of procedures to work through the first stages of a process of inquiry.

The Basic Action Research Process

The need for systematic, structured processes of investigation indicates the need for frameworks of inquiry to guide research activity. A Look, Think, Act process provides a simple way of envisaging the basics steps to the type of inquiry explicated in this project. For this project, we have also added a fourth step – Share – as a means of disseminating the resources and lessons learned. This process is cyclical and not linear, and it enables participants to systematically acquire information, reflect on its significance, and plan the next steps in the process. It is a constructive process, in which emerging understandings gradually refine and clarify elements of the situation, gradually increasing the scope of investigation to encompass all major factors influencing the issue investigated. This process assumes that there is an issue providing the focus for investigation, and a particular context in which the issue will be investigated. Though the issue may change or be re-framed, and the context broadened or narrowed as people provide input, the process remains essentially the same.

LOOK entails gathering relevant information to build a picture of the situation, enabling the researcher to describe what is involved, what is happening, and how, where and when events and activities occur. Information is acquired by observing, interacting and talking informally with people.

THINK requires researchers to explore and analyze the emerging picture. In the preliminary stages of investigation reflection enables a clearer understanding of the stakeholding groups effected by or affecting the issue, and identifying people in each group who should be included in the processes of inquiry.

ACT defines the actions emerging from reflection. It requires people to plan their next steps and implement appropriate activity.

SHARE describes the dissemination of the information to a larger community.

EVALUATION of these steps requires a return to the beginning of the cycle.

Although the look, think, act, share routine is presented in a linear format throughout this paper, it should be read as a continually recycling set of activities. As participants work through each of the major stages, they explore the details of their activities through a constant process of observation, reflection, and action. At the completion of each set of activities, they will review (look again), reflect (reanalyze), and re-act (modify their actions). As experience will show, action research is not a neat, orderly activity that allows participants to proceed step by step to the end of the process. People will find themselves working backward through the routines, repeating processes, revising procedures, rethinking interpretations, leapfrogging steps or stages, and sometimes making radical changes in direction.

Community-Based Action Research

In practice, action research can be a complex process. The procedures are likely to be ineffective, however, unless enacted in ways that take into account the social, cultural, interactional, and emotional factors that affect all human activity. Community-based action research seeks to change the social and personal dynamics of the research situation so that it is noncompetitive and nonexploitative and enhances the lives of all those who participate. This collaborative approach to inquiry seeks to build positive working relationships and productive interactional and communicative styles. Its intent is to provide a climate that enables disparate groups of people to work harmoniously and productively to achieve their various goals. A key feature of community-based action research is that it takes into account the impact of activities on the lives of people engaged in or subject to investigation. Its intent is not only to get the job done, but also to ensure the well-being of everyone involved.

The art and craft of community-based action research includes the careful management of research activities so that stakeholders can formulate jointly constructed definitions of the situation. The aim of inquiry is not to establish the truth or to describe what really is happening, but to reveal the different truths and realities held by different individuals and groups. Even people who have the same facts or information will interpret them differently according to their own experiences, worldviews, and cultural backgrounds.

The task of action researchers, therefore, is to develop a context in which individuals and groups with divergent perceptions and interpretations can formulate a construction of their situation that makes sense to them all – a joint construction. The major purpose of the process is to achieve a higher-level synthesis, to reach a consensus where possible, to otherwise expose and clarify the different perspectives, and to use these consensual/divergent views to build an agenda for negotiating actions to be taken. This process is fundamental to action research, requiring people to work together with purpose and integrity to ensure the effective resolution of their issues and problems.

Working Principles of Action Research

There is no one right way in which to engage action research. The processes will differ from group to group, from issue to issue and from context to context. They do so because people in each new situation will describe and interpret similar events in quite different ways. The major task of any particular project, therefore, is to creatively find ways to enable the diverse groups to negotiate a definition of the situation enabling them to work productively together. There is a strong need to take into account the differences in culture and perspective, and the emotional responses of people who engage in the processes of inquiry.

Action Research with Faculty

Contact with faculty has paralleled on a lesser scale the action research model of the entire project. The most significant process that the grant team uses with the faculty members is an interview process. In action research this takes the shape of questions, feedback, and more clarifying questions. In our grant experience, it was quickly apparent that faculty and curricula were so diverse that only the one-to-one exposure of action research could uncover their individual needs and issues. Bailey (1997) compares the process of technology and staff development with the activities undertaken by early American pioneers. The paths are largely uncharted before the exploration begins.

In spite of the differences among faculty and curricula, a few central themes emerged:

- Physical access to technology

- Faculty needed assistance at their level
- Time was an essential element
- Relevancy piqued interest
- Student-professor-tech fellow
- Plateaus and "What Next"
- Individual technology in curriculum approaches

Access

Initial meetings required strong attention to the professor's needs and interests. Many stated that they would use more technology if more "computers/projectors/internet connections" were available. Campus limitations to physical components of technology emerged as a key problem. Because of the dollars involved in improving access to technology, this is not an issue that can be quickly resolved. The action research process, however, was instrumental in bringing the situation to notice, a necessary first step in progress.

With this awareness, the grant team was able to help many faculty members identify and apply for equipment funding. Policies on "check-out" and use of departmental resources were reexamined. The one-on-one assistance that the team of technology fellows provided gave other professors the encouragement to budget for appropriate technology. With the assurance of assistance, new numbers of instructors were willing to book labs, check out equipment, and investigate new venues for technology integration.

Assistance

Other reticent faculty members were initially concerned that the assistance that would be forthcoming would be inappropriate, and a poor use of their time. The action research model, however, allows the support to be tailored for each instructor's particular need. Both proficient and beginner technology using instructors were concerned with this. Proficient users wanted to be recognized for their skills, and beginners were more afraid of perceived obstacles. The dialog between the tech fellow and professor about real needs fostered the growth of both a collaborative relationship and a safe and productive learning environment.

This supportive relationship was just as important later, when faculty began investigating more technology integration with their own students. Consistently, the professors have been enthusiastic about technology exploration when they trust this support system.

Time

Often the professors were inclined to feel they were too busy to learn more technology until the team member offered a technology that could save the professor time or effort. Interviews with our faculty members also revealed that they are rarely on campus at the same time, and even less likely to be free simultaneously. There were many opportunities for informal learning through lunch-hour "brown-bag" events, but there were always numbers of instructors who reported that their schedules prevented them from attending. The tech fellows were able to bridge this difficulty by scheduling individual support directly into each professor's available time slots. This flexibility made scheduling so convenient for each faculty member, that many of them arranged to have weekly, standing sessions. Multi-session training such this has been reported to enhance faculty understanding and feelings of competency with technology (Smith, 2000).

Relevancy

Above all, our instructors were interested first in technology that would be useful, and not in technology for technology's sake. A number of professors began the collaboration with very direct and limited requests. As stated earlier, the goal of the dialog between the tech fellow and the instructor was to tap into the instructor's needs and interests. Once the faculty member began to see usefulness or a more efficient result, the discussion generally broadened into a more inquisitive, creative, and less directive approach to technology.

Student-Professor-Tech Fellow

A second relevancy for the professors was that the tech fellows also were technology instructors to the preservice teachers. This meant that the tech fellows were in a unique position to be a sort of a bridge between the professors and the students. The undergraduate technology lab courses were structured so that preservice students could focus on their academic requirements, and the tech fellows would provide them with lab support for their classroom projects. This enabled the professors to understand what they could expect from their students, and enabled the tech fellows to better assist their lab students.

Plateaus and "What Next?"

One of the most compelling phases in action research is at the end of a spiral of "Look, Think, and Act." These spirals can be imagined in all different sizes for all of the various faculty involvements and all the individual goals set at any point in time. At the end of the revolution, sometimes we see a "plateau" with the individual faculty members. It is difficult to seek something that one does not know is there, and it is also difficult for professors to imagine needing or using a component of technology that they are not yet aware of. These plateaus have given the team enormous opportunities to develop strategies for introducing new levels of achievement to the faculty.

The team was initially reticent to provide many discrete curriculum integration suggestions, fearing that the professors would feel overwhelmed. This may, in fact, be true during early stages, but as the team developed and introduced alternate views and suggestions for technology integration, the faculty met them with applause. Though this appeared to be one of the biggest surprises in faculty work, under our action research model we were able to redirect our approaches to satisfy this faculty interest.

Technology in Curriculum Approaches

The "look (listen) and think" part of our action research plan led the team to find concrete ways to help the faculty think through the whole idea of technology integration into the curriculum. For this, the faculty feedback on previous technology integration ideas was organized into a chart corresponding to traditional classroom and educational techniques. Examples of these would include "class discussion, presentations, communication, group work, research," and the like. Tech fellows would meet with each professor individually over one course syllabus, and explore the syllabus and chart together. Areas where technology might be appropriate would be discussed. Negotiations and modifications were encouraged, and often resulted in an even better idea of technology use in education.

Summary

Our program was redesigned to include several critical factors for success: the use of an action research approach to ensure that progress towards goals is continually assessed and evaluated; the purposeful creation of collaborative learning environments in which future teachers are empowered to develop content, pedagogy, and technology strategies; and a dual approach to address the best ways to develop and use skill with technology for instruction.

Pedagogical change is the outgrowth of both the integration of technology and the development of the collaborative community created by the project. The integration of technology that provides for active participation in the learning process encompasses instructors, team members, and students in the process of change. Through this collaboration, the team members have found that many instructors of future teachers have become eagerly engaged in learning to integrate the appropriate use of technology into their teaching. By modeling technological integration and the concomitant pedagogical change, these professors are helping the future students of these pre-service teachers acquire the technical integration skills critical to success in the 21st century.

As a result of the action research model, the faculty at the College of Education has begun a steady and comfortable migration toward greater and more effective technology integration. Although systemic changes are slow and difficult to distinguish, there is such ample anecdotal feedback, that the PT3 team is certain of the ripple that has already been created through our many spirals with the faculty.

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Strategies for Preservice Technology Integration

Donna Odle Smith
Department of Curriculum and Instruction
University of Houston
United States
odlsmith@uh.edu

Angelle Adams
Department of Curriculum and Instruction
University of Houston
United States
Lennyama@aol.com

Gene Fillip
Department of Curriculum and Instruction
University of Houston
United States
gfilipp@yahoo.com

Randall Smith
Department of Curriculum and Instruction
University of Houston
United States
rpsmith@uh.edu

Abstract: This paper describes a multi-directional approach aimed at enhancing preservice technology integration within the University of Houston College of Education. Strategies used by the grant team include reorganizing the structure and content of the undergraduate preservice technology classes, a one-on-one approach between team and faculty for facilitating individual technology growth, an ongoing offering of workshops and lunch seminars, and a consistent team-faculty approach toward increasing appropriate and fitting technology integration within various and differing curricula.

Introduction

The University of Houston PT3 grant, Action Communities for Teaching Excellence, has adopted a multi-faceted approach to address and facilitate preservice technology integration. Following an action research model, the PT3 team has identified three major areas in teacher education where attention to technology may benefit the preservice teachers. These areas are: the preservice "Technology in Education" courses, the undergraduate education classes, and the preservice field-based experiences at area schools.

Processes

A variety of strategies were aimed at enriching technology experiences of the preservice teachers. Facing what many consider a multimedia revolution, Vogel and Savage (1996) predicted displacement of traditional modes of thought and action. The strategies for technological change in the College of Education reflect that view as well. Historically, the preservice "Technology in Education" class for undergraduates consisted of a single traditional three-hour course. The one semester technology course was broken into three one hour courses spread across three semesters, and a constructivist curricular approach facilitated projects with relevance to the students' other current education courses.

As the technology courses were restructured, the PT3 team also initiated meetings with the faculty who taught the undergraduate core courses in education. Since folk wisdom dictates that these professors' visions of technology integration are unlikely to exceed their own level of experience with technology, the PT3 staff offered individual technology instruction and support to faculty. Faculty technology development can be viewed as a process that is not solely oriented toward faculty mastery of classroom technology, but toward the use of instructional technology to enhance students' achievement of curricular objectives (Cagle & Hornik, 2001). Faculty members were interviewed for subject matter and teaching style, along with technology interests and visions of technology integration. A team member was matched with each interested faculty member to promote a collaborative and consistent relationship with the grant team.

Following faculty involvement in personal technology exploration, the topic of curriculum integration was approached, with an eye for providing preservice students additional opportunities to explore technology in their College of Education assignments. Faculty and PT3 team members joined for a collaborative look at technology possibilities offered within their curricula.

As preservice students moved out into the schools for their field based experiences, the PT3 team made contact with the field based methods teachers to offer continued support and collaboration on site. One-on-one technology support was expanded to include all undergraduate methods teachers.

Responses

As the contiguous technology course semesters unfolded, the preservice students evolved into a remarkable community of technology users. The current students entering field experiences display confidence in their ability to integrate existing technology at any level of real-world availability.

Quick and Davies (1999) reported that faculty development participants requested training opportunities fitting their time constraints. University of Houston College of Education faculty particularly favored a one-on-one team approach toward individual technology skills development. An interviewing and matching process was employed to meet varying skills, interests, and schedules. Brown bag and workshop opportunities were also available to address common interests.

The next tier of faculty support explored particular curricular interests and additional integration opportunities. This again was carried out on a case-by-case basis, resulting in many new and innovative curriculum additions. Instructors responded positively to the collaborative nature of the additional exploration. Particularly well received was a series of charting processes developed by the team to provide consistent scaffolding for these tailored individual approaches. For example, faculty feedback on previous technology integration ideas was organized into a chart corresponding to traditional classroom and educational techniques, including "class discussion, presentations, communication, group work, research," and the like. Tech fellows would meet with each professor individually over each course syllabus, and explore the syllabus and chart together, discussing areas where technology might be appropriate. These charting processes facilitated a convenient and easy way to explore technology options in almost any curriculum environment.

Conclusions

The variety of strategies employed by the PT3 team at the University of Houston College of Education are gradually impacting the nature of technology use in all areas associated with preservice education. Not only are preservice teachers emerging from the education program with enhanced skills and proficiencies, but the nature of technology use by faculty is also changing around them. An integrated community of technology users is emerging from the classrooms and offices of the College of Education.

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Using Technology for Urban Teacher Preparation: a PT3 project

Louanne Ione Smolin, Department of Curriculum and Instruction
University of Illinois at Chicago, USA
Louannes@uic.edu

Kimberly A. Lawless, Department of Curriculum and Instruction
University of Illinois at Chicago, USA
klawless@uic.edu

Mark Newman, Educational Advancement
University of Illinois at Chicago, USA
mnewman@uic.edu

Josh Radinsky, Program Associate
University of Illinois at Chicago, USA
joshuar@uic.edu

Scott Brown, Department of Educational Psychology
University of Connecticut
sbrown@uconnvm.uconn.edu

Abstract: Through a U.S. Department of Education PT3 grant, the University of Illinois at Chicago (UIC), in partnership with the Technology Resource Network of the Chicago Public Schools (CPS) and other Consortium partners, designed a flexible process for integrating technology-infused instruction into urban pre-service teaching courses for elementary and secondary programs. This poster presentation describes this 5-pronged process, which includes: (1) interdisciplinary team-based curriculum development; (2) faculty development initiatives; (3) infrastructure development to support teaching with technology in all of the teacher education programs; (4) technology-rich pre-service coursework and field placements; and (5) standards-based accountability mechanisms across all teacher education programs at UIC.

Introduction

In an effort to bring about educational reform, many states have changed to a standards based competency model and adopted new accountability procedures that demand results from students, teachers and schools. These standards and procedures follow the lead of current research in education, requiring teachers to have substantial background in both content and pedagogical knowledge (Ball, 1994; Ball & McKiarmond, 1990; Seixas, 1998; Shulman, 1986). A strong push in the standards movement is toward the use of technology enhanced instruction.

Research has indicated that the traditional model for technology education, a single technology competency course or multiple competency modules, has been found inadequate (Moursund & Bielefeldt, 1999). Rather, effective technology infusion in PreK-12 classrooms requires teacher preparation coursework that fosters the development of content-rich, pedagogically sound strategies for integrating technology throughout the entire teacher preparation curriculum.

The purpose of this poster presentation is to describe the components of a comprehensive PT3 initiative occurring at the University of Illinois at Chicago (UIC) in cooperation with the Chicago Public Schools (CPS.

Design team concept and processes

Interdisciplinary subject-area design teams collaborate to create discipline rich technology materials that can be infused into teacher education methods courses. The activities of the design teams begin with an assessment of curricular needs within the College of Education. These needs are then addressed through the development of easily accessible technologies. Each module is based on a set of domain thinking skills and concepts (such as, in a History course, supporting claims with evidence from documents), which are embodied in the use of specific kinds of technology tools (such as hyper-text linking from text to documents). The technologies employed are used to support the learning objectives, rather than just being used as an add on to instruction.

Professional development strategies

Professional development strategies were designed to help faculty identify synergistic places in their courses for marrying content and technology and to increase faculty members' abilities to use appropriate technologies to achieve specific outcomes within their domain. Strategies for professional development included interactive technology tool-based workshops, a technology development center designed to provide faculty with support for creating technology-based course materials, and summer curriculum institutes for developing technology infused curriculum within teacher education courses.

Infrastructure development

Through ongoing systematic technology planning and deployment, infrastructure could support all aspects of this initiative. Technology planning activities will be described.

Developing and sustaining technology rich field experiences

Fieldwork plays a pivotal role in a teacher candidate's education, and insuring that a field placement can support technology integration is an essential component. Methods implemented to develop and nurture university-school partnerships included recruitment assessments, technology-based curriculum development workshops for k-12 mentor teachers and teacher candidates, and the establishment of an online learning community for consortium partners.

Evaluation

Program evaluation is an extremely important part of successful projects in educational technology reform, without which no program can make any claim of success. In this poster session, innovative data collection techniques via the WWW and authentic performance indicators will be demonstrated.

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Developing Proficiencies for Web-based Course Delivery: Examining Changes in Faculty Attitudes and Behaviors

Sharla L. Snider, Ph.D.
Department of Family Sciences
Texas Woman's University
USA
ssnider@twu.edu

Vera T. Gershner, Ph.D.
Department of Teacher Education
Texas Woman's University
vgershner@twu.edu

Tobye Nelson, M.S.
LINKS Center
Texas Woman's University
tnelson@twu.edu

Abstract: LINKS is a three-year technology project designed to integrate technologies into the teacher preparation curriculum at the Texas Woman's University (TWU). The project is supported by a U.S.D.E., Preparing Tomorrow's Teachers to Use Technology implementation grant. As part of the systemic approach to the integration of technology, the project supports changes in university faculty involvement and roles, technology curriculum content and delivery. Two broad research questions were used to guide this study: (1) how were the development of faculty technology proficiencies supported and (2) what was the progress of the participating faculty in infusion of technology in university web-based course delivery? Second year findings regarding the examination of changes in faculty attitudes and behaviors and the effectiveness of the implemented project are provided.

Introduction

Preservice teachers need to experience technology within a meaningful context in both their learning opportunities at the university and their field-based student teaching experiences. A crucial element in supporting the development of "fearless users of technology" is the modeling of advanced and emerging technologies by faculty who instruct preservice teachers (OTA, 1995; Topp, Mortenson, & Gradgenett, 1995; Wetzel, 1993). In order to model this type of framework within their course structures, faculty must change attitudes and behaviors toward the use of technology (Joyce & Showers, 1983; Schrum, 1999). They must model the use of various technologies to increase instructional effectiveness, be cognizant of the high level of skills essential for preservice teacher certification, and focus on the metacognition surrounding the use of technology as a tool. As Strudler and Wetzel (1999) assert, the "goal of technology integration is a moving target" (p.80), and therefore must be studied within the context of continued learning and professional development for both the student and the instructor.

Learning and Integrating New Knowledge and Skills (LINKS) is a three-year technology project designed to integrate technologies into the teacher preparation curriculum at the Texas Woman's University (TWU). The project is supported by a U.S. Department of Education, Preparing Tomorrow's Teachers to Use Technology implementation grant. As part of the systemic approach to the integration of technology, the project supports both changes in university faculty involvement in addition to changes in technology curriculum content and delivery. This study's purpose is to describe changes in behaviors and attitudes as well as changes in institutional processes. Two broad research questions were used to guide this study: (1) how were the development of faculty technology proficiencies supported and (2) what was the progress of the participating faculty in infusion of technology in university web-based course delivery? To address these questions, second year findings regarding the examination of changes in faculty attitudes and behaviors and the effectiveness of the implemented LINKS project are provided.

The Study

In order to increase the quantity of technology-proficient teachers who use technology to support teaching and learning, the University must change, the curriculum must be changed, and active partnerships must be created and maintained between professors from diverse disciplines. The change process itself must be studied to monitor changes in attitudes and behaviors of participants. This study is grounded in the Concerns-Based Adoption Model (Hord, Rutherford, Huling-Austin, & Hall, 1987) that monitors changes as an innovation is implemented. Changes in participants' technological proficiency over time, implementation concerns, and in some cases their levels of technology use were monitored.

A needs assessment from a purposive sample of current faculty addressed faculty needs relating to the integration of advanced technology tools into course delivery. Their perceived critical needs were in three areas of: (1) productivity; (2) connectivity; and (3) the integration of technology. Faculty members see **productivity** as a priority including support in development of their skills related to multi-media presentations and the creation of a professional web page for use in classroom instruction and communication with pre-service teachers. The survey data indicated the need for training to extend their multimedia presentations with more advanced media tools and the use of **connectivity** tools such as the World Wide Web and asynchronous and synchronous forms of communication. Building from these perceived needs, the LINKS program for faculty was created and implemented.

A volunteer sample of university instructors (N=20) agreed to participate in professional development sessions. Sessions primarily focused on an orientation to LINKS resources and the preparation of web-based course delivery via *Blackboard*, the university's web-based course delivery template. Data were collected on instructors' stages of concern, levels of use, and perceptions of the utility and quality of training. Faculty participants included individuals from the following disciplines: Biology, Chemistry and Physics, Family Sciences, Health Studies, Kinesiology, Performing Arts, Philosophy and Psychology, Reading, Teacher Education, and Visual Arts.

Training Goals. Two primary training goals existed: (a) Introduction of the LINKS standards and resources, and (b) support for instructor delivery of web-based courses as models for the future teachers in their classes. The goals were implemented through a series of technology-training sessions divided into two categories a whole-group professional development sessions geared to broad topics, and hands-on professional development sessions specializing in specific areas for remediation or advanced work.

Training Sessions Overview. In order to provide a model for preservice teachers, faculty were encouraged to integrate technology into the design and delivery of their instruction. These sessions also served as a training vehicle for the preparation of web-based course delivery via Blackboard, the University's delivery template. Sessions were administered throughout the year, seven per semester. These two-hour sessions (28 hours total) were delivered in a University computer lab, using Blackboard as the method of delivery. All materials were available on the class Blackboard site for later reference. By using Blackboard to communicate with the faculty participants, meaningful learning was integrated into their own Blackboard course development.

Personnel from Information Technology Services (ITS), the Distance Education Support Team, and specialists from the library services collaborated with LINKS personnel in organization and implementation of the training. Professional development sessions included an introductory LINKS project overview, sessions on Internet resources, Internet searches, creating a virtual office, uploading course material and online tests, and seven sessions addressing the use of Blackboard, the university's web-based course delivery template. Blackboard sessions covered the following topics: preparing documents, adding information, uploading material, using shortcuts, changing the appearance of courses, adding security measures, student management, and online assessment. One-on-one assistance was available from LINKS staff on request.

Data sources. The Concerns Based Adoption Model (CBAM) was used to assess university instructors' progress toward the use of *Blackboard*. Pre- and posttest data were collected for the Stages of Concern Questionnaire (SoCQ) and Levels of Use. Parametric paired-sample t-tests assessed differences across time. To assess quality and utility of the training sessions, qualitative analyses were conducted for open-ended items on session evaluation forms.

Concerns about Technology. The SoCQ monitors changes in attitudes and behaviors as an innovation is implemented. The SoCQ consists of 35 items that are rated on a 7-point Likert scale with three anchors: 1 (*not true of me now*), 4 (*somewhat true of me now*), and 7 (*very true of me now*). The instrument measures the intensity of concerns around three main clusters (self, task, and impact concerns). The technical qualities of the instrument are acceptable. Cronbach alpha coefficients of internal consistency range from .64 to .83, and the test-retest Pearson r correlations range from .65 to .86.

Level of Use (LoU) Questionnaire. For the first project year (1999-2000), data on instructors' Level of Use was collected through individual interviews. Due to excessive time requirements for individual interviews, project staff developed an objective LoU questionnaire to be administered online intermittently during year 2. Drawing on year-one interview responses, project staff developed items related to Blackboard use. Eight distinct levels of use of an innovation have been identified (Nonuse, Orientation, Preparation, Mechanical Use, Routine Use, Refinement, Integration, Renewal). According to Hord et al. (1987), each stage encompasses a range of behaviors with distinctive actions that move the individual to the next level. CBAM's LoU interview was adapted to describe the behaviors of university instructors relative to the adoption of Blackboard. The LoU Questionnaire included 56 items items rated dichotomously as 0 (*disagree)* or 1 (*agree)*, with 7 items for each of the eight dimensions. The purpose of the LoU was to establish participants' level of use at various stages of the innovation adoption process.

Quality and Utility of Training. Instructors completed session evaluation forms including both objective and open-ended items. Their evaluations first asked for ratings on a 6-point scale from *strongly disagree* (1) to *strongly agree* (6) for the training sessions' possible effects on motivation to use technology in the classroom and ability to use technology more effectively. On a final item, respondents rated sessions overall on a 6-point scale ranging from *not at all helpful* (1) to *extremely helpful* (6). All participants completed three open-ended items: (a) What have you learned or gained from the training sessions? (b) What is your main concern about using the information? and (c) Do you have any suggestions for making the training sessions more effective?

Findings

Stages of Concern Questionnaire (SoCQ). Mean instructor ratings on the seven stages of concern (awareness, informational needs, personal implications, time mangement, consequence for students, collaboration with others, and refocusing or refinement) are presented in Table 1. Significant pre- and posttest differences were evident for faculty on two domains, with both related to self-concerns. Outcomes suggested that instructors' initial awareness and informational concerns ($M = 2.36$ and $M = 4.64$, respectively) had decreased significantly by spring (($M = 1.70$ and $M = 3.57$, respectively). Management, consequence, collaboration, and refocusing concerns intensified, although not significantly.

Table 1: Stages of Concern Questionaire

	Pretest (F00)		Posttest (S01)			Paired
Cohort 2	Mean	SD	Mean	SD	Difference	*T*-test
Self						
Awareness	2.36	1.38	1.70	0.89	-0.66	*
Informational	4.64	1.86	3.57	1.34	-1.08	*
Personal	4.59	1.57	4.59	1.69	.01	--
Task						
Management	3.76	1.81	4.01	1.88	.26	--
Impact						
Consequence	4.79	1.52	5.04	1.16	.26	--
Collaboration	4.63	1.18	4.77	1.34	.14	--
Refocusing	3.61	1.19	4.29	1.33	.67	--

Note. Statistics basedon 14 valid matched pairs using paired-samples t-tests. * $p < .05$. Ratings made on a 7-point scale with three anchors: 1 (*not true of me now*), 4 (*somewhat true of me now*), and 7 (*very true of me now*).

Levels of Use (LoU) Questionnaire. Results for the LoU Questionnaires are summarized in Figure 1. Individual LoU profiles were created for university instructors (labeled U1 to U13). To construct the profiles, mean item ratings were first calculated for the eight stages of the LoU, with mean ratings ranging from zero (*disagree*) to one (*agree*). Next, individual pretest (initial LoU) and posttest (final LoU) outcomes were determined for each university instructor. Mean ratings at least one standard deviation above the instructor group average (mean of 0.7 or higher) were regarded as strongly exemplifying a "stage of use." Instructors are organized in three categories as "beginners who progressed," "mechanical users who made strong progress," and "mechanical users who failed to progress."

Figure 1: University Instructors' Levels of Use Profiles (Pre- and Posttests)

Stage of Use	U8	U12	U7	U13	*U1*	U2	U3	U5	U4	U6	U9	U10	U11
Nonuse	P^1	P^1											
Orientation	P^2												
Preparation			P^1	P^1			P^1					P^{12}	
Mechanical Use		P^2	P^2	P^2	P^1	P^1		P^1	P^{12}	P^{12}	P^{12}		P^{12}
Routine Use													
Refinement													
Integration													
Renewal					P^2	P^2	P^2	P^2					

Key. U = University Instructor (n = 13). P^1 = Pretest (Initial LoU). P^2 = Posttest (Current LoU). Shaded area indicates a mean rating of 0.7 or higher on a scale of 0.0 (disagree) to 1.0 (agree).

Nonusers/novice users with moderate growth. Four instructors (labeled U8, U12, U7, and U13) began as nonusers or were at the orientation/preparation stage, but over time they progressed to a higher level of use. As an example, university instructor eight (U8) considered himself a nonuser at pretest and progressed to orientation by posttest. Although progress was made, this individual is currently exploring the value of Blackboard, but has not made a decision to start using the innovation. Another instructor (U12) began as a nonuser, but she progressed to mechanical use of Blackboard. SoCQ mean ratings for these instructors showed they had lower informational (3.4), collaboration (4.0), and refocusing (3.7) concerns, while their personal (4.6), management (4.7), and consequence (4.9) concerns were moderate.

Mechanical users with strong growth. Another four instructors (labeled U1, U2, U3, and U5) began as mechanical users, but they progressed over the year to become routine, stabilized Blackboard users wanting to refine Blackboard to increase student impact, collaborate with colleages to achieve a collective impact, and to alter Blackboard to increase impact. Interestingly, the mean SoCQ ratings for these instructors were comparable to the beginners who showed moderate growth. They had lower informational (4.0) and refocusing (3.8) concerns, and moderate personal (4.5), management (4.8), consequence (4.6) and collaboration (4.4) concerns.

Mechanical users with no growth. Five of the university instructors (labeled U4, U6, U9, U10, and U11) showed no growth from pretest to posttest on the LoU Questionnaire. Four of five began as mechanical Blackboard users, while one was preparing for first use. Notably, these university instructors had very high personal (5.7), consequence (6.2), collaboration (6.4), and refocusing (5.8) concerns, whereas they had very low informational (3.8) and management (3.2) concerns.

Quality and Utility of Training

Most important learning. The most important learning usually coincided with the session topic. For example, instructors mentioned learning about "changes in Blackboard," "logistics of Blackboard," "direct access to multiple search engines," and "basic HTML." Instructors also noted heightened awareness and knowledge of technology resources, most commonly the various Internet search engines and online library and database resources. Several instructors reported gains in their knowledge of the LINKS project and its benefits.

Main concerns regarding application of the information. Common concerns centered on the time needed for technology and instructors' personal technology skill proficiency. Instructors mentioned a need for time to "learn," "assimilate new information," "practice these new skills," "play with it all," and "the amount of time to do it for every course!" Typical concerns about limited technology proficiency included "lack of familiarity," "my own inadequacy to learn fast enough," "putting all the pieces together," "learning all of the acronyms," "becoming more comfortable with [the] Internet," and "taking advantage of the information." Instructors also expressed concern with their ability to retain their technology skills, the availability and quality of resources, their ability to integrate technology into the classroom, and a need for continued technology support after the sessions concluded.

Suggestions for making sessions more effective. Suggestions for improvement included instructional pace, training content, and a desire for more hands-on opportunities. Several instructors advised slowing the pace of the sessions or creating separate sessions for novices and more advanced technology users. They stressed the "different levels of expertise" among session participants and a need for "more hand-holding." In addition to pace, instructors also offered suggestions for changes in training content, including "opportunities to see concrete examples," "more practical information," and a greater concentration on Blackboard. Fewer suggestions related to the provision of hands-on activities and training timing, and several instructors noted that no improvements were needed.

Conclusions

This project introduced university faculty members to the LINKS project and resources, and supported instructor delivery of web-based courses as models for future teachers. Descriptive statistics and profiles for the SoCQ suggest that instructors' self-concerns declined while task and impact concerns heightened. The majority moved toward higher levels of technology use. Qualitative analyses of open-ended evaluation items revealed concerns with their own ability, the time needed, and the applicability of their new learning.

Findings regarding the implementation and effectiveness of the LINKS project within the teacher education program has implications for increasing the technology proficiencies of entry-level teachers as well as providing a model for other universities undertaking similar changes in teacher preparation programs. Further, the resources created by LINKS, such as the Technology Passport, are available to other institutions on the project web site. Findings have particular relevance to explain how university professors can be supported as effective models of technology use in web-based course delivery and electronic communication with students. The documentation of learner-centered standards for preservice teachers through the Technology Passport provides a much-needed model to monitor and assess changes in preservice teachers' technological proficiencies related to the Texas Education Agency's Learner-Centered Proficiencies for Texas Schools.

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Providing Support for Technology Infusion into a Teacher Preparation Program

Sharla L. Snider, Ph.D.
Department of Family Sciences
Texas Woman's University
USA
ssnider@twu.edu

Vera T. Gershner, Ph.D.
Department of Teacher Education
Texas Woman's University
vgershner@twu.edu

Tobye Nelson, M.S.
LINKS Center
Texas Woman's University
tnelson@twu.edu

Introduction

Through a unique technology infusion approach, The Learning and Integrating New Knowledge and Skills (LINKS) project addresses national, institutional, and teacher education goals as preservice teachers are prepared to use a variety of technologies. Funded through a U.S. Department of Education, Preparing Tomorrow's Teachers to Use Technology implementation grant, the LINKS program encompasses the integration of technology use as intrinsic to all courses leading to professional certification as well as within the professional education field-based courses. In the professional education field-based coursework, preservice teachers complete their documentation of technology skills mastered and demonstrate the use of these tools in a variety of school settings. Specifically, this study addresses these questions: (1) how did LINKS support technology infusion in teacher preparation, (2) to what extent did preservice teachers build technological skills and understanding, (3) how did mentor and supervising teachers build technological skills and serve as guides of technology integration?

The Study

Overview. As participants in the LINKS project, students progressed through university coursework, technology seminars, documentation of proficiencies in a Technology Passport, and field-based placements as they moved through Intern I, II, and Residency over three semesters. Responsibility for preparing students was divided among technology seminar leaders, university liaisons, and supervising teachers. This study focused on the second and third cohorts of three separate cohorts established for this project. Cohort 2 included 62 Intern IIs in fall 2000, 41 of which continued as Residents in spring 2001. For Cohort 3, 66 preservice teachers participated as Intern Is in fall 2000, and 62 progressed to Intern IIs in spring 2001. As Intern Is and Intern IIs, preservice teachers participated in three technology seminars, bi-weekly conferencing groups, and completed the Technology Passport. During Residency, preservice teachers began their student teaching and attended two technology seminars. Pre- and posttests were administered to all preservice teachers to assess changes in technological proficiency and use, as well as attitudes and concerns. Parametric paired-sample t-tests were utilized for analyses of quantitative data for preservice students with complete data sets. In addition, preservice teachers completed evaluations at the end of each semester to assess the utility and quality of their TechTrek experience.

Training. Each semester, Interns interacted weekly with mentor teachers during classroom observations. Mentors (N=30) participated in on-campus training sessions and received assistance designed to encourage their receptivity toward technology use. During Residency, preservice teachers were paired with supervising teachers for their student teaching experience. A select group of supervising teachers (N=15) participated in specialized training dedicated to creating classroom appropriate technology products for use and evaluation in the classroom setting. Both supervising and mentor teachers completed training evaluations to assess quality and utility of training. In addition, supervising teachers also completed instruments to assess technological proficiencies, attitudes, and use.

Data Sources. Implementation data came from reviews of project documents, attendance records, evaluation forms, information on LINKS-related web sites, and interviews with project staff. Data sources for the student, supervising and mentor teacher populations are listed below.

Preservice teachers. Quantitative measures were administered at the beginning and end of the fall and spring semesters. Measures included: Self-Evaluation Rubrics for Basic Computer Use, Advanced Computer Use, and Internet Use, and the Stages of Concern Questionnaire (SoCQ). Parametric paired-sample t-tests assessed differences across semesters. Qualitative data were derived from course evaluations to assess changes in attitudes about technology.

Supervising and mentor teachers. Supervising teachers completed the *Self-Evaluation Rubrics* for *Basic Computer Use*, *Advanced Computer Use*, and *Internet Use* at the end of their semester as supervising teachers. Quantitative results were compared with those for preservice Residents. Qualitative analyses were conducted for open-ended items on questionnaires completed by email and on session evaluation forms by both supervising and mentor teachers.

Findings

This study presents findings for the second-year of the three-year grant. Results for preservice educators revealed that participants considered themselves more technologically proficient after experiencing the technology integration, with statistically significant pre- and posttest differences for all domains of the Basic Computer Use, 10 out of 11 domains on the Advanced Computer Use, and all domains on Internet Use. Preservice teachers moved toward higher impact concerns and relatively low self-concerns as measured by the SoCQ. Qualitative analyses revealed generally positive acceptance of and comfort with technology, as well as confidence in curricular integration of technology. Interestingly, supervising teachers expressed less technology proficiency overall, and scored lower than Residents on all domains on the self-evaluation rubrics for Basic Computer Use, Advanced Computer Use, and Internet Use. Qualitative analyses of open-ended items indicated that supervising teachers were generally positive about technology integration, and being paired with a Resident appeared to be a supportive factor. Concerns related to time, resource quality and availability, and personal skill proficiency.

Conclusions

Findings regarding the implementation and effectiveness of the new LINKS curriculum within the teacher education program has implications for increasing the technology proficiencies of entry-level teachers as well as providing a model for other universities undertaking similar changes in teacher preparation programs. Further, the resources created by LINKS, such as the Technology Passport, are available to other institutions on the project web site. The documentation of learner-centered standards for preservice teachers through the Technology Passport provides a much-needed model to monitor and assess changes in preservice teachers' technological proficiencies related to the Texas Education Agency's Learner-Centered Proficiencies for Texas Schools.

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High Tech Mentoring: Assessing the Effectiveness of a Preparing Tomorrow's Teachers for Technology Project

Debra Sprague
George Mason University
Fairfax, VA, USA
dspragu1@gmu.edu

Jane Cooper
Rockman, Et Al
San Francisco, CA, USA
jane@rockman.com

Natalie Milman
George Washington University
Washington, DC, USA
nmilman@gwu.edu

Abstract

This paper presents the first year findings of a mixed-method study of the High Touch Mentoring for High Tech Integration project at a suburban state-supported university. This three-year project was funded in part by the Preparing Tomorrow's Teachers to Use Technology (PT3) Federal grant program. Participants were teacher education faculty (faculty partners), K-12 technology proficient teachers (teacher partners) and preservice teacher education candidates. The purpose of the study was to: gather baseline data about faculty members', teacher mentors', and preservice teachers' backgrounds and usage of technology; examine how well the faculty-teacher partnerships were working; determine how the faculty-teacher partnerships affected the integration and use of technology in faculty partner teacher education courses; and provide feedback for formative and summative improvement of the project.

Theoretical Framework

The ideal way to prepare preservice teachers for incorporating technology into classrooms is by integrating technology-based learning environments into the college curriculum, with university faculty modeling usage (Sprague, Kopfman, Dorsey, 1998). However, a recent survey by the Milken Exchange (1999) revealed that most faculty, whether in colleges of education or in the disciplines, do not model the use of technology in their courses. Faculty, like teachers, need time to develop technology skills and to learn how to teach with technology. They need to reflect on their own teaching practice and beliefs. They need to explore software appropriate to their content area and need support as they begin to implement new teaching approaches. One faculty development model that is receiving much attention is one-to-one mentoring in which faculty can focus on their own individual needs (Thompson, Hansen, and Reinhart, 1996, Sprague, et. al., 1998, O' Bannon, Matthew, and Thomas, 1998). Little research has been done on this model to determine its effectiveness on a wide scale.

In June 2000, George Mason University (GMU), a state-supported institution located in a highly diverse urban/suburban region near Washington, DC, was awarded a PT3 grant by the U.S. Department of Education. This PT3 project involves pairing K-12 teachers with faculty from the Graduate School of Education (GSE) in one-to-one mentoring relationships. These teachers are providing models for the effective use of technology, are demonstrating various software and web-based programs that can be used in education, and are assisting GSE faculty in redesigning their teacher preparation courses. Sixteen GSE faculty members participated in the first year of the project.

Methods and Results

Quantitative and qualitative methods were employed in this study. Quantitative methods included the use of pre- and post- web-based surveys that faculty partners, teacher partners, and preservice candidates completed. Qualitative methods included classroom observations of GMU professors and teacher partners, informal interviews of several faculty and teacher team members, and document review. A paired-samples t-test on pre-post faculty data for comfort levels and for frequency of use was performed. Significance was set at .05. A Cronbach's Alpha Reliability (.9571) was conducted on the post-survey. Qualitative data from the interviews and classroom observations were reviewed for common themes among the participants. Data reported reflects pre- and post-surveys from twelve first year teams of GMU faculty and K-12 teachers. Data also include classroom observations of 9 professors, and 9 teacher partners, and informal interviews with 7 professors and 3 teachers.

Based on a 4-point Likert scale, three of the items on the pre-post questionnaires were significant. Under frequency of use faculty rated their use of technology imbedded in pedagogy at a higher level on the post-test (Pre-test Mean=2.0, Post-test Mean=2.8, p=.012). Under comfort level faculty rated an increase of comfort in modeling the use of technology in the K-12 curriculum (Pre-test Mean=2.75, Post-test Mean=3.3, p=.027) and in participating in online professional development and collaboration
with other education professionals (Pre-test Mean=2.6, Post-test Mean=3.6, p=.004).

Findings of all other data collected indicate that:

1. Overall, as a result of the mentoring relationships, professors integrated technology in ways they would not have without the grant opportunity.
2. Over 80% of the teams formed a close relationship that resulted in an increased use of, understanding of, and infusion of technology by the faculty.
3. Overall, faculty partners increased their technology skills and level of comfort whether they were novice or advanced technology users prior to joining a team.
4. Several factors promoted positive professor-teacher-mentor relationships:
    - The pairing of professors with teachers who had several years of experience at a variety of grade levels (especially at the elementary school level)
    - The pairing of professors with teachers who had the resources to model a variety of uses of technology (e.g., whole group in a lab, small groups in a classroom, a variety of software programs)
    - Provision of release time for teacher-mentors to meet with professors
    - Description of clear goals, objectives, and expectations of all parties involved at the onset of the project

Discussion

The results of this study provide evidence for further efforts for one-to-one mentoring between university faculty and K-12 teachers in order to ensure faculty members develop the necessary skills and knowledge needed to integrate technology into their teacher preparation courses. Pairing the faculty members with K-12 teachers allowed them to see the challenges of integrating technology in K-12 education. It also gave the faculty the opportunity to explore a variety of software programs and websites. Such opportunities have resulted in an increase of technology integration in the faculty partners' courses.

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Perceptions Held by Participants in a Preservice Teacher Preparation Program Regarding the Role of Technology in Education

Charlotte Stromfors, Krista Glazewski, Thomas Brush
Educational Technology
Arizona State University
United States
charlotte.stromfors@asu.edu

Abstract: The PT3 funded program at Arizona State University investigates the effects of integrating technology skills in the preservice teachers' methods courses. How preservice teachers will integrate computers in their teaching practices tends to be framed by their perceptions about the role of technology in education, their experiences in their undergraduate teacher-training program, and the role models they encounter along the way. Through a series of focus groups this study attempts to capture the perceptions the held by preservice students and their instructors towards the role that technology plays in teaching practices (K-8).

Introduction

In the face of rapid advancements in technology, possibilities for enhancing instruction have equally expanded. Those who will be primarily responsible for the implementation of technology in education will be classroom teachers (Piña & Harris, 1993). Therefore, it is important to examine the perceived role of technology in both the university and the K-12 arenas, where preservice teachers transition from students to practicing teachers. Researchers have identified key obstacles to infusing technology into preservice teacher training. For methods instructors, a lack of university faculty training, lack of administrative expectations, an inadequate amount of time for skill development, plus lack of technical support have contributed to faculty inefficacy regarding technology use (Ertmer, 1999). The resultant lack of appropriate modeling by classroom teachers and teacher-educators presents a considerable obstacle (Beyerbach, Walsh, and Vannatta, 2001). In conjunction with the PT3-funded initiative, one large university envisions technology as an integrated component in a field-based teaching experience for preparing teachers. Students' experiences in this field-based model include the following: a) modeled activities; b) opportunities to develop and implement technology-rich instructional activities in authentic teaching situations; and c) technical support (Brush, Igoe, Brinkerhoff, Glazewski, Ku, & Smith, 2001). The research discussed in this paper focuses on collecting comparison data from participants in this initiative. The data collection is aimed at addressing the following questions: 1) What perceptions do methods faculty and preservice teachers hold regarding the role of technology in K-8 environments? 2) What beliefs and attitudes do methods faculty and preservice teachers have related to teacher preparation for technology integration?

The Study

Participants included four methods course instructors who conduct field-base courses, and eight preservice teachers who participated in the field-based experiences. In order to ascertain the perceptions held by participants, four focus groups were formed: Language arts / social studies methods faculty (n=2); math and science methods faculty (n=2); Preservice teachers participating in language arts / social studies methods courses (n=2); and Preservice teachers participating in math / science methods courses (n=2). Data were collected in October 2001. A researcher led each focus group separately using a semi-structured interview protocol. The protocol questions related to current uses of technology, beliefs regarding the role of technology in education, perceptions of the effectiveness of preservice teacher preparation for technology integration, and ideas for effective technology integration preparation. Each one-hour session was taped and transcribed. The results were analyzed for overlapping and contrasting themes.

Findings

The overall findings indicate that technology as a learning tool is seldom modeled in an educational setting, either in methods courses or in the K-8 classroom. The preservice teachers in this study tended to minimize the role of technology in this formative stage in their careers. Dedicating the extra time towards learning new skills and developing instruction using technology skills were viewed as impediments to change from the traditional method of instruction.

Focus group data indicated five trends. *1. Perceptions held regarding the importance of technology in education*: Pre-service teachers viewed technology with a mixed importance. Member of this group felt that technology made students "lazy" and perceived important skills were being lost as the consequence of computers. Pre-service teachers generally felt the Internet provided a positive, but limited, resource for information. Although the methods instructors regarded computer literacy as important, they cited online investigations, graphing data, and communicating with peers as more appropriate uses technology in education. All groups thought it would be easier to introduce technology in grades above the primary level (K – 3). The language arts / social studies faculty indicated technology use was important when it "fit neatly into the flow of real classroom life," but they could not articulate a means for accomplishing this. *2. Classroom experiences and observations*: In response to inquiries in this area, the pre-service teachers were generally more negative than positive. Each classroom had at least one computer, but its apparent role was non-educational. A typical comment was: "I assume it is used by teachers for grades and worksheet." Methods instructors had few personal experiences with technology integration. Computer use was limited to personal productivity, such as email and a student database. *3. The quality of preservice teacher preparation*: Preservice teachers felt ill prepared for technology integration in. One stated, "I'm computer illiterate…I don't see myself using the computer to instruct students." Methods instructors felt students possessed basic skills, but they were not prepared to use these skills as instructional tools. *4. Perceived impediments to integration of technology in education*: The most frequently mentioned impediments to integration of technology were time to learn skills, time to develop integration strategies, insufficient resources, and insufficient support. Preservice teachers had not been encouraged to try a technology-based lesson, nor did they consider it as part of the school culture where they served as interns. The methods instructors identified a lack of training opportunities, on-site technical and instructional support, and reliable hardware as impediments. They were motivated to integrate technology more in their courses, but felt uncomfortable with their current skill level. *5. Perceived solutions for the future*: More time, access, and resources were identified as keys to successful technology integration in the teaching/learning environment. Pre-service teachers agreed that the modeling of lessons using exemplary technology integration was important. Methods instructors felt a minimum of a 5 computer workstations in each classroom; a projection system to display computer output; and support (instructional and technical) would be a good start.

Conclusion

The focus group results suggest that he greatest impediments to integration are time, information, and equipment. The implication is that this is true from the university to the elementary classroom. The use of technology in teaching concepts is only minimally observed or practiced (if at all) by any of the groups, instructors or preservice teachers. Therefore, it seems unlikely that the use of technology for the enhancement of learning is perceived as a significant educational strategy. Methods faculty expressed a willingness to integrate more technology into their teaching, but they felt a need for training and support. Unless preservice teachers observe exemplary use in the classroom and by the university faculty, it will not be deemed important. Unless they are encouraged to integrate technology into practice lessons, they cannot expect to experience its benefits. Unless the equipment is there and functioning, they cannot expect to do either one.

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MOVING FORWARD WITH TECHNOLOGY INTEGRATION: WHAT WE DID ON OUR SUMMER VACATION

Neal Strudler
Department of Curriculum and Instruction
University of Nevada, Las Vegas
United States
strudler@unlv.edu

Risa Weiss
Project THREAD Coordinator
University of Nevada, Las Vegas
United States
rweiss@ccmail.nevada.edu

Leanna Archambault
Educational Computing Specialist
University of Nevada, Las Vegas
United States
leanna.archambault@ccmail.nevada.edu

Abstract: The practice of using mini-grants to encourage faculty members to explore using technology with their students has been documented as an effective model of professional development (Strudler & Wetzel, 1999; Strudler & Weiss, 2001). With the 2001 mini-grants, Project THREAD took the concept a step further and implemented the Summer Technology Institute. This series of workshops provided faculty with hands-on technical training as well as various methods of integrating technology throughout their courses. By providing both technical and pedagogical skills associated with technology, the 2001 mini-grants proved to be even more successful. This paper will discuss the Summer Technology Institute and findings related to its implementation. For more information and examples of faculty projects please see: http://www.unlv.edu/projects/THREAD/.

Project THREAD (Technology Helping Restructure Educational Access and Delivery), is a U.S. Department of Education PT3 grant awarded to the University of Nevada, Las Vegas. As part of the grant's overreaching goal, Project THREAD has implemented programs that weave together a mixture of new and existing learning opportunities in order to prepare pre-service teachers for tomorrow's technology-rich classrooms. One such initiative was the Summer Technology Institute, held during the 2001 summer session at UNLV.

The Summer Technology Institute consisted of a series of workshops and one-on-one training to support faculty taking part in Project THREAD's mini-grant program. Under the mini-grant program, UNLV professors brainstormed ways that they could effectively integrate technology into student learning activities. They then submitted proposals that included the specific kind of technology that they would use as well as how they planned on integratingthis technology into their teaching. In exchange, the mini-grant program offered a professional stipend to cover the time and expense required to learn new technical skills, redesign the courses, and implement the new course modules. In order to assist faculty with this challenge, Project THREAD implemented the Summer Technology Institute to provide ongoing support throughout the course of the program. As a final part of the mini-grant program, faculty were required to update their course syllabi to reflect the integration of technology.

Specific objectives of the mini-grant program and the Summer Technology Institute included:

- enhancing the ability of university faculty and field supervisors to effectively model technology use and support pre-service teachers in their use of technology;
- making technology resources readily available to faculty so that they will have access to varied and necessary models and resources for their use in teaching and
- helping university faculty modify their courses to meet ISTE standards for integrating technology.

The goal of the program was to provide a means for faculty to make time in their schedules for professional development and to provide training and support based on their needs. During 2000, thirteen College of Education faculty members took advantage of this opportunity. While the program was successful, (Strudler & Weiss, 2001) it was a challenge to meet all of the training and support needs on an individual basis. In the following year, the Summer Technology Institute was implemented, as the mini-grant program expanded throughout the UNLV campus, to include seven departments and four colleges. In 2001, twenty-one mini-grants were awarded to 25 faculty members working on 15 professional development projects. Projects included instructional use of digitized video, teaching with educational software, and using web-based resources.

The workshops of the Summer Technology Institute were carefully designed to meet the technical and instructional needs of faculty. Various workshops, such as "Introduction to Imaging with Digital Cameras, Video Cameras, and Scanners," "Creating I-Movies," and "Creating Web Sites Using Dreamweaver" focused on specific technical skills. Other sessions concentrated on integrating technology in the classroom with sessions like "Technology in the Elementary and Secondary Math Classroom," "Technology in the Science and Social Studies Classroom," and "Teaching with a Mobile Lab." Workshops focused on technical skills as well as integrating technology were offered because the current research shows that professional development involving technology must include instructional support in order to be successful (Ronnkvist, Dexter, & Anderson, 2000).

In light of this research, faculty members were advised as to which workshops they should take in order to best help them achieve their integration goals. In addition, project staff offered ongoing support, including help with hardware/software product selection and installation, as well as individualized instruction and access to useful Internet resources. By providing opportunities to learn about integrating technology that were site-based, ongoing, content-focused, and involved faculty as active learners, Project THREAD was able to create a series of workshops that were based on an effective model of professional development (Birman, Desimone, Porter & Garet, 2000).

Outcomes

Reaction to the 2001 Summer Technology Institute was overwhelmingly positive. Thirty-seven faculty members participated in at least one session. Over the course of three weeks, there were a total of 197 registrations for the 21 sessions. Faculty used the opportunity to participate in the mini-grant program to learn ways that they could incorporate technology in their teaching practices. All of those faculty members attending workshops and receiving mini-grants indicated in workshop evaluations that they had gained skills and/or knowledge and would use this knowledge with their students (Anderson, 2001). The next step will be to begin a comprehensive planning process based on the ISTE-NETS Standards for Teachers. This will include visiting College of Education faculty to examine how they have integrated the technology learned during the Summer Technology Institute and throughout the mini-grant program.

Future Directions

For the 2002 mini-grant program, we are considering creating specific strands which determine the type of technology that will be used by faculty. These might include digital video technology, productivity tools, and online teaching and learning. By concentrating the areas of mini-grants, we would be able to better tailor professional development workshops to meet the specific needs of instructors. Also, with the Summer 2002 Technology Institute, Project THREAD plans on offering a clear sequence of workshops that would provide an ideal balance between technical and integration skills. These sessions would be required of mini-grant participants so that they could develop the necessary skills in order to effectively integration technology in their courses. Through implementing specific technology strands and expanding summer institute sessions, Project THREAD will continue to visit the mini-grant concept to improve upon this professional development model.

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RESTRUCTURING THE FIELD EXPERIENCE COMPONENT OF TEACHER PREPARATION

Neal Strudler
Department of Curriculum and Instruction
University of Nevada, Las Vegas
United States
strudler@unlv.edu

Karen Grove
Department of Curriculum and Instruction
University of Nevada, Las Vegas
United States
kgrove@interact.ccsd.net

Abstract: This paper reports on initiatives to restructure pre-service teachers' field experiences to support the integration of technology. The field experience component is multifaceted and involves close coordination with the local school district. Implementing changes in this placement process poses challenges to planners and coordinators. Several ongoing projects are described that address systemic changes in the process. Included is information on creating request options for students, revising student handbooks, addressing the development of field supervisors, and providing alternative models for students' field experiences.

Introduction

Project THREAD (Technology Helping Restructure Educational Access and Delivery), is a U.S. Department of Education PT3 grant awarded to the University of Nevada, Las Vegas (UNLV) in collaboration with the Clark County School District (CCSD), the nation's fastest growing urban school district. The project's overarching goal is to weave together a mixture of learning opportunities to prepare pre-service teachers for tomorrow's technology-rich classrooms (Strudler & Heflich, 2000). A critical component of meeting this goal has involved revising expectations and procedures for students' field experiences. This paper documents our efforts in this area. It begins with some brief background information, followed by a description of specific initiatives, and concludes with a discussion of our outcomes thus far and future directions that we envision for our program.

Background

A study of first year teachers in CCSD confirmed gaps in their preparation to use technology. In a recent survey, only 25% of beginning teachers reported that they were required to teach a minimum of one lesson using computers in their field experiences (Strudler, McKinney, Jones & Quinn, 1999). This finding is consistent with the survey reported by Willis & Mehlinger (1996), which concluded that technology was barely considered in student teaching placements and only a minority of student teachers were required to teach with computers in student teaching. As the literature attests, this component of technology integration in teacher preparation is clearly the most lacking, and arguably, the most important. Since technology has been implemented unevenly across K-12 schools and classrooms, it is difficult to place education students with teachers who are both accomplished in technology integration and have adequate access to appropriate computer resources. Researchers have concluded that this would likely remain a problem for some time (Mergendoller, Johnston, Rockman & Willis; 1994). But as the Office of Technology Assessment's report noted (U. S. Congress, 1995), if information technologies are to become an integral part of teacher education programs, "K-12 and university educators must work together to integrate technology into curriculum and classroom practice" (p. 165). Project THREAD is addressing this need through various collaborative initiatives designed to support the integration of technology into students' field experiences.

Field Experience Initiatives

The field experience component of the grant involves a collaborative effort between UNLV and CCSD, and is clearly entrenched within each of the organization's policies, procedures, and cultures. Major changes, therefore, are not easily implemented, especially due to the large number of student teachers that need to be placed each semester. In view of this, rather than attempting to revamp the entire placement system, we decided to initiate an opportunity for students to request a placement with a technology-using teacher. While our goal, of course, is for all student teachers to be placed in technology-rich environments, we adopted the strategy of placing those who made special requests as we transition toward providing such experiences for all students. We also sought to impact the entire programby revising current expectations for technology use in field experiences. In addition, we addressed the need for professional development for field supervisors as well as experimented with alternative models for students' field experiences. Each of these initiatives is discussed below.

Creating Request Options

Based on effective practices identified in exemplary colleges of education (Strudler & Wetzel, 1999), students now have the option to request student teaching placements with a technology-using teacher. UNLV's field experience office collaboratively planned with CCSD to make this option available. The field experience applications were revised to include this preference, and the office adjusted its database to include this information with the student names forwarded to the school district for placement. The school district placement office then began the process of trying to match interested students with mentor teachers who commit to infusing technology in students' field experiences. While we initially attempted to do this for practica and student teaching, it was decided by CCSD to forego inclusion of practica students due to the difficulty of accommodating such placements for all who requested them.

To appreciate the level of collaboration needed to modify this process, it is helpful to review details of the process of placing a student teacher. On the university side, once the prospective student teachers have completed all requirements and forms, their names are entered into a database which includes their requests for grade levels, location, and a column indicating whether they request placement with a technology-using teacher. The database is then forwarded to the school district office and principals from around the district are contacted to see if they are interested in hosting student teachers. The principals consult with their teachers and decide what placements should be made based on the student teacher requests. Once the teacher has accepted the student teaching placement, the information is forwarded back to the university so that supervising teacher assignments can be compiled.

The selection process for the cooperating teachers has posed clear challenges to the goals of the project. Initially, criteria for technology-using cooperating teachers were not clearly defined in the grant. Though we had hoped that principals would select teachers who were accomplished in their use of technology tools in the curriculum, in some cases principals viewed this as an opportunity to provide technology training for teachers and thus selected those most in need. Furthermore, cooperating teachers voiced concern about their roles and whether or not their technology skills were adequate for the task.

Eventually, we fine-tuned our expectations to meet this challenge and communicated more clearly with school leaders. To address these issues, more site visits were initiated, an online communication folder was established, and information booklets with frequently asked questions were developed to address the concerns of the teachers and support them in their role of mentoring student teachers. A sample booklet is available at the Project THREAD website: http://www.unlv.edu/projects/THREAD. Similarly, expectations for the project were more clearly articulated for students, thus minimizing confusion and resulting in greater satisfaction with the program.

What is emerging from this process is a clearer picture of what we need for a good student teaching experience that integrates technology. Communication with the schools through the principal has proven to be quite beneficial in developing a positive presence for the grant. Communication with each school's technology coordinator (known as educational computing strategists within CCSD) has resulted in increased support for student teachers as they plan and implement technology-integrated lessons.

Revising Handbooks

While the option for technology-based placements helps pre-service teachers who are motivated to use technology, we are committed to making technology a required part of all students' field experiences. To accomplish this, key faculty and field supervisors were selected to participate in a planning retreat in the summer of 2001, led by our Associate Dean and Director of Teacher Education. The purpose of this session was to revisit and revise expectations for field experiences. This effort, funded by Project THREAD, was designed to address current professional standards, including the integration of technology in various subject areas.

At this point, the committee developed a revised draft of the handbook under the direction of the Associate Dean. The draft is currently under review by other education faculty members and an educational technology specialist. After all of their recommendations are received, the committee will reconvene and finish revising the document. Once the practica revision is completed, a similar process is envisioned to revise our student teaching handbook.

Including Supervisors

Orientation meetings for university supervisors included a component about the goals of Project THREAD and technology use in field experiences. At those meetings, responses from the field supervisors indicated a need to provide them with information on technology uses in the classroom. To accomplish this task, we conducted a needs assessment with field supervisors. Results of that survey were used to design a series of workshops to introduce the supervisors to a range of technology uses in the classroom. A majority of the responding supervisors (75%) indicated that technology was very important in teacher education. We found, however, that many of the supervisors had minimal comfort with computer applications that enhance classroom instruction. The workshops, designed to address these needs, focused on presentation software, generic productivity applications, and an introduction to digital still and video cameras.

Altogether, 27 field supervisors participated in our first series of workshops. The hands-on practice time and one-on-one support helped develop their personal skills with technology. In addition, field-based videos were used to provide a framework for understanding and "seeing" what technology use looks like in K-12 classrooms. This combined approach of enhancing personal skills and providing a framework for understanding is a key piece in developing their capacity for assessing technology use during practicum and student teaching placements as well as supporting the efforts of their students. The impact of these workshops was best summed in a comment from one of the participants: "Technology will have a major impact on education…I feel fortunate to be able to participate in this worthwhile project. As a supervisor of student teachers, I need to have as much knowledge as possible to be able to help them out in the field."

Providing Alternative Student Placement Models

One model involved the creation of a cluster of five professional practice schools in conjunction with CCSD. Two elementary schools, two middle schools, and a high school all located within close proximity of each other, were identified to focus on creating positive field placement opportunities for pre-service teachers. The cluster schools all serve large populations of low-income, minority, and special needs students. A second model, involving the Paradise Professional Development School (PPDS), advanced technology integration through a field-based cohort program.

The Cluster School Model

In planning for the implementation of our project with our school district partners, we did not explicitly address the levels of technology at the schools or the levels of use by the teachers. Selection of the schools was based on meeting demographic criteria and the recommendations of CCSD's administrators. We were not in a position to dictate partner schools that were chosen and believed that it was important to work with the schools that were selected. As was previously discussed, principals at the school sites selected the cooperating teachers for the project.

Typically, cooperating teachers from the school district attend four half-day sessions designed to address their role as mentors. For this project, an additional half-day was added to each of the four sessions. The focus of the additional half-day was to support cooperating teachers in developing their skills with technology as well as learning how to integrate technology in teaching activities. Project THREAD funded the additional time. CCSD and UNLV personnel delivered the workshops jointly. Over the past few semesters, an average of 26 cooperating teachers participated in these workshops.

During the fall, 2001 semester, Project THREAD expanded its professional development workshops for cluster teachers to include an online graduate course, Internet for Educators. The professional development activities in this course were designed so that participants could learn how to create web-based curriculum materials and effectively model using technology in the classroom. The classes were ongoing, content-focused, and involved teachers as active learners, traits that make professional development more effective (Birman, Desimone, Porter & Garet, 2000).

Paradise Professional Development School (PPDS) Model

A second alternative program that seeks to expand technology use in field experiences is the Paradise Professional Development School. This initiative offers expanded opportunities over the traditional field placement system to articulate expectations between the university and its K-12 partner school. The PDS cohort model, planned collaboratively by UNLV and CCSD, was designed to prepare pre-service teachers to be effective in urban settings with diverse student populations. Technology integration was identified as a major priority for the program.

It should be noted that similar to the cluster schools, we consider the cooperating teachers and administrators to be our "clients" in the project. While our ultimate goal is to better prepare pre-service teachers, we seek to do this by restructuring the system and increasing the capacity of UNLV and CCSD personnel who work within it. To help accomplish this goal, a comprehensive series of monthly workshop (four per semester) were presented for PPDS mentor teachers and university supervisors in the school. Workshop topics included: Mentoring and Communication, Meeting the Standards: Technology and Others, Students and Teachers as Researchers, and a Constructivist Approach to Teaching and Assessment. Project THREAD personnel and the Educational Computing Strategist taught the workshops.

Conclusions/Future Directions

Our experience with reforming pre-service field experiences provides further evidence for the importance of this work and the challenges that are involved. In retrospect, we believe our "two-pronged" approach for reform is a good one. That is, we have chosen to focus on selected alternative programs—a cluster of professional practice schools and a technology-rich professional development school—while also addressing the larger program and the need for implementing systemic change at that level. We have accelerated the change process by working with a subset of "volunteer" pre-service teachers, schools, and cooperating teachers, while fully recognizing that our longer term goal is to reform the entire program to ensure that technology integration is a required and supported component of all students' field experiences.

For the alternative programs, we have learned about the need to clarify our expectations, and communicate them more clearly to pre-service teachers and school district partners. Via brochures, handbooks, and online information, we are finding that participants better understand our goals and expectations, and satisfaction with the program has increased. We have also found that by being more proactive in selecting partners at the "front end" who support the goals of the program, we can minimize problems that will likely arise. With our grant, we have been able to "buy" time for technology development through our workshops. However, issues of support and access within the schools are also critical factors in the success of the placements and are items that cannot be bought. As the literature clearly attests, we have learned that schools with strong administrative support for the program from the principal and the on-site technology coordinator offer the greatest access and support for our student teachers.

We are currently in the second year of our PT3 Implementation grant—which was preceded by one year as a capacity-building project. During that time participating schools have changed (e.g., two partner school became Edison schools and needed to withdraw from our program), and we have benefited from our experience in selecting new partners. For the final year of our grant (2002-03), we plan to ask all partner schools to assess their participation in the project and reapply if they would like to continue. We will assess how well we believe the schools supports the goals of the project and possibly make a change or two to ensure that our collaboration with partner schools provides a "win-win" for all concerned. We see this as a good "next step" to build upon the momentum that we have established thus far in accomplishing the goals of the project.

We will also seek to create more formal procedures for the placement of student teachers with technology-using mentor teachers. Our goal is to institutionalize all changes so that program initiatives will continue beyond the life of the grant and the particular individuals currently involved. As with our current effort to revise the field experience handbook, we will continue to formalize expectations and procedures in writing and seek "buy in" from key UNLV and CCSD personnel.

As we continue this work, ongoing project evaluation efforts will address the effectiveness of students' field experiences. Surveys will be administered to pre-service teachers at the end of their student teaching experience, along with exit interviews, lesson plan analyses, and classroom observations. Overall, we hope to gather all-important evidence to document if our efforts to integrate technology into students' field experiences are indeed impacting the quality of their preparation for tomorrow's classrooms. For now, though, we view our initial efforts regarding field experiences as becoming "unstuck" and are very pleased with the collaboration we have had with our K-12 partners. Through these initiatives, we believe Project THREAD is making significant progress toward achieving its goals of supporting pre-service teachers in their preparation for teaching in 21st century classrooms.

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Teachers as Leaders Using Technology: Evidence from Innovative Changes to Teacher Education

Erika L. F. Sucker
PT3 Grant Evaluator, Independent Educational Consultant,
Golden, CO, USA esucker@rmi.net

Sherri A. Buss
Instructional Technology Specialist, College of St. Catherine,
Minneapolis, MN, USA sabuss@stkate.edu

Abstract: The Teachers as Leaders Using Technology group is a consortium of one institution of higher education and three elementary schools, located in a large metropolitan area. Faculty (P-12 and college) and prospective teachers are engaging in technology-rich learning experiences, both on campus and in fieldwork settings. An Instructional Technology Specialist provides in- and out-of-class support to both groups. This innovative teacher education project aims to increase the likelihood that new teachers will integrate technology into their classroom practices, and that faculty and teachers will use technology to create improved curriculum for all students, helping to close the digital divide.

Problem

Despite many advances in educational technology for P-12 students, pre-service teachers who learn about technology tools and applications during their preparation often do not effectively integrate technology into their classroom teaching once they become certified. Prior to that point, they need enough practice with new technology skills to feel confident enough to use them with students (U.S. Office of Technology Assessment, 1995). They need specific goals and expectations, reassurance, and the availability of in-class assistance during their first classroom methods and teaching experiences (Brand, 1998). Some studies have shown that the most crucial determining factor in whether teachers will integrate technology into their classrooms is the level of support they receive from school administrators (Sandholtz, Ringstaff & Dwyer, 1997). Thus this problem is multi-faceted and systemic, going beyond the often-stated needs for thorough instruction in educational technology tools and applications, understanding of cognitive psychological principals of learning from different media, and constructivist teaching methods (e.g., Grabe & Grabe, 1996). In addition, the problem raises the issues of faculty modeling of technology use, technology access during fieldwork and student teaching, and training and support during education coursework and beyond. The difficult problem of digital equity for diverse populations is also inherent in any discussion of technology integration (Bennetts, 1999).

To respond to these needs, the Education Department at the College of St. Catherine's, a private women's college in the Twin Cities area, is engaged in a project called Teachers as Leaders Using Technology, funded by a federal PT3 grant. The department is implementing far-reaching changes affecting faculty and students, policies and practices, to ensure that graduates will be better prepared to integrate technology into their future teaching. The Department has created partnerships with a diverse set of local schools that are serving as fieldwork and student-teaching locations for the prospective teachers. The varying amounts of technology at use in these partner schools, as well as the differing school sizes, structures, and diverse student populations, will allow comparison of the effects of St. Catherine's changes in various teaching environments.

Proposed Solution

The purpose of the Teachers as Leaders Using Technology program is to prepare teachers who are proficient in using technology to increase P12 student learning, and who can use technology to improve their own productivity. Three major changes are being implemented over three years, with the goal of becoming self-sustaining. (1) Faculty (P-12 and college) and prospective teachers are engaging in technology-rich learning experiences both on campus and in fieldwork settings. A major factor in this change is a laptop lease program required for all prospective teachers. The belief is that using computers and associated devices should become as natural as using books, pens and paper. Students will use their laptops for classwork, assignments, and assessments. During fieldwork and student teaching, prospective teachers will prepare lessons, give presentations to students, use a digital camera, and create grade-keeping spreadsheets. Faculty will revise their syllabi, hold monthly discussions regarding standards for technology use, model the use of technology in the classroom, and communicate with students via email and the Department website. (2) An Instructional Technology Specialist (ITS) is providing in- and out-of-class support to both faculty and prospective teachers. The ITS will provide workshops, training, and support for all aspects of the technological changes. She travels to the fieldwork and student-teaching sites and provides assistance to prospective teachers and faculty there. She participates in interdisciplinary faculty study groups to discuss cross-discipline applications, technology-related classroom experiences, and many other aspects of integrating technology. (3) An Instructional Technology Network to be implemented in Year Three will sustain support after students complete the teacher preparation program. Graduates will access technology and pedagogy support that will be monitored by a web-manager. Users will ask questions, share information and pedagogical ideas, interact with others striving to integrate technology, and learn about new resources.

Goals

The goals associated with these three changes are: (1) for faculty and prospective teachers to develop greater potential for infusing technology into teaching and learning experiences by experimenting with a variety of applications both in the college classroom and in the P-12 settings; (2) for faculty in the partner schools and the college of education, as well as the prospective teachers, to use technology to design curriculum that responds to all students' learning needs and styles, and that demands the use of higher-order thinking skills, resulting in more effective problem-solving and decision-making; and (3) for graduates of the teacher education program and P-12 teachers in the partner schools to stay connected and receive on-going support via an Instructional Technology Network. To accomplish the three major goals of the project, the Department will provide technology support for prospective teachers and faculty (college and P-12) throughout the process of closely aligning on-campus classroom experiences, fieldwork experiences, student-teaching experiences, and first-year teaching experiences with the National Educational Technology Standards (NETS).

Examples of the technology-rich learning experiences that faculty and prospective students are engaging in include learning new technological tools such as spreadsheets, digital cameras, video editing, and presentation software techniques. They are also studying content-based software, how the use of technology and related teaching practices can affect student learning, and issues involved in teaching students about technology. Students are keeping ongoing electronic portfolios of their experiences, assignments, curriculum designs, lesson plans, and other products involving the use of technology. The portfolios will serve as assessment tools as well as records of student work and references for their future teaching. Faculty and prospective teachers are currently attending workshops on computer maintenance, Access data base creation and use, Lotus Notes, Excel, PowerPoint, and Publisher. Future workshops will be created based on the needs of the program as it evolves. Through their fieldwork and student teaching in the consortium schools, prospective teachers are learning about the wide variety of technology applications already available for school children. At one partner school, students will experience the limitations of a hodgepodge system of donated computers in need of upgrading as well as the creative ways teachers can capitalize upon even basic resources. At another they will encounter, some standard applications for libraries and media centers, the use of email for communication within a school and district, and software resources in all content areas. At the third they will have the opportunity to use technology fully infused throughout a large school, including specialized equipment and software for the hearing-impaired, flight simulators and other high-level applications, and sophisticated technology use for all aspects of education.

Research and Evaluation

To assess the success of the project, longitudinal research is being conducted by an external evaluator. During the first year, students beginning the program with the newly implemented departmental changes will be compared to second-year students who were not the targets of the changes. These beginning students will then be followed for three years to look for evidence of continued improvement as the departmental changes become more solidified. In the second year of the program, research will focus on student teachers who have experienced the Department changes, as compared to student teachers from the previous year who did not. In the third year, the Instructional Technology Network will be created to support the first-year teacher graduates who were the beginning students in Year One. These teachers will be compared to previous first-year teachers who did not have access to the Network or other departmental changes.

Prospective teachers' comfort and ability with using educational technology tools and applications will be measured through performance-based assessments, including but not limited to electronic portfolios and observation of their teaching, as well as through self-report surveys. Variables that are expected to modify their success in integrating technology into their teaching include the location and circumstances of their student teaching and fieldwork experiences (e.g., higher- vs. lower-tech schools, focus on immigrant populations, relationship with partner school administrators and mentor teachers), the amount of support and training they receive (e.g., contact with the ITS, workshops, modeling of technology use by faculty), and their attitudes toward technology in education.

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University of Florida Teaching and Technology Initiative

Colleen Swain, Gail Ring, Kara Dawson
University of Florida
United States
cswain@coe.ufl.edu
gailring@coe.ufl.edu
dawson@coe.ufl.edu

The University of Florida Teaching and Technology and Technology Initiative is a PT3 funded initiative designed to facilitate and accelerate systemic change related to technology integration in our teacher education program. The initiative involves the collaboration of several organizations within the University of Florida, the School Board of Alachua County, Apple Computer, and the Center for Technology in Learning and Teaching at Iowa State University. In this poster session we will outline the goals of the project, overview the ongoing activities we are supporting to meet these goals, share the implementation strategies we are using to meet the needs of our teacher education program, and discuss our evaluation strategies which are designed to ascertain the effectiveness and impact of the project.

Introduction

In the PT3 trailer movie, Tom Carroll remarked that the PT3 program is about creating teaching and learning environments that promote and facilitate learning with a capital 'L' and technology with a lowercase 't'. This statement captures the essence of the University of Florida Teaching and Technology Initiative (UFTTI). This initiative is a PT3 funded project designed to facilitate and accelerate systemic change related to technology integration in our teacher education program. The UFTTI involves the collaboration of several organizations within the University of Florida, the School Board of Alachua County, Apple Computer, and the Center for Technology in Learning and Teaching at Iowa State University. The goals of the initiative are to:

1. Develop a comprehensive institutional vision for technology integration that will consider new state and national standards involving a variety of stakeholders and enable effective technology integration in our traditional and nontraditional teacher education programs.
2. Design and implement innovative faculty development efforts that will enable professors working with preservice and potential preservice teachers to effectively implement content-specific, technology-based instructional strategies in their courses and model uses of instructional technology in their teaching.
3. Create opportunities for technology-based field experiences that will enable students in the Unified Elementary Proteach and "Project SITE" programs to observe and implement curriculum-focused, technology-based instructional strategies.
4. Facilitate and support college-wide implementation of electronic portfolios designed to promote student-centered assessment.
5. Disseminate project results and resources to our faculty and other teacher education institutions.

Steps Toward the Goals

Upon notification of PT3 funding beginning in July 2001, we began to implement our action plans for each of the goals previously listed. With streamline budgetary and personnel resources at the University of Florida as a part of our teacher education environment, our action plans are designed to not only be grounded in theoretical frameworks but to also take advantage of existing programs, resources, and personnel. We will briefly share some of our action plans in this paper and will expound in more detail events occurring in the UFTTI at our poster session.

Establishing an Institutional Vision

Although the College of Education has made progress in equipping the college with technology, there has not been consistent leadership in the area of instructional technology. We believe it is critical that the foundations for establishing a vision for the use of technology in the College of Education begin. We recognized that building consensus and developing a vision for the College of Education will take considerable time and effort. Therefore, to guide us in this process we relied upon the various educational change models found in the book *Surviving Change: A Survey of Educational Change* Models by James B. Ellsworth as well as the guidance from others including our advisory board and external evaluators.

Providing Faculty Development

The faculty development initiatives in the UFTTI are categorized into general faculty development and content-specific faculty development. This action plan has been based upon research that suggests innovative faculty development models which focus on individuals are most effective in producing educational change, that exemplary faculty development prepares teachers to use technology in their discipline, and that effective faculty development efforts enable teacher educators to enhance their instruction so that future teachers are prepared to advance student learning with technology. The UFTTI developed a cohort of Teaching and Technology fellows to provide specialized, content-specific assistance to faculty members in the Colleges of Education and Liberal Arts and Sciences. Also created was the Teaching and Technology Incentive Program for faculty members to conceptualize and implement innovative strategies for integrating technology into their teacher education courses. In addition, we provide an extensive array of technology workshops along with consulting-on demand and a College of Education online support center.

Technology-based Field Experiences

In the UFTTI selected preservice teacher education students are paired with an inservice teacher(s). These teams will focus on implementing an in-depth instructional project and/or series of min-lessons in the classroom. The goals of these field experiences are to create more positive relationships with teachers and schools in our district, provide authentic technology-related experiences for students, and to have a mutually beneficial technology-related experience for the preservice and inservice teacher.

Electronic Portfolios

All teacher education students at the University of Florida are required to develop an electronic portfolio to demonstrate mastery of the Florida Accomplished Practices. These portfolios also provide students with a vehicle to reflect upon their learning as well as communicate information about themselves. Each student's portfolio is a dynamic, iterative document that evolves and expands throughout the student's collegiate experience. Although there has been considerable success in the Electronic Portfolio Project, the PT3 grant has allowed this project to develop a stronger infrastructure that prepares faculty and students to evaluate electronic portfolios for mastery of the Florida Accomplished Practices. In addition, we are striving to develop a culture of faculty buy-in that promotes similar beliefs about and compatible strategies for implementation of electronic portfolios.

Future Steps

As we approach the end of our first year in the University of Florida Teaching and Technology Initiative, we know there is much work still to be done. We will continue to work to establish a vision for the use of technology in the College of Education, strengthen our faculty development opportunities and technology-based field experiences, and expand the Electronic Portfolio Project.

Empowering 21st Century Teachers MPS PT3

Kathy Swope, Milwaukee Public Schools, US

The MPS PT3 catalyst initiative formed a consortium to enrich the teaching/learning process by maximizing the integration of technology across the curriculum. New learning resources that assist higher education faculty and future educators will be identified through innovative learning communities developed through the membership of the consortium. Project activities include: establishing a communication loop of effective practices between National Advisory Board and teacher preparation faculty; increasing effective resources for teacher training faculty; training schools of education faculties on tools which effectively bridge the gap between classroom practices, state and local standards, and assessment; and providing interactive video distance learning which allows for live collaboration among master classroom teachers integrating the use of technology into the curriculum, teacher preparation faculty and pre-service teachers. Anticipated outcomes from these efforts are that future teachers will integrate technology across the curriculum.

The interactive demonstration/ discussion will highlight the activities implemented to meet the goals of the project. The Empowering 21st Century Teachers Consortium includes the Milwaukee Public Schools, Marquette University, the University of Wisconsin-Milwaukee, the University of Wisconsin System, and the Council of the Great City Schools.

The Goals of the project:

- Increase national and state collaboration around the integration of technology in teacher preparation
- Improve the technology integration skills of colleges' and universities' teacher training faculty
- Increase the number of graduates of teacher training colleges/universities who have technology integration skills
- Decrease the existing educational gaps between standards, assessments, and the day-to-day classroom lessons using effective practices and technology-based mechanisms.

Activities include:

- Creation of a National Advisory Board to increase access to national expertise and broaden the knowledge base for integrative technology practices in education.
- Train schools/departments of education faculties on tools which effectively bridge the gap between classroom practices, state and local standards, and assessments
- Provide interactive video distance learning which allows for the collaboration among master classroom teachers integrating the use of technology into thee curriculum, teacher preparation faculty and pre-service teachers
- Develop and distribute video tapes of classroom activities which demonstrate effective technology use in K-12 classrooms.

National Advisory Board

This Board guides the paradigm shift to technology-rich learning environments impacting all educational levels. This National Advisory Board works with the consortium to disseminate and publish project results to Institutions of Higher Education across Wisconsin, the region and nation. This initiative assists colleges and universities in tapping the technological resources both human and tangible, already in place in school systems in order to build capacity at the college level and in K-12 systems. In the scheme of Empowering 21st Century Teachers both college and K-12 school staffs are acknowledged. Under the guidance of the National Advisory Board, each learns from the other.

- Provide in-service training opportunities for teacher preparation faculty on engaged learning using K-12 Master Teachers, who integrate the use of technology into the curriculum.
- Establish a communication loop of effective practices between National Advisory board and teacher preparation faculty
- Increase effective resources for teacher training faculty

Curriculum Design Assistant (CDA)

The CDA is a web-based central knowledge database of instructional plans. The MPS Curriculum Design Assistant (CDA) was developed by teachers for teachers. This successful internet curriculum tool is in its' third revision and is now oracle based with a whole new look and feel. The CDA has been proven to be an effective tool for all K-12 educators and pre service teachers. Educators can share successful standards based instructional plans, units, projects or staff development with peers and pre service teachers by entering them into the central knowledge database. The CDA allows for easy access to state and local standards was well as the ISTE technology standards. Many of the instructional plans integrate technology for instruction and assessment. Modifications and accommodations can also be included in instructional plans so that ALL students can be included and successful! Video streaming is a new enhancement to the CDA.

Video

We have a Milwaukee Distance Learning Group. There are over 50 sites within MPS that now have two way video capabilities. This vehicle is used in a number of ways including enrichment of curriculum; providing rich coursework opportunities, staff development, community programming, administrative meetings, virtual fieldtrips, expanding partnerships, maintaining face-to-face relationships, and connecting with university partners. Preservice teachers are able to be involved in instructional experiences never before possible. Several teachers state: "Educating tomorrow's leaders requires today's children to be exposed to the global community, a reality that interactive technology makes possible." And "Interactive video enhances our curriculum in a powerful way. Our students can connect and share experiences with kids throughout the state and beyond."

Technology Thursdays

Our Technology Thursdays are offered twice a month to provide practical and useful professional development opportunities that merge the latest in learning technologies and the best in pedagogical techniques. Most of these sessions represent a pairing of technology savvy and curriculum expertise, and are led by a team of facilitators. Topics focus on the instructional practice, supported by technology. For example; "Writing Instruction Supported By Technology", Participants in this session learn about using technology to facilitate the writing process using word processing, graphic organizers, publishing software, and some research engines. The emphases includes ascertaining when the use of technology is most effective within the context of the writing process for various grade levels K - 5. Other topics include a focus on mathematics, reading, multicultural education, the research paper, and special sessions for educational leaders. These sessions are open to any teacher, preservice teacher or university faculty. There is no cost to participants, or their school and are brief Two-hour overviews. This provides the opportunity to sample a number of topics without committing to an entire semester of workshops.

We will share the results of this work with an in-depth demonstration of the Curriculum Design Assistant, CDA; a web based tool that gives teachers point and click access to detailed standards based lessons and resources, a discussion of the work of both the local and national advisory board, a show and tell of the various video projects and a glimpse of an innovative staff development model known as Technology Thursdays.

If It's Not Online and It's Not Live, What is It?

Sharon Tettegah, University of Illinois, Urbana Champaign, US
John Sfondilias, University of Illinois, US
Cathy Thurston, University of Illinois, US

There has been a good amount of discussion in the literature (online and otherwise) regarding the pros and cons of live ("bricks and mortar") versus online (distance) education (Dominguez and Ridley 1999; Knox, 2000; Miller, Smith & Tilstone, 1998). These discussions sometime imply a dichotomy between several modes (face to face, mixed media and distance education) or an all or none approach to teaching and learning that infrequently represents most educational environments. Whatever the long-term future, in the current and near-term, teacher education consists of predominantly live instruction with numerous opportunities for the infusion of technology in the curriculum.

In our PT3 project, we take a pragmatic approach and look at what technologies are available, how technology will be used, what makes instructional sense, and what makes political sense (i.e., what will faculty and teachers accept and adopt?). Technology is integrated into the curriculum, as any instructional method would be through curriculum development (Crotty, 1995). Our evaluation plan assesses the impact technology infusion has on achieving learning objectives of a course. We believe that teaching involves a continuum of technology (and always has), and results in a product that can simply be regarded as "instruction and learning," with its associated goals and objectives. We evaluate how well those goals and objectives are attained. Of course, we attempt to break down, as much as it is feasible, the contribution of the various teaching and learning strategies to learning outcomes. A preliminary evaluation is included in this presentation.

Specific courses in Curriculum & Instruction are targeted for the initial phase of the project. We consider technologies based upon a number of factors including ease of integration, cost (both people and $$), existing campus and departmental support, and potential for maximum positive impact upon teaching and learning using a variety of electronic technologies. These technologies include email, discussion boards, comprehensive course management systems, word processors, Powerpoint, streaming audio and video, electronic portfolio development and java applets. Selected examples of such technology integration are included in this presentation.

Ultimately, regardless of whatever else we accomplish in this PT3 project, our project must show promise for improving the teaching and learning process, which (facilitation, instructional design and curriculum) happens in classrooms. We have designed our technology interventions to be consistent with what we know about how people learn and what constitute good teaching practices. Our integrated model for infusing technology selects and incorporates, peer coaching, collaboration, mentoring, problem-based learning and modeling using new technologies based upon their instructional appropriateness. The overall model is presented with particular emphasis upon how project management and evaluation, and specific technology interventions fit within the teaching and learning communities of practice, while realizing that internet and other forms of technology are useful tools that can provide resources just as a chalkboard, overhead projector or video cassette recorder (Rosen, 1999).

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Revised Standards for ISTE/NCATE Accreditation and National Recognition

Lajeane Thomas, Louisana Tech University, US
Dianne Porter, Louisiana Tech University, US
Harriet Taylor, Louisiana State University, US
Peggy Kelly, California State University, San Marcos, US

DESCRIPTION: Examine revised ISTE/NCATE accreditation program standards for Educational Technology Facilitation (preparing campus technology leaders) and Educational Technology Leadership (preparing district, regional, or state technology leader).

SUMMARY: The International Society for Technology in Education (ISTE) recognizes that educational computing and technology foundations (NETS for Teachers) are essential for all teachers. ISTE also acknowledges educational computing and technology specialty areas beyond these foundations and has established program standards for initial and advanced programs . These program standards assist teacher education units, and professional organizations and agencies in understanding and evaluating the educational preparation needed for specialization within the field.

Lajeane Thomas, Chair of the ISTE Accreditation and Standards Committee and additional members of that committee will present the newly revised NCATE/ISTE Accreditation Standards for Educational Computing and Technology programs. These two sets of standards are designed to identify standards, performance indicators, and performance tasks identifying what candidates prepared for Educational Computing and Technology Facilitation (ECT-F) and Educational Computing and Technology Leadership (ECT-L) should know about and be able to do with technology

The standards presented address the initial and advanced educational computing and technology programs including: (1) the educational computing and technology facilitation initial endorsement; and (2) the advanced educational computing and technology leadership program. Institutions that offer one or more of these programs should respond to the corresponding program standards. Included in the resources provided in the session are rubrics for use in identifying the level performance for candidates.

Educational Computing and Technology Facilitation -- Initial Endorsement Guidelines

Educational Computing and Technology Facilitation (ECTF) endorsement programs meeting ISTE standards will prepare candidates to serve as building/campus-level Technology Facilitators. Candidates completing this program will exhibit knowledge, skills, and dispositions equipping them to teach technology applications; demonstrate effective use of technology to support student learning of content; and provide professional development, mentoring, and basic technical assistance for other teachers who require support in their efforts to apply technology to support student learning.

Educational Computing and Technology Leadership – Advanced Program Guidelines

Educational Computing and Technology Leadership (ECTL) advanced programs meeting ISTE standards will prepare candidates to serve as Educational Computing and Technology Directors, Coordinators, or Specialists. Special preparation in computing systems, facilities planning and management, instructional program development, staff development, and other advanced applications of technology to support student learning and assessment will prepare candidates to serve in technology-related leadership positions at district, regional, and/or state levels.

These programs prepare candidates to keep abreast of changes in educational computing and technology and their impact on education. In addition, candidates are equipped to utilize and integrate a broad range of educational computing and technology applications to enhance student learning. Finally, candidates will be prepared to work effectively as professional leaders to advance their specific fields within a culturally diverse society. Resources including the standards, rubrics, and guidelines for seeking national recognition through ISTE and NCATE for these university programs can be found at the following Internet locations: http://cnets.iste.org and http://www.ncate.org

Gary Thompson
Al Olsen
Dave Bass
Larry Grooters
Dale Hoskisson

SITE Paper 2002 – Abstract

Radical Change in a Traditional Setting: Lessons Learned

In an age when change is a norm, lifelong learning a critical mandate for prosperity, and technology a revolutionizing force, transforming traditional education practice is a central theme at Valley City State University (VCSU). Beginning with the distribution of IBM notebook computers to all faculty in January of 1996 and to all students at the start of the 1996-97 academic year, VCSU became the first notebook university in North Dakota and of a small number across the country.

With the universal access to notebook computers, the teacher education faculty at VCSU altered teaching and learning significantly. Teacher education faculty can walk into nearly any classroom knowing that they will be able to display presentations developed with PowerPoint, ask the entire class to find resources on the worldwide web, work with on-line courses at any time, and receive e-mail documents which they can display as a basis for class discussion.

Technology has provided VCSU faculty in the teacher education unit with tremendous capacity to revolutionize education both on campus and in the public schools. Integration of technology into the elementary education classroom has been a very important goal of the unit the past three years. To help achieve this goal, the VCSU elementary education department has formed partnerships with six other educational entities to strengthen and improve learning with technology. The department is also in the second year of their PT3 Grant that seeks to provide opportunities for VCSU elementary education faculty, preservice teachers and classroom teachers from the Valley City area to work together to integrate technology into their courses and to create a learning community among themselves for the purpose of using technology to improve learning.

The grant goals include creating a learning community and developing complex reasoning and problem solving skills. VCSU faculty, K-6 teachers, and candidates participate in collaborative projects designed to develop complex reasoning and problem solving skills. Cooperating teachers representing the various consortium schools collaborate with VCSU faculty and candidates to restructure learning experiences in their classrooms that reflect current best practices for using instructional technology strategies and tools. Another goal prepares elementary education graduates to use technology to help their future students improve learning by developing complex reasoning and problem solving skills.

The success of the PT3 grant is a reflection of the direction VCSU has been moving the past eight years. VCSU has been a national leader in instructional technologies and the resources available at VCSU ensure that successful efforts continue and the university will be an example for others to follow.

As VCSU has moved in this direction, we have learned many lessons. The collaborative projects have brought a new level of authenticity to the technology training of VCSU students. But this authenticity has required VCSU faculty to be willing to give up control of the learning setting and be willing to share it with the student and the classroom teacher. We have also learned that our students need to know how to be consultants when they work with classroom teachers. The teachers are at varying stages of readiness to integrate technology into their classrooms. Some are already deeply involved while others still feel unprepared. We have sponsored workshops to help the teachers gain skills and brainstorm ideas. We are preparing consultant guides for our students to help them better meets the needs of the teachers, especially those who are in the beginning stages of technology use.

Besides the above, this session will include in-depth results of the evaluations of the workshop and collaborative projects and the strengths and challenges the data reveals.

Developing Interactive Computer Tutorials for Current and Future Teachers

Sudheer Vaka, Bhargav R Marpuri, Taha Mzoughi, and Jessie Burnette Hamil
Mississippi State University
Bosede Aworuwa
Alcorn State University

Increasingly, proficiency in the use of computers is becoming a necessary skill for all teachers. They need to use computers for teaching, class and lecture preparation, class assignments, class management, research, and professional development. However, many current teachers lack even the basic skills for operating a computer, let alone integrating the use of computers into their teaching. As a result, many local and national programs have emerged to offer teacher training on the use of computers and the use of computers in teaching. Alcorn State University and Mississippi State University have received grants from the US Department of Education, Preparing Tomorrows Teachers to Use Technology program, to provide this type of training.

In both programs, the training includes hands on activities and interactive collaborative sessions that allow for exchanges between the teachers and between teachers and trainers. The training targets basic skills as well as more advanced skills and strategies for classroom integration. Teachers attending our workshops have felt that they have learned a lot and their confidence about the use of computers have increased significantly. To help insure that they can carry that newly acquired knowledge beyond the workshop, we found it necessary to provide them with resources that they can use on their own at their own pace. The resources should help them reinforce the skills that they have learned during the workshops and work on more advanced activities than the ones they were able to complete during the workshop.

Our strategy was to insure that the resources are easy to use and that they provide a gradual approach to the learning process. Additionally we wanted them to be interactive and to meet the needs of people of different learning styles and skill levels. Skill Level 1 tutorials are intended to meet the needs of teachers who have little or no computer skills. Level 2 tutorials are for teachers with more advanced computer skills. Another important component was to have some teachers participate in authoring some of these tutorials and to sometimes provide the actual training. A study by the "The Computer Learning Foundation" suggests that training of teachers by teachers is more effective then training by administrators [Alden.] By providing and authoring the training teachers experience the benefits of technology for themselves and get a first hand experience on using technology in teaching.

We currently have developed twenty interactive tutorials. They are compiled into a manual that we started using during training sessions. The interactive version is provided on CD-ROM and on the Web for easy download.

Assessment of Online Technology Modules in Pre-Service Teacher Education Courses

Jeanne Vilberg
Learning and Technology Center
Clarion University of Pennsylvania
United States
jvilberg@clarion.edu

Darla Ausel
Learning and Technology Center
Clarion University of Pennsylvania
United States
dausel@clarion.edu

Abstract: Teams of faculty, administrators and staff at three State System of Higher Education (SSHE) universities in Western Pennsylvania developed online technology modules incorporating the International Society for Technology in Education (ISTE) standards to enhance pre-service teachers' use of technology and provide opportunities for faculty to model effective technology in the classroom. This paper will report the findings of a study on the use of online modules in teacher education courses at Clarion University where 244 pre-service teachers were surveyed on their experiences. Results indicated that the students found the online modules to be a valuable component in their courses, providing new and innovative ways to engage students using technology.

Introduction

In its third year of a $1.7 million Preparing Tomorrow's Teachers to Use Technology (PT3) implementation grant, a consortium of three universities in rural Pennsylvania (Clarion, Edinboro and Indiana) is continuing its success in infusing technology into the teacher preparation curriculum by helping faculty develop appropriate assignments requiring technology use for students and incorporate them into their courses. Building on the National Council for Accreditation of Teacher Education (NCATE) and the International Society for Technology in Education (ISTE) pre-service teacher competencies for technology education, the universities are developing technology integration plans that prepare the faculty as well as the students to infuse technology (NCATE 2001). Findings in a 1998 report for the Milken Exchange on Education Technology indicate that "the biggest challenge facing institutions today is preparing faculty to model the effective use of technology as a teaching and learning tool" (Willis & Raines 2001). In the first two years of the PT3 grant the members designed and implemented a strategy for professional development opportunities for faculty, technology support, and enhancing the pre-service teacher education experiences through technology. In year three, implementation and integration of online course modules in the teacher education curriculum is providing a wide range of educational technology experiences for pre-service teacher education students.

It is no longer enough to have computers in the schools or required courses that teach students how to use computer applications. Faculty need to model appropriate use of technology and effectively integrate technology across the curriculum (Abdal-Haqq 1995, ISTE 2001). At Clarion University the Learning and Technology Center staff and education faculty collaborated to create a professional development experience for faculty on how technology can be used effectively in the classroom Presented as a hands-on, weeklong immersion in technology applications in the summer, the "Technology Chalkboard" series laid a foundation for the development of the online technology model. Based on a modular approach, each technology application (electronic communication, spreadsheets, multimedia, mindtools, videoconferencing, technology classrooms, digital imaging, online courses, webquests) was presented in a three-hour session incorporating foundation, application, and integration skills that lowered the entry level for faculty and teachers to begin their investigation of effective uses of technology in teaching and learning. McKenzie (2001) defines the challenge of professional development to "inspire and prepare classroom teachers to launch curriculum rich activities with the tools that make sense." The "Technology Chalkboard" model reinforces this idea by providing a foundation for faculty to model technology integration.

In the fall Clarion, Edinboro and Indiana university faculty, administrators and staff collaborated to develop the model into nine online course components (Electronic Communication and Collaboration, Integrating Electronic Spreadsheets, Mindtools, Digital Imaging to Enhance Instruction, Developing Multimedia Presentations, Videoconferencing for K-12 Education, WebQuests, Developing Instruction Online, Reshaping Classrooms Using Technology) for use in the teacher education curriculum, enabling faculty to more easily integrate technology in their courses and meet the need for future technology proficient teachers.

Methods

Nine faculty teaching education core or methods courses were recruited to develop the online technology modules in collaboration with project directors and support staff. Three faculty developers at each consortium institution selected five faculty and four K-12 teachers in their intermediate unit to implement and assess the modules. The module implementation design included in-service as well as pre-service teachers to provide a common connection for the students' field experiences.

Overall, approximately 1,200 students at the three campuses will use the modules through the spring semester of 2002 to investigate classroom technology applications. Similar to the "Technology Chalkboard" model used by faculty, the modules incorporated three main components. In the first (framework) the students were introduced to the technology, in the second (exploration) the students explored examples of how the technology can be used in the classroom at either the elementary or secondary level, and in the third (integration), the students integrated the technology into a lesson plan incorporating ISTE standards designed for their field experience. The modules focused on how the technology could be used to support the curriculum and designed so that they could be replicated for use at each of the institutions and across courses. Students completed specific assignments for each of the three areas and used electronic communication and discussion boards to share their experiences. To meet the needs of both pre-service and in-service teachers and for future professional development needs, the modules were designed so that they could be integrated into the classroom or used as standalone learning tools, enabling anytime, anywhere learning,

In Fall 2001 faculty at each institution began to integrate the online technology modules into web-enhanced teacher education courses using WebCT and Blackboard courseware. Not all modules were fully implemented in the fall semester, however. Obstacles to completing the modules were the lack of instructional design support in developing the modules and faculty expertise in redesigning content to fit the Web environment. This study will focus on three of nine modules that were implemented and assessed at Clarion University.

The three online modules (WebQuests, Mindtools, and Reshaping Classrooms) were incorporated into six teacher education courses, impacting approximately 400 students. The WebQuest module was used with ELED-324 Teaching Elementary Mathematics (3 sections) and SCED-539 Resource Materials for Science Education (1 section); the Mindtools module was used in ELED-325 Teaching Elementary School Social Studies (2 sections) and ED-327 Instructional Strategies and Management (1 section); and the Reshaping Classrooms module was used in ED-217 Micro Applications in the Classroom (4 sections) and ELED-331 Children's Literature (1 section).

Two measures were taken to evaluate the online modules; the first was incorporated into the module as an assignment consisting of a student reflection of the online module experience (Was it a valuable learning experience? Did it expand your knowledge about the technology or about a concept? How will you use the experience in your classroom? How can it be used to meet standards?) and the second was a 10-item survey on how effectively the technology module was integrated into the course, its ease of use, and whether the module was a valuable part of the course. Out of the 400 education students enrolled in the targeted courses, 117 completed the student reflection and 244 (7 sophomores, 96 juniors, 134 seniors and 7 graduate students) participated in the voluntary survey. The students rated their technology level as: beginner (18), intermediate user (64), advanced (131), and expert (31). The survey used a five-point Likert scale ranging from 1=Strongly Disagree, 2=Disagree, 3=Neutral/No Opinion, 4=Agree, 5=Strongly Agree. Seven faculty developers, cooperating faculty and K-12 teachers also submitted an online assessment survey following completion of the course module.

Results

Student survey responses are reported in Table 1. Items 2 and 5 dealt with the module's ease of use in the course. The students found that they needed little help in using the online module (3.62) and learning the computer applications (3.81). Each module was designed with clear navigation properties that were consistent among modules and a good foundation for understanding the technology application. For example, the Mindtools module incorporated a tutorial on Inspiration software as well as a free download of the software. Table 2 reports responses based on students' perceived technology level. In general user level was positively related with ease of use and learning the computer application. The more advanced the user the more positively they rated ease of use (beginner, 2.89; intermediate user, 3.55; advanced user, 3.63 and expert user, 4.19) and learning the application (beginner, 3.56; intermediate user, 3.64; advanced user, 3.85 and expert user, 4.13).

Items 1, 3 and 6 focused on the appropriateness of the module and how well it was integrated into the course. These items were positively rated by the students: learning how to use the technology module was adequately discussed in class (3.91), the technology module assignments were appropriate for this course (3.98) and the technology module was well integrated with the rest of the course (3.67). Student reflections indicated that they were enthusiastic about integrating technology into the classroom. Students suggested using WebQuests to enhance content knowledge and enable higher-level student thinking, using the Web for research, creating scavenger hunts as a way to make students discover information for themselves, and using virtual field trips to help students become more actively involved in their learning.

Item 4 rated the amount of time needed to complete the module assignments. Overall, the students did not feel the module assignments required too much time; however, there was variability between user level and how the instructor implemented the online module. Some instructors integrated the technology module more fully into their courses while others used it as a supplement. Further, individual technology modules required different learning skills depending on the learner and the technology application.

Items 7 and 8 reflected the student's understanding and interest in the material. Students' responses indicated that the modules had a positive effect on their understanding (3.47) and enhanced their interest in the course material (3.42). Student reflections confirmed the survey results. Ninety-eight percent (115 out of 117) reported that the module expanded either their knowledge about the technology or classroom content. Recurring comments were that 1) they learned when and how it is appropriate to use technology, 2) it expanded knowledge of standards and made them much easier to understand, 3) they learned how technology can be used for student-centered and discovery approaches, and 4) the module showed the steps to implementing technology as well as strategies and paths for various subjects and various types of teachers. Comments like, "The module opened my eyes to new and innovative ways to help my students learn by using technology," "Before looking at the module, I didn't know much at all about the different [technology] options available" and "[I was] amazed at the information this module has to offer" were numerous.

Items 9 and 10 evaluated the value of the online module for the student. Students positively rated the module as a valuable part of the course (3.67). Student reflections supported this data; 97% (113 out of 117) of students reported that the module was a valuable learning experience. They reported 1) gaining a deeper understanding of what technology can do to enhance children's learning experiences, 2) feeling more secure about using technology in student teaching, 3) learning new ways to make lessons more student centered, 4) realizing the importance of integration of technology in the classroom, 5) acquiring an expanded view of the one computer classroom, and 6) finding the module a great learning experience to discover a new way of teaching. Students commented positively on the importance of technology in the classroom: "[The module] expanded my view on the use of technology." "[I] Now know the important impact technology can have on both learner and teacher." "This online module opened my eyes to the importance of computers in the classroom."

Conclusion

The findings from this study indicate that online modules incorporating technology into the pre-service teacher education curriculum can be valuable tools. Students in pre-service teacher education courses reported that the modules promote the use of technology in their field experiences and expand their knowledge of ways to effectively integrate technology into the curriculum. Through the experience the students were challenged to think about how technology can help their students learn in the classroom. A student described it this way, "One crucial aspect I learned...was that it is so important not to use technology separate from the curriculum, but rather find any way possible to infuse it within the curriculum to enhance learning. I realized that students would be able to understand concepts on a higher level when technology is used in the classroom." Several students in speech and language pathology were especially positive about the online module experience: "I never realized how blind I was when it came to integrating technology into a speech and language therapy session or clinic." "At first I was unable to make a connection between technology and speech therapy, but with more information later on, a light bulb went on and I finally pieced together what I was missing."

On the use of standards one student commented: "Technology can be incorporated in the existing curriculum in almost any subject. Spreadsheets could be incorporated into a math lesson or the students could use an Internet scavenger hunt to learn more about something they are studying in social studies. By incorporating technology into the existing curriculum we can meet both the content standards and the technology standards at once. The key is to begin with the standard and learning objective you want students to achieve and then incorporate technology effectively."

While the use of the online technology modules has been positive overall for the students, faculty will need to further evaluate and improve content in the Spring 2002 semester. As part of the collaborative project, all nine modules will be shared among the institutions to be evaluated and revised for use in the teacher education curriculum at each campus. The students' responses to the online modules indicate it will be well worth the effort.

Table 1: Item Analysis

Questions	Mean (n=244)	SD (n=244)
1. Learning how to use the technology module was adequately discussed in class.	3.91	0.80
2. Learning how to use the technology module required relatively little help from others.	3.62	0.99
3. The technology module assignments were appropriate for this course.	3.98	0.89
4. The technology module assignments required too much time.	2.93	1.05
5. Learning the computer applications for the technology module was relatively easy.	3.81	0.77
6. The technology module was well integrated with the rest of the course.	3.67	0.96
7. The technology module contributed to my understanding of the course material.	3.47	0.99
8. The technology module enhanced my interest in the course material.	3.42	0.99
9. This course would have been better without the technology module.	2.44	1.02
10. Overall, the technology module was a valuable part of this course.	3.67	0.94

1=Strongly Disagree 2=Disagree 3=Neutral/No Opinion 4=Agree 5=Strongly Agree

Table 2: User Technology Level

	Beginner (n=18)		Intermediate User (n=64)		Advanced (n=131)		Expert User (n=31)	
Questions	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1. Learning how to use the technology module was adequately discussed in class.	3.83	0.83	3.78	0.76	4.05	0.72	3.68	1.06
2. Learning how to use the technology module required relatively little help from others.	2.89	1.05	3.55	0.93	3.63	0.93	4.19	0.96
3. The technology module assignments were appropriate for this course.	3.72	0.65	3.69	1.00	4.14	0.76	4.06	1.08
4. The technology module assignments required too much time.	3.06	0.97	3.09	1.11	2.82	0.98	2.94	1.16
5. Learning the computer applications for the technology module was relatively easy.	3.56	0.76	3.64	0.69	3.85	0.73	4.13	0.98
6. The technology module was well integrated with the rest of the course.	3.78	0.71	3.44	1.04	3.82	0.84	3.42	1.19
7. The technology module contributed to my understanding of the course material.	3.78	0.85	3.19	1.06	3.63	0.86	3.19	1.18
8. The technology module enhanced my interest in the course material.	3.50	0.83	3.11	1.03	3.65	0.92	3.03	1.03
9. This course would have been better without the technology module.	2.72	0.99	2.67	1.08	2.27	0.93	2.55	1.16
10. Overall, the technology module was a valuable part of this course.	3.78	0.63	3.36	1.04	3.88	0.83	3.39	1.10

1=Strongly Disagree 2=Disagree 3=Neutral/No Opinion 4=Agree 5=Strongly Agree

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PT3 (Past, Present, and Potential): Sustaining Existing Technology Integration Efforts While Anticipating the Future

Rick Voithofer, Ohio State University, US
Suzanne Damarin, Ohio State University, US
Donna Weatherholtz, Ohio State University, US
Jennifer Strickland, Ohio State University, US

This proposed panel will offer a cross section of experiences and lessons from the implementation of a Preparing Tomorrow's Teachers to Use Technology (PT3) award in an urban setting at a large Midwestern university. Following a one year capacity building grant, this PT3 grant is currently in the second year of its three year duration. The participants in the panel will include one of the grant's principal investigators, the grant project manager, a faculty member involved in both teaching pre-service teachers technology skills and training teacher education faculty in technology integration, and a graduate assistant who is helping elementary and middle school teacher education faculty and students with technology infusion. The panel participants will address the following topic(s):

1. Project Manager – Overview of the grant including a history of its implementation
2. Faculty member – Pre-service teacher technology course and faculty technology integration training
3. Graduate Assistant – Elementary and middle school teacher education
4. Grant PI – Sustaining Change in Changing Times

A more in-depth description of each panelist's presentation follows:

Presenter 1 – **Project Manager** (Grant Overview)

This presentation will offer an overview of the current grant structure and its history. The Technology Enhanced Teaching and Learning (TETL) Implementation Grant, awarded by the U.S. Department of Education's Preparing Tomorrow's Teachers to Use Technology (PT3) Program, focuses on increasing the technological knowledge and skills of students in teacher education programs to ensure that every graduate will be able to use technology effectively in the classroom. The emphasis on systemic change and improvement in the College of Education's teacher education programs' curriculum makes use of technology to improve teaching practices and student learning opportunities.

The goal of the Technology Enhanced Teaching and Learning Implementation Grant is:

? to integrate technology thoroughly and effectively into pre-service teacher education programs
? to decrease the "digital differences" in an urban school district
? to build upon the best features of existing teacher education programs
? to involve K-12 teachers in all phases of the project
? to assure sustainability of the resulting revised programs and practices
? to prepare faculty and students to meet the national accreditation technology standards.

The project includes professional development in the uses of technology in the classroom. The professional development and support component targets mentor teachers, clinical educators, pre-service teachers and faculty to increase their knowledge and abilities to effectively incorporate technology into field experiences, school classrooms and pre-service courses. Professional development efforts focus on 1. providing a variety of learning activities including hands-on engagement with classroom technologies; 2. on-going support to promote participants' application of what they learn to their own courses and classrooms; and 3. reflecting on the professional development activities.

The local urban school district and the district education association join the College of Education in this grant as partners in pre-service courses, field experiences and technologically-rich school classrooms. In this partnership, technology issues, such as equity, diversity, and the digital divide in urban schools are addressed.

Presenter 2 – **Faculty member** (Pre-service teacher technology education / Faculty technology integration training)

This presentation will discuss PT3 supported work in a required technology education class for pre-service teachers and faculty technology integration training.

"Media and Technology in Education" is the only required technology course for pre-service teachers in the teacher education program at this university. The course provides students with basic technology skills in web development, Microsoft PowerPoint, and Microsoft Excel while teaching them how to evaluate technology resources (i.e. web sites and educational software), use electronic communication including discussion boards and create lesson plans that incorporate media and technology in teaching high order thinking skills. By the end of the course students leave with a complete web-based teaching portfolio. The course teaches students a constructivist approach in which technology is treated as only one aspect of the classroom ecology. Changes in the course over the past two years and plans for course evolution will be central to this discussion.

In addition to describing this course, the presenter will explain teacher education faculty technology training that is being supported by the grant. This training includes workshops on web development, PowerPoint, Excel, video production, computer graphics, WebCT, and computer troubleshooting. In addition to these workshops, faculty receive individualized training from educational technology faculty and graduate assistants on their office computer. Both workshops and individualized training include technical instruction and suggestions for technology integration that moves beyond using technology as merely an add-on to their courses.

Presenter 3 – **Graduate Assistant** (Elementary and Secondary Education)

The presentation will describe PT3 supported work in technology integration in elementary and middle school teacher education. The elementary and middle childhood cohorts consist of ten faculty members, sixty Master of Education students, five graduate assistants, and fifty public school teachers (i.e., cooperating educators). Their community of learners (COL) holds as its mission the preparation of professionals who are broadly concerned with multidisciplinary approaches to education, and bringing to bear such approaches on problems of teaching and learning for diverse populations of students. This program area is centrally defined by a continuing examination of issues related to integration. Watchwords for the program include "learner-centered" and developmental approaches, holistic teaching, and social construction of classroom culture, inquiry, and informal and experience-based approaches to curriculum.

With the onset of the College's PT3 grant the elementary and middle school cohorts have continually examined and engaged in discovering how technology can become integrated into their pedagogies thereby infusing their program with significant technology experiences. This area has engaged in group and individual workshops, offered student computer labs along with a weekly discussion group surrounding technology in the classroom for the students. Additionally, they've offered workshops and conferences for the cooperating educators in the public schools as well as weekly discussion groups surrounding technology and education.

This presentation will describe a variety of projects underway that explore various technologies and how these technologies can improve and enhance current pedagogies. Currently a number of the elementary and middle school faculty, cooperating educators, and all of their graduate students have and maintain websites for electronic portfolios, course support, classroom display, and school information. A group of cooperating educators and a faculty member are exploring ways to use their websites as a means to engage in deeper thinking about their practice. Another group of cooperating educators with a faculty member are exploring the use of wireless technology using HandSpring Visors to find ways in which ubiquitous computing can facilitate thinking and learning. Another group is exploring video and how this can improve individual practice.

Presenter 4 – **Grant PI** (Sustaining Change in Changing Times)

With a year of capacity building and nearly two years of PT3 implementation, the TETL projects have effected considerable change, heightening faculty knowledge and use of technology, increasing pre-service teacher experience using technology instructionally, and generally making technology an integral part of the meaning of teacher education at this University. Are the changes strong enough to flourish in times of fiscal restraint? Or, will these changes whither and die in the institutional storms of budget restructuring, economic recession, new forms of faculty and program accountability, and other factors impacting teacher education?

This presentation summarizes, first, the ways in which the we sought to assure sustainability of change in the design of the TETL projects, and secondly, the nature of the institutional and state-mandated threats to sustainability on the immediate horizon. The dangers to sustainability and potential means of assuring continuity are examined in detail and various ways we are addressing them are described. The paper then argues that due to the way the TETL project is structured, any external funding for technology will have greater change value in times of fiscal crisis than in "good times." As we continue in a deepening recession, any new monies ear-marked for integration of technology into pre-service teacher education programs will constitute a larger percentage of the total funds available for state or institutionally mandated curriculum revision. The result will be a more thorough integration of technology into all other changes, thus increasing the probability of sustaining PT3 induced changes.

Teaming with Technology: Faculty Design Teams for Technology Integration in Teacher Education

Greg Waddoups
Rodney Earle

Brigham Young University

Background/Introduction

Connecting curriculum and technology is a goal of the McKay School of Education teacher preparation program. As part of the federal Preparing Tomorrow's Teachers to Use Technology (PT3), the McKay School of Education is supporting graduate and undergraduate students, technology specialists, public school teachers, and university faculty in a collaborative effort to create technology-enhanced curricula. The key feature of these efforts is the development of faculty design teams which are organized and supported to create technology-enhanced and problem based curriculum. Successful support of these faculty design teams requires providing training for individuals concerning theories of integration, instruction on how to use a particular technology, as well as support for the team to develop a common purpose.

From our analysis of the initial activities of the PT3 support staff and the faculty design teams, we have discovered basic principles that have led to successful personal and institutional change. First, early efforts must be made to understand the needs of key stakeholders involved in the teacher preparation program. Meeting the needs of key stakeholders and building buy in from them is crucial for the early success of the implementation of the BYU PT3 grant activities. Second, a core team, led by faculty must be organized and function to initiate the institutional change activities. It is crucial that these change efforts be seen as organic and originating from the faculty. Indeed, faculty members occupy a unique place as mediators between administrators, students, and district support staff and as such are important change agents. Third, faculty design teams should be organized according to naturally occurring alliances in the Teacher Education program. This requires understanding these alliances and using them to bolster reform initiative. Fourth, flexible support structures including access to instructional technologies and training must be constructed to support the various needs and interests of teacher education faculty and design team members. A "one size fits all" approach to reform will not be successful in the context of Teacher Education programs. Fifth, for faculty design teams to be successfully they must be committed to the idea of technology and system reform. Sixth, it is important to foster collaboration between and among faculty design teams. It is only through this collaboration that systemic reform can take hold and lead to institutional change (Fullan and Stielgelbauer, 1991).

In this presentation, we provide detailed case studies highlighting the ways in which these principles are realized in the formation, development, and support of faculty design teams. In addition, these case studies demonstrate the ways in which the "faculty design team model" facilitates systemic reform within the BYU College of Education and how these reforms reach affiliated schools and districts. In this way, change is seen as multiply embedded in a system of relationships, rather than the possession of an individual or an institution. Case study research has a long history as a qualitative research method for capturing the complexity of systemic reform and institutional change (Fullan, 1996; Merriam, 1987; Stake, 1988; Yin, 1979). We also hope these two case studies will serve as a model for other Teacher Education programs interested in adopting the use of faculty design teams for accomplishing technology integration and systemic reform.

Case study one will focus on the efforts of a faculty design team to develop electronic portfolios for pre-service students. This design team consists of tenure track faculty, clinical faculty associates, and technology support staff. This case describes the ways in which support from the PT3 initiative raised awareness among individual design team participants concerning the need for technology integration and facilitated alignment among team members on the utility of electronic portfolios. Case study two focuses on a design team in the area of history and social science curriculum who prior to the PT3 initiative did not have the technical or conceptual understanding to integrate technology into their teacher education courses. This case describes the ways in which support for individual team members and facilitation of team alignment has led to systemic reform within this content area. Through this case study we demonstrate the ways in which changes in faculty uses of technology have led to changes in the technology use of pre-service teachers.

We conclude this presentation by discussing the extent to which the six principles of successful technology integration and systemic reform are realized within the context of these two case studies.

Knowledge Innovation for Technology in Education (KITE)

Feng-Kwei Wang, Chi-Ren Shyu, David Jonassen
School of Information Science & Learning Technologies
University of Missouri – Columbia
wangfeng@missouri.edu, shyuc@missouri.edu, jonassen@missouri.edu

Abstact. The Knowledge Innovation for Technology in Education (KITE) project is funded by US Department of Education to build a knowledge repository with case-based reasoning capabilities to capture and disseminate the best practices and lessons learned of technology integration experiences by teachers and teacher educators. The project's overarching mission is to build a K-16 community of practice through this knowledge repository that enables learning through sharing, communal understanding through storytelling, continuous exchange and creation of new knowledge, and collective problem solving.

"Today's students live in a global, knowledge-based age, and they deserve teachers whose practice embraces the best that technology can bring to learning" (Lemke, 1999, p.i of ISTE study).

As the face of American classrooms continues to change with rapidly increasing technological changes, greater diversity, and a projected need for 2.2 million new teachers in the next decade, teacher training institutions are faced with the challenge of graduating new teachers who will be adept at keeping pace with the technology explosion in the classroom. A 1999 study entitled *Will New Teachers be Prepared to Teach in a Digital Age?* —commissioned by the Milken Exchange on Education Technology and conducted by the International Society for Technology in Education (ISTE)—documented that while teacher preparation programs are well-intentioned, they are not providing the kind of training and exposure teachers need to be proficient in integrating technology in their teaching.

Issues

To increase the level of technology integration, the ISTE study strongly recommends that "in order to provide models for change, researchers, professionals societies, and education agencies should – on an ongoing basis – identify, study, and disseminate examples of effective technology integration ..." The advocacy for sharing examples illuminates four common issues that have hindered teacher education from overcoming problems in technology integration. First, it is important to realize that many problems in technology integration are universal for teacher educators and inservice teachers. However, because of lack of collaboration, many educators and teachers are powerless or inadequate to tackle these problems individually. Second, it is very likely that some educators and teachers have successful experiences in integrating technology. However, their successes often occur in isolation and are not documented and thus are not disseminated to others in any systematic manner. As a result, these hidden experiences cannot be shared across the entire teacher enterprise. Third, for some novice teachers, they need to learn. Probably, the best way to learn is through observing other experienced teachers. This experience transfer helps a novice teacher learn better, faster, and more effectively from successes and mistakes of other teachers. Fourth, experienced teachers are often entrenched with their practices and are not receptive to newer and better strategy, technology, process, and practice. In today's environment of rapid changes and technological discontinuity, even sharable knowledge and expertise often become obsolete quickly. Without constant reflection, successful experiences can easily become "stale" or even the root of failure.

Project Design

The lack of collaboration and sharing experiences between educators and teachers result in tremendous waste of resources on duplicate efforts and loss of valuable knowledge and expertise. In response to these issues, the Knowledge Innovation for Technology in Education (KITE) project funded by the Preparing Tomorrow's Teachers to Use Technology (PT3) program builds upon the foundation set in place by the Technology Integration Process Knowledge Repository Project (TIP-KR) and the TechConnect Project, both of which captured a collection of stories describing teacher education faculty's and inservice teachers' experiences in integrating technology.

The project involves a consortium of 8 teacher education programs collaborating to create and diffuse technology integration knowledge. As the lead institution of this project, The University of Missouri-Columbia (MU) will enhance and continue to support the ongoing development of the knowledge repository, with improvements in depth of analysis, breadth of content, and functionality to strengthen its effectiveness. The knowledge repository applies case-based reasoning, a contemporary theory of human memory and intellect, to describe and index stories and cases as they are added to the repository. It documents and organizes experiences in technology integration as cases. These cases will be categorized and indexed so they can be retrieved easily by all community members. In this way, technology integration problems are solved by finding similar previous experiences captured in the knowledge repository and applying the lessons to the new experience.

MU will provide global access to the repository through the Web, provide training to partner institutions, introduce partners to effective technology integration tools, provide follow-up support throughout the project period, and engage in ongoing project evaluation. Each partner institution will identify 1) a Knowledge Scout who will be responsible for collecting, reporting, and updating technology integration cases from his/her institution in the knowledge repository; and 2) a Technology Integration Specialist who will serve as the local change agent and project coordinator.

Project Goals

Adopting a knowledge repository approach and case-based reasoning, the Knowledge Development Consortium seeks to expand and enhance its initial efforts in the TIP-KR and TechConnect through a collaborative partnership for innovation and change involving selected teacher education programs and K-12 schools. The project's overarching mission is to build a K-16 community of practice through a knowledge repository of technology integration that enables learning through sharing, communal understanding through storytelling, continuous exchange and creation of new knowledge, and collective problem solving. In the context of the technology integration community, its significance is manifested by the following project goals:

- Create a community memory to preserve the intellectual asset of the community of practice;
- Engender a process for continuous knowledge creation;
- Build professional excellence through knowledge sharing;
- Form a virtual learning community beyond time and space boundaries;
- Establish a conducive environment to effective knowledge creation and diffusion; and
- Assess effectiveness of new knowledge produced from this project.

Inside a Community of Learners: Case Studies of Learning Circles of the Southwest Mississippi Center for Educational Technology

Bosede Aworuwa, Department of Education & Psychology, aworuwa@lorman.alcorn.edu
Babu Patlolla, Department of Biological Sciences, babu@lorman.alcorn.edu
Doris McGowan, Department of Education & Psychology, dmcgowan@lorman.alcorn.edu;
Pamela Felder, Department of Education & Psychology, pfelder@lorman.alcorn.edu;
Delores Williams, Department of Education & Psychology, deloresw@lorman.alcorn.edu;
Kenneth H. Williams, Department of Social Sciences, wilken@lorman.alcorn.edu;
Willie D. Humphrey, Department of Biological Sciences, humphrey@lorman.alcorn.edu,
Alcorn State University
United States

Belinda James Hawkins, Wilkinson County Elementary School, Woodville, MS, Luckyabc18@hotmail.com
Gail Sherman, A.W. Watson Elementary School, Port Gibson, MS, atjsherman@aol.com
Sharon Middleton, Franklin High School, Meadville, MS, midtrp@aol.com
Trena Warren, A.W. Watson Elementary School, Port Gibson MS, TreWarren@aol.com
Isaac L. King, Natchez High School, Natchez MS, nhsisaaclking2000@yahoo.com
United States

Abstract: Six learning circles were formed to pilot study the technology integration and collaborative learning initiative of Southwest Mississippi Center for Educational Technology (SMCET), a PT3 Implementation Grant project. The learning circles consist of pre-service teachers, university faculty at Alcorn State University; and in-service teachers and K-12 students from four school districts. University professors and their partner teachers jointly develop activities based on K-12 curriculum. University students (pre-service teachers) assist K-12 students to complete the activities using variety of technologies. The goal was to find out what kinds of human-technology interaction promote learning among different level of learners in the learning circles, and how that might contribute to an understanding of how best to use technology in the classroom. As a result of this project, faculty and teachers are rethinking their teaching strategies and exploring a model of teacher education that involve stronger university-K-12 collaboration and technology use in the classroom.

Introduction

Many of today's educational technology initiatives are focusing on integration, as it is becoming evident that training in basic technology skills alone has not been enough to get teachers to automatically plan for the use of technology in the classroom. According to Robert Tinker, President of the Concord Consortium, "In spite of the decades that computers have been in schools, we have yet to see the revolution they could cause in learning." Teachers need training on implementation and integration that is based on tested models. Several models of technology integration are being developed to help educators make the transition from the traditional lecture method to creating technology -rich learning environments for their students. The Tri-Rivers Educational Computer Association (TRECA)'s Summer Academy (TSA) was developed to help teachers learn how to integrate technology by experiencing integration both as 'students' and teachers. Through a two-week professional development, teachers experienced learning and teaching with technology tools such as online discussion forum, taking fieldtrips and recording events with digital cameras, and producing multimedia projects in several subject areas (Crohen, 2001). Another model of technology integration is the Virtual High School, which delivers online instructions to 8,000 students in 150 high schools across the United States and in 10 foreign countries (Allen, 2001).

Learning Circles is a model of learning with technology developed by Margaret Riel and colleagues, and sponsored by AT&T for several years. It has been used successfully in several settings to explore learning issues, and evidence abounds that it promotes student achievement. According to Riel (1990), students in a Learning Circle use better grammar and syntax when they collaboratively author newspapers and booklets with peers from around the world. Learning Circles are usually organized around specific projects, which may involve online activities. "The best Learning Circles have clear work activities specified that require planning, execution, and reporting, followed by comparison and collaboration across sites" (Jonassen, Peck, & Wilson, 1999). Jonassen (2000) contends that collaboration in Learning Circles is easier among known rather than imaginary audience.

The learning circle concept is based on the constructivist approach, where technology is seen as a tool with which learners think and learn. The constructivist views learners as constructing their own reality by interpreting life experiences. These interpretations assume meaning through social negotiation that takes place through active collaboration (Jonassen, Peck, & Wilson, 1999). The role of the teacher in this collaboration is to create environments in which learners can actively construct their own knowledge rather than recapitulating the teacher's interpretations of the world. This environment also assume that the teacher becomes a learner in some instances, especially since technology is a relatively new tool to the teacher while it is a tool that the student is growing up with. The Learning Circles in the current study were adapted to fit local conditions, but assumes many of the elements of the ones created and tested by Riel and colleagues.

The Learning Circles

Six Learning Circles were formed in Fall of 2001 to pilot study the technology integration model of the Southwest Mississippi Center for Educational Technology (SMCET), a project of the "Preparing Tomorrow's Teachers to Use Technology", sponsored by the U.S. Department of Education. Each Learning Circle was awarded a mini-grant of $2000, which was matched by the four partner school districts in equipment and other resources, such as teachers' time and lab hours.

Establishing the learning circles served a two-fold purpose of enabling us to explore how technology can enhance learning in the classroom at both university and K-12 levels, and to provide environments in which pre-service teachers learn to become technology-using teachers. The goal of the Learning Circles is to promote effective learning and students' achievement through technology integration into the classrooms of the participants. Among the expected outcomes of the Circles' activities are that all levels of learners in the circles develop: a) technology literacy skills, b) reading skills, c) higher-order thinking skills, c) collaboration skills, and d) research skills. We believe that these skills are the key to school achievement. Each Learning Circle designed curriculum-based activities to be completed by student participants within the context of the regular classroom, supplemented by out-of-class experiences. The following table contains the composition and activities of the Learning Circles:

Learning Circle #1

Project Name: Mainstream Integrated Technology (MIT).

Participants Description: One 4th grade class and teacher at Wilkinson County Elementary School, Woodville, MS; One Professor of History and a pre-service teacher majoring in History Education at Alcorn State University

Project Description: Immerse students in technology-rich, project-based learning environment. As students rotate through work centers to complete project tasks, they also acquire skills required in the curriculum framework. The university student serves as a facilitator for the 4th graders, developing project ideas on Social Studies topics.

Role of Technology: Word processing to type reports of class activities; Taking virtual field trips; Researching various topics on the Internet; Creating class website and electronic portfolios of students' works; Creating digital images with scanners and digital cameras.

Learning Circle #2

Project Name: Enhancing Mathematics and Language Arts Learning with Technology in a Special Education Classroom.

Participants Description: One Special Education Teacher & class (Grades 9-12) at Franklin High School, Meadville, MS; One Special Education professor, and pre-service teachers enrolled in a Psychology of Exceptional Children course at Alcorn State University.

Project Description: Technology is seen as a tool for facilitating learning of targeted skills and remediation of deficiencies in reading, mathematics, and life skills in the Special Education classroom. Pre-service teachers become E-pals to the students in this class, engaging them in online discussion of books read, providing corrective feedback on students' writing through e-mail messages, and finding materials on the Internet to reinforce concept taught in class.

Role of Technology: Handheld calculators and spreadsheet for learning mathematics skills; Reading Pens to enhance reading skills; Internet for researching topics; E-mail with E-pals to facilitate reading and writing skills.

Learning Circle #3

Project Name: Technology Integration in a High School Science Classroom.

Participants Description: One High School Science teacher and a class of 10th -12th grade students in Human Anatomy, Physiology, and Botany courses at Natchez High School, Natchez, MS; One Biology professor and two pre-service teachers majoring in Biology Education at Alcorn State University.

Project Description: Main focus is technology integration into the instruction of three science courses as a way to motivate students to learn the subjects. The university professor and the science teacher jointly explored and selected materials including software, equipment, and Internet sources. This is supplemented with weekly presentations and experiments led by the University professor. The high school students are assigned projects and reports in which pre-service teachers serve as facilitators and peer-collaborators.

Role of Technology: Researching science topics on the Internet; Developing presentations in PowerPoint; Using standalone software, such as A.D.A.M. to explore science topics; Laboratory equipment for experiments; Large screen TV with AverKey attached to a computer for whole class instruction and presentations.

Learning Circle #4

Project Name: Using Technology to Enhance Reading Performance of Third and Fourth Grade Students.

Participants Description: One 3rd & 4th grade reading teacher and students at A.W. Watson Elementary School, Port Gibson, MS; One Reading Instructor and three pre-service teachers enrolled in a Reading course at Alcorn State University.

Project Description: Emphasis on collaboration between pre-service teacher education students and students in 3rd and 4th grade reading class, and implementation of intervention strategies from the Mississippi Reading Initiative. Using the reading intervention strategies learned in their reading class, pre-service teachers work with the elementary students to develop book reports in PowerPoint. Books read will be compiled into an electronic database.

Role of Technology: Developing book reports and biographies of authors in PowerPoint; Illustrating book report using graphics and clip arts; Concept mapping using Kidspiration; Creating an electronic database of books read by students; Publishing students book reviews on online sources such as the Cyberzine.

Learning Circle #5

Project Name: Working Together to Connect Curriculum and Technology with Learning Inside and Outside of the Classroom.

Participants Description: One 5th grade class and teacher at A.W. Watson Elementary School, Port Gibson, MS; One Professor of Elementary Education and 15 pre-service teachers enrolled in two method courses at Alcorn State University.

Project Description: Grouped into subject areas, prospective teachers from the university form partnership with groups of fifth graders to investigate topics in Language Arts, Mathematics, Science, and Social Studies. They assist the 5th graders to set up e-mail accounts through which they shared information, exchange ideas as they jointly complete the projects they set up for themselves. Among the topics being explored are: 'Get to Know Your Favorite Authors', 'Probability', 'Harriet Tubman'.

Role of Technology: Researching authors and historical figures from the Internet; Searching for Lesson plans and grading rubrics from the Internet; E- mail communications between university and fifth grade students; PowerPoint presentations of book and project reports.

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Learning Circle #6
Project Name: Integrating Technology in a Science Classroom.
Participants Description: One Science teacher and a class of high school students in Botany and Environmental Science courses at Natchez High School, Natchez, MS; One Biology professor, and Pre-service teachers majoring in Biology Education at Alcorn State University.
Project Description: This program focuses on using technology to facilitate learning of Botany and Environmental Science to meet the Mississippi Science Framework. The teacher selects course-related web sites for students to explore, supplemented by presentations and experiments led by the University professor, assisted by the pre-service teachers. Strong collaboration with Learning Circle 3 in several activities.
Role of Technology: Researching course materials from the Internet; Reading Daily Science news from the Internet; Preparing class presentations in PowerPoint; Using large screen TV with AverKey hooked up to a computer for whole class instruction and presentations.

Table 1: Learning Circles Description. See http://smcet.alcorn.edu/LearningCircles for more descriptions.

Monthly Meetings

Collaboration across sites takes the form of exchange of ideas during monthly meetings and participation in weekly online chats in the Circles' online community. Faculty and teachers share information about the progress in their Learning Circles, teaching issues, problems, and solutions. As illustrated in the extract below, Circle members learn classroom tips from one another:

> trena : I think all of this is great! I just have questions about the management of your class in using the technology. How do you arrange for all of your students to have access to the technology?
> **Bosede** : I guess Belinda can answer that better than I
> Belinda : Trena my students are grouped in three's and we rotate every twenty minutes. I have three computers, so when they get to the computer, they have a task to do as a group or an individual. It depends on what I want them to do.
> Belinda : One time, they had to do Sequential Events. "How to Make a Ham and Cheese Sandwich." We had practiced earlier in the week on paper and through discussion the words they should use and what I will be looking for. Well of course they loved it.
> trena : That's sort of like the arrangement I have planned for my class. It works fine for individual tasks and projects; I just wondered how you were incorporating the technology in the delivery of your lessons. Before long I will be able to supplement my ... delivery with the smart board in our school media room.
> Belinda : On cooperating groups, they had to write up their paragraph in one center and type it when they rotated to the computers.
> trena : Do you have all your computers networked to one printer? (***Online Chat, October 18, 2001***)

Reflection is emphasized during the meetings and in online chats. Faculty and teachers are encouraged to ask questions such as what does this new teaching approach mean to my students and me? How am I coping with the intellectual disequilibria that the approach represents? What does my role as a facilitator of learning entail? What am I learning from this experience? The afternoon session of the monthly meeting is devoted to training on specific technologies being used in the Learning Circle classrooms.

Conclusions

It is too early in the pilot year to begin to look for specific impacts of the Learning Circles. However, some interesting patterns are emerging that may be of interest to educators and technology advocates. One such pattern is that university and K-12 educators in the Circles are beginning to realize the advantage of pre-service teachers making early connection between their teacher education curricula and real life classroom events. The Learning Circle provides opportunity for more intensive, integrated and longer practicum experiences for students that have not been possible before.

> "…. I had no idea that it was going to have such an impact on the students as it did, both groups of students really – the college students and the public school students. Once they got into the classroom, once we've finally decided on how many hours they would do and what days they would go, they bonded with the students there. As they bonded, they really got more work done than anticipated. So they did work with the students by e-mailing them, not only that, they developed PowerPoint presentations, and they presented their PowerPoint [presentations]. And students, both the university and A.W. Watson students were very excited. It was really a learning situation for the students. It was really a learning situation for me because I found that students were very enthusiastic about going back to the public school and working with students there…" ***(Doris, University faculty, Learning Circle 5, Interview Fall 2001)***

Rethinking teaching. Teachers and faculty in the learning circles are rethinking their teaching strategies. The learning circle approach, with the integration of technology, forced participants to begin to look critically at what they do in the classroom, to face issues of own and students' learning. They are realizing that traditional teaching strategies seem to underestimate the intellectual abilities of children, and their natural capacity for motivation through exploration. Even though developing a book report in PowerPoint may be regarded as low-end use of technology, it represents a major shift in the way these students used to learn. Having to organize information in presentation format, selecting appropriate slides and illustrative graphics enable deep processing of information that may not have occurred in the traditional book report. Also, by becoming learners themselves, teachers and faculty members are more sensitive to learning concerns of their students. In addition, the faculty and teachers are learning to balance the need to hold on to what is familiar and trying something new, something that is not safe, perhaps, but may be more rewarding. Some of the educators are able to make this shift easily while some are making it gradually. Student participants seem to take the changes in stride. University students (pre-service teachers) found that they enjoyed the time they spent in the school with the children (K-12 students). It further confirmed the reasons they wanted to be teachers.

Action Research

Action research was built into this project to enable us answer the question of what makes educational technology effective in the six situations under study. We wanted to find out the skills and knowledge that students gain by using technology as a tool of learning; how using technology changes organization of learning environment, and the outcomes that can reasonably be expected at different stages and forms of technology implementation. Some of the baseline data we have collected include, 1) students scores on the Terra Nova tests for current and previous years, students scores on teacher made pre-test based on the Terra Nova format, and scores on first 9-week examination. These will be analyzed to establish baseline information about students' achievement level at the beginning of the project. During the year, other data will be collected for formative and summative evaluation purposes. Quantitative data will be supplemented with qualitative information from students, teachers, and faculty. These include journal and reflection notes, sample products, sample e-mail conversations, online chat and discussion transcripts, interviews, and analysis of videotaped classroom events.

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Evaluating PT3

Lisa A. Washington
Rockman Et Al
USA
lisa@rockman.com

Jane Cooper
Rockman Et Al
USA
jane@rockman.com

Abstract: This paper discusses issues learned while evaluating 12 PT3 projects in various stages of the grant's funding period. Although many issues can be discussed we have chosen to focus on issues related to gathering data from faculty and the efficacy of self-reported technology skills. As external evaluators, we bring a unique perspective on PT3 and will share our thoughts on how the evaluative data assist project directors with program development.

Overview

Rockman Et Al is an independent research and consulting firm, specializing in the study of technology's role and impact on education. We are currently serving as external evaluators of 12 Preparing Tomorrow's Teachers to Use Technology (PT3) projects, funded by the U.S. Department of Education to support the efforts of schools and colleges of education (SCOE) to integrate the use of technology into pre-service teacher education. The projects we are evaluating include Implementation and Catalyst grantees in various stages of the funding cycle; they represent large and mid-size public and private SCOEs in the West, Northeast, Mid Atlantic, and Southern regions of the country. While each project brings its own perspective to preparing its pre-service teachers and transforming teacher education, we have found that there are also common themes related to the implementation and evaluation of the PT3 projects. It is with this lens that we share our unique perspective as external evaluators and discuss our lessons learned.

In reviewing the data we found a number of common themes related to evaluating PT3 projects, however, in this paper we focus on some of the challenges we faced as external evaluators, including: developing instruments that measure technology skill, using self-reported data to inform project development, identifying barriers to project implementation, and helping project directors revisit their project timelines.

Issues and Challenges

Many of the PT3 projects we evaluate are seeking to transform teacher education programs by educating faculty about how to model the meaningful integration of technology into pre-service teacher education. Typically this transformation begins by supporting faculty in the use of technology in their own courses. To provide project directors with meaningful data we developed a series of pre- and post-survey questions that require faculty to rate their technology skills on a 5-point scale, (ranging from 1 = "cannot perform" to 5 = "I can teach others"). These skills questions focus on basic computer operations, use of telecommunications, use of productivity tools (word processing, spreadsheets, data bases), use of the Internet, and developing Web pages and multimedia presentations. The challenge in developing this instrument was using terminology that was understandable for all faculty whether they were technology users or not. Our assessment of these skills was focused on basic operations and not the integration of these skills. The purpose was to set the stage for project directors about what skills faculty participants were bringing to the project and to help guide the development of faculty training workshops.

We have found that faculty participants are comfortable with basic computer operations and using the computer for basic productivity such as word processing, sending and receiving email and searching the Internet.

Faculty, on average, did not consider themselves to be skilled in desktop publishing, creating Web pages and multimedia presentations, and troubleshooting.

While we rely heavily on faculty members' self-reported data in our reporting, we acknowledge that there are limitations to doing so. We have found that faculty tend to overrate their ability to use various technology applications. They tend to rate themselves higher when they are not proficient users of technology because they are not aware of what they do not know. We have found that faculty self-ratings on the post-survey remain the same or even decrease. This we feel is attributed to faculty, through participation in the program, gaining a true understanding of the various technologies. Whereas, on the pre-survey they may have overrated their skills due to lack of knowledge, the post-survey appears to be a truer measure of their technology skills. This poses a challenge for evaluators because in reporting the data it appears that the project is not having a meaningful impact on project participants.

In addition to the aforementioned difficulties in using data gathered from the faculty members, we learned that certain unanticipated issues developed for the project directors. Project directors are required to establish project goals and objectives and set timelines for meeting them. Given that many of the project directors are the technology innovators on their campuses, they believed at the outset that they could have an impact on the teacher education faculty at a rate that would meet the timelines.

In looking at how our PT3 clients began implementing their projects, we found that the majority of directors did not anticipate the time that would be needed to train the faculty in basic technology skills. This is consistent with Wisniewski's (2000) finding that three years is often insufficient to truly impact the acquisition of skills and knowledge that lead to a change on the part of individual faculty members. Project directors were surprised that while faculty support was embedded into the project (e.g. technology training, tutorials, and technical support) that they still faced faculty resistance to full cooperation and participation. Our evaluation activities identified that a number of the tenured faculty members lacked sufficient skills to become early adopters of technology, thus limiting their ability to understand how to integrate it into their courses. This finding led directors to refocus their initial efforts from integration of technology into pre-service course work to technology skill development.

The most difficult barrier to overcome was that of time. A challenge for evaluators was to help the directors redesign their original timeline and goals in order to accommodate the difficulties they faced. As evaluators we helped the directors review what they first hoped to accomplish and how they could refocus their efforts to accomplish many of their original goals. Our data included feedback on perceived barriers to integrating technology. Using a 4-point scale, with 1 = never a barrier and 4 = often a barrier, responding faculty, on average, rated *lack of time* (M=3.2) as the greatest barrier to technology integration, with 74% of the faculty indicating that it was *sometimes* or *often* a barrier. This was followed by inadequate equipment (M=3.0), the uncertainty of how to infuse technology into teacher education courses (M=2.8), and the lack of personal technology skill and knowledge (M=2.7). With these data we helped the project directors face some of the issues they may have overlooked in writing the grant proposal. For some of the grant projects this required a narrowing of activities, for others it required expanding their original target group to include additional faculty (i.e. adjunct, Arts and Sciences).

Our evaluation goals this year are to show that while technology integration occurred at a slower rate than intended, that realized change and shifts in attitude have begun and will continue. We are in the process of helping to design and support the ways in which these PT3 grants will continue to affect participating faculty in the goal of supporting teacher candidates.

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Restructuring Teacher Education: Lessons from Evaluating Preservice Teacher Products Using NETS

Nancy Wentworth
Department of Teacher Education
Brigham Young University
USA
nancy_wentworth@byu.edu

Greg Waddoups
Center for Instructional Design
Brigham Young University
USA
greg_waddoups@byu.edu

Rodney Earle
Department of Teacher Education
Brigham Young University
USA
rodney_earle@byu.edu

Abstract: PT3 implementation grant funds have been used to restructure a teacher education program to meet the National Educational Technology Standards (NETS). Technology-enhanced unit plans written by preservice teachers were coded to see which NETS were met. Technology as Productivity tool was met most often followed by Technology as Research Tool. The results of this study seem to indicate that our preservice teachers are using these higher level thinking skills in the unit plans they write. It also indicates that enhancing units planning with technology encourages these types of activities in the units developed by our students.

Introduction

Preparing Tomorrows Teachers to Use Technology (PT3) implementation grant funds have been used to restructure a teacher education program to meet the National Educational Technology Standards (NETS) defined by the International Society for Technology in Education (ISTE). Grant related activities include (1) the creation of curriculum design teams to develop technology-enriched curriculum for both the teacher education program and K-12 schools and the mentoring of BYU faculty and BYU students in the use of the technology-enriched curriculum; (2) collaboration with arts and science departments, five public school districts and the State Office of Education in the development of K-12 technology-enhanced curriculum, and with the two other PT3 grant recipients in Utah to share resources and efforts; and (3) evaluation of the process and products supported by the PT3 funds. This paper will discuss the products developed by preservice teachers in redefined courses by reviewing which NETS standards they have met.

Theoretical Framework

Researchers, parents, and politicians have called for reform in K-12 education to include the integration of learning technologies (Fullan and Stielgelbauer 1991; Means, 1994). One approach of reform in teacher education programs includes providing in-service training to practicing teachers designed to help them change their teaching practice (Fullan and Stielgelbauer, 1991). A second approach includes reforming preservice education to include the use of learning technologies in the context of problem based teaching and learning. The PT3 project in this study focused on both approaches. Teacher education programs often perpetuate the isolation of technology from curriculum and instruction. In many instances, prospective teachers take a computer literacy class separate from content methods classes and rarely engage in real collaboration on how school teachers could integrate technology into authentic learning experiences. Likewise, many public school classrooms do not link instruction to real-life situations or technology integration so the practica experiences of preservice teachers are limited (Pappillion & Cellitti, 1996)

The PT3 funded re-structuring efforts outlined here are designed to alleviate these weaknesses in traditional teacher preparation through simultaneous re-design of teacher preparation and K-12 curricula enriching both with technology integration. Preparing tomorrow's teachers to integrate technology into their instruction requires university faculty to provide preservice teachers with examples and experiences of learning enhanced with technology. These goals are being achieved through creating curriculum design teams composed of School of Education faculty, content specific methods teachers, cooperating teachers, and instructional design and technology specialists who together will re-design our current teacher preparation curricula with the purpose of integrating technology.

Data Collection

The large research agenda for this PT3 grant is to study the systemic change of a preservice program. This paper will address a smaller agenda that of evaluating technology-enhanced unit plans developed by preservice teachers in three teacher education classes. Which NETS standards do the unit plans meet? Do they meet more than one standard? If so, which standard is the most commonly uses with other standards? How does this evaluation of products help teacher education faculty mentor preservice teachers in the development of technology-enhanced curriculum and instruction?

The three instructors of the courses introduced unit design and discussed enhancing the purpose of the unit plans with technology. They selected direct instruction, inquiry learning, and problem-based learning examples and discussed the different uses of technology in each type of unit. They assigned the preservice teachers to write a technology-enhanced unit plan. Each unit was coded by other students and by faculty members on the evaluation team of the PT3 grant as to the type of instruction used and which NETS standard for students it supports. The NETS standards are: (1) Basic Operations and Concepts, (2) Social, Ethical, and Human Issues, (3) Technology Productivity Tools, (4) Technology Communication Tools, (5) Technology Research Tools, and (6) Technology Problem-Solving and Decision-Making Tools. Results were tabulated for total number of standards met, for which standards correlated to other standards, and for a relationship between standards met and the type of instruction used.

Results

Currently 47 unit plans have been written and coded by 3 students each for a total of 141 evaluations. Students only circled the Standard that they felt was addressed in the unit plan. They did not evaluate whether or not the Standard was essential to the unit plan. Of the 141 evaluation 1% coded a lesson with only one standard being met, 4% marked two standards, 7% marked three standards, 51% marked four standards, 35% marked five, and 2% marked all six standards. "Basic operations and concepts" (marked 124 times) and "productivity" (122) were the most common standards met followed by "research" (112), "problem solving and decision making" (88), "communication" (78) and "social, ethical and human issues" (66).

The researchers were surprised to see so many evaluations marked with 4 and 5 standards being met. They wondered if the students understood what it meant to mark a standard so they asked them why they had marked so many. The students said that if the students were using technology in any way they marked basic operations, even if the instruction was not in computer operations. They also commented that they marked technology productivity tool when the students used any software package to produce something, a report, statistically results, a PowerPoint presentation, etc. Again the instruction in the lesson was not about using the tools, but the assignments in the unit plan were.

Three faculty members have coded 52 unit plans using the following rubric:

	Not present in the unit plan	Present but not essential to the unit plan	Present and improves the unit plan	Present and very essential to the unit plan
Basic Operations and Concepts	0	1	2	3
• Students demonstrate a sound understanding of the nature and operation of technology systems. • Students are proficient in the use of technology.				
Social, Ethical, and Human Issues	0	1	2	3
• Students understand the ethical, cultural, and societal issues related to technology. • Students practice responsible use of technology systems, information, and software. • Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.				
Technology Productivity Tools	0	1	2	3
• Students use technology tools to enhance learning, increase productivity, and promote creativity. • Students use productivity tools to collaborate in constructing technology-enhanced models, preparing publications, and producing other creative works.				
Technology Communications Tools	0	1	2	3
• Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences. • Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.				
Technology Research Tools	0	1	2	3
• Students use technology to locate, evaluate, and collect information from a variety of sources. • Students use technology tools to process data and report results. • Students evaluate and select new information resources and technological innovations based on the appropriateness to specific tasks.				
Technology Problem-solving and Decision-making Tools	0	1	2	3
• Students use technology resources for				

solving problems and making informed decisions. • Students employ technology in the development of strategies for solving problems in the real world.				

Table 1: Rubric for Coding Unit Plans for NETS Met

Standard 1 (Basic Operations and Concepts) and Standard 2 (Social, Ethical and Human Issues) were coded as a zero for every unit plan by every evaluator. The unit plans were not about learning to use technology or the ethical issues of technology. Figure 1 summarizes the coded scores of the other 4 standards.

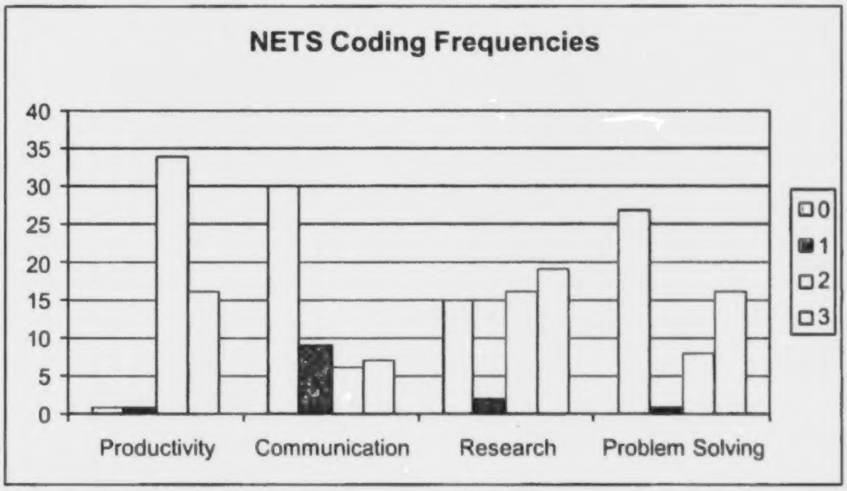

Figure 1: NETS Coding Frequencies

The "Technology as Productivity Tool" standard had the fewest "0" ratings and the highest "2" ratings. "Technology as Research Tool" standard had the highest "3" ratings. "Technology as Problem-solving and Decision-making tool" was very close in "3" ratings. "Technology as Communication Tool" had the most "0" ratings and was low in the other three ratings as well. Productivity and research coded together 38 times followed in frequency by productivity and problem-solving (25), and research and problem-solving (25). Productivity and communication were coded together 22 times. Communication and research matched 17 times. Communication and problem-solving matched 16 times. One more interesting finding was that when research and problem-solving were coded "3" then productivity and communication were almost always coded as a "2" or more.

Summary

The researchers were not surprised to see "Technology Productivity Tools" as the most common standard met. Most preservice teachers had assignments in their unit plans for students to create reports using presentation software. The researchers were surprised and pleased to see "Technology as Research Tool" as the next most frequent standard met. Many of the unit plans required students to gather data on an website and then analyze it in some way. The teacher was doing less lecturing and was acting more as a guide to the students as they researched topics in groups. This seems to indicate that technology-enhanced unit plans include inquiry learning that requires problem solving and communication. Research, problem-solving and decision-making require higher-level thinking skills of students. Our teacher education program encourages this type of lesson and unit planning. The results of this study seem to indicate that our preservice teachers are using these higher level thinking skills in the unit plans they write. It also indicates that enhancing units planning with technology encourages these types of activities in the units developed by our students.

The researchers will continue to review the units that were coded to meet research, problem solving and communication to see if they are based in inquiry instruction and problems-based learning. They will also review those units that had the fewest standards met to see if they are based in direct instruction. Finally the researchers will review those units that met the "social, ethical, and human issues" standard to see how this standard can be brought to other units.

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Preservice Teachers, Technology, and Information Literacy in the English Literature Classroom

Karin E. Westman
Naomi Wood
Department of English
Kansas State University
United States
westmank@ksu.edu
naomiw@ksu.edu

Abstract: This paper reports the results of a survey we conducted to assess our preservice teachers' use of technology in the English classroom. These survey results, in conjunction with our experience teaching preservice teachers, suggest that preservice teachers are frequently uncritical readers of the web pages that a search engine or directory provides, and that they need assistance in linking their current technological skills to the study of literature and language -- two skills necessary for meeting the new performance standards for technology in the K-12 language arts classroom. We then report the results of our pilot program designed to foster information literacy in our preservice teachers. By incorporating a writing-based technology curriculum composed of online discussion, online research, and web projects, we found that the literature classroom offers an excellent opportunity for preservice teachers to develop information literacy and to see instructors model the teaching of literature through technology.

As many scholars and teachers have noted in journals such as *Contemporary Issues in Teacher Education*, faculty who teach preservice teachers have an obligation to incorporate technology into course curriculum (Pope & Golub, 2000; Willis, 2001; Willis & Raines, 2001). This obligation, however, must extend beyond the borders of the Education classroom. As two professors of English literature who regularly incorporate technology into our English courses, we see a rich opportunity to foster the critical reading and writing skills that preservice teachers need in order to meet the new national emphasis on technology in the K-12 classroom. We also see the opportunity to fulfill many educators' calls to model strategies for incorporating technology into the study and teaching of literature (Pope & Golub, 2000; Willis & Raines, 2001; Carroll & Bowman, 2000; Jonassen, 2000). Our paper argues for the advantages of a writing-based technology curriculum for preservice teachers, especially for those in Language Arts. We seek to establish what David Jonassen (2000) has called "intellectual partnerships" between students and their computers (p. 4); while Jonassen posits this theory for students in the K-12 classroom, we see a need for such pedagogy in the college preservice classroom as well. Today, we will first provide the results of a survey assessing our Education majors' use of technology. Second, we will introduce and summarize the results of a technology-intensive pilot course designed to help preservice teachers meet the performance standards for the K-12 classroom. Only by using "computers as mindtools" (Jonassen, 2000, p. 1) can we help preservice teachers attain the higher level thinking skills they must, in turn, impart to their students.

If, as Cynthia Bowman (2000) points out, "information literacy requires students to conduct searches, evaluate, and create new ideas" (para. 14), we must prepare our preservice teachers to assist their future students with these tasks. Indeed, information literacy is not only recommended for preservice teachers, but increasingly required of them. In the year 2000, National Council of Teachers of English and the International Reading Association mandated that K_12 teachers should be prepared to foster students' technological abilities. Standard 8 of the twelve "Standards for the English Language Arts" reads, "Students use a variety of technological and information resources to gather and synthesize information and to create and communicate knowledge"; other standards implicitly refer to technology as a component ("List of Standards for the English Language Arts," 2000). In our own state of Kansas, the teacher licensure standards now include a new emphasis upon instructional technology, particularly in preparation for language arts. We must be sure, then, that our preservice teachers attain a high level of information literacy as well as a facility with technological resources. A recent survey of 255 Education majors in our English classrooms at Kansas State University reveals, however, that we are falling short of our goal: our preservice teachers show some facility with technology, but they lack information literacy.

The results of our survey indicate that a high percentage of preservice teachers recognize the importance of current technologies both to their success in their college courses (72%) and for their chosen profession (86%). Many also show a high level of competence with current technologies such as word processing, even if knowledge of other technologies remains low (only 49% have designed a web page or PowerPoint presentation, for instance). In our survey, 84% of Education majors reported using the internet primarily to access their e-mail; only 7% cited research as the primary reason for using the web – the same percentage who reported using the web for sports, entertainment, or business information. These use patterns suggest that preservice teachers may not have much experience critically evaluating the materials they find. This conclusion is supported by the fact that 74% of the Education majors surveyed reported using an internet search engine such as Yahoo, Excite, Google, or Infoseek to research information for their English classes *before* any other online resource, such as electronic full-text or abstract databases available through the library or a catalog of library print materials. Most preservice teachers are using the internet for research, but are they familiar with its wide range of resources, if they primarily use the web for email?

This high number -- 74% -- therefore attests to our students' ability to *access* the Internet, but we wonder about our students' ability to *evaluate* the sources they encounter and to *apply* their skills for a larger audience. There's no question that the internet is perceived by Education majors to be an important resource for the study of English at the college level: 47% of students surveyed found online resources "helpful" and another 23% found them "very helpful." When queried about the kinds of internet resources they found most useful for their study of English, 32% reported accessing primary texts, 24% retrieving critical essays, 19% researching historical and cultural backgrounds of texts, and 13% using writing style handbooks. While we do not know what students "count" as critical essays – for example, do our students perceive teacher-resource guides from a publisher to be "critical essays"? – these figures suggest that we need to make sure our students know how to evaluate a primary text, a critical essay, and other web-based documents, since they are seeking them out. If preservice teachers are not able to evaluate resources now, how will they be able to assist their own students? In addition, the ability to research and evaluate historical and cultural background would be an extremely helpful use of the internet for their future profession; however, as our survey results show, it is by no means our students' primary motive for consulting web resources, garnering only 19% of the responses. Finally, when asked which online resources they would like to know more about, students evenly spread themselves over the four categories: 23% selected primary texts, 25% critical essays, 24% historical and cultural background materials, and 26% writing style manuals. This remarkably balanced breakdown suggests that students are aware of the importance of all four categories but may not feel confident that they know enough about how to find, evaluate, and use these sources.

These survey results, in conjunction with our experience in the English classroom, suggest that our Education majors are frequently uncritical readers and interpreters of the web pages that a search engine or directory provides, and that they need assistance in linking their current technological skills to the study of literature and language – two skills necessary for meeting the new performance standards for technology in the K-12 language arts classroom. As English teachers, we know that not all editions of primary texts are equal; therefore, we need to alert students to the elements of a primary text that will be most accurate and helpful to their study. We know that critical essays published online are not *necessarily* as authoritative or as reputable as print essays, while at the same time recognizing that an increasing number of critical essays are indeed being published in this format.

In addition to alerting our students to the differences of quality and implied audience among journals, we need to be offering them the same guidance for documents which appear on the World Wide Web. *We* may know, as David Jonassen states, that the world wide web is not a mindtool (Jonassen, 2000, p. 17), but many of our preservice teachers do labor under the misconception that they "download ... thinking" when they print a web page (Healy, qtd. in Jonassen, 2000, p. 188). The Internet and the Web offer a tremendously rich variety of historical and cultural background materials – a course in Indian and Pakistani literature, for example, can link directly to English-language Indian and Pakistani newspapers for information about contemporary issues in those countries. However, students also need to be able to distinguish the reliable material from the less reliable, the obviously biased from the implicitly biased. In one children's literature class, for example, students offered as background to a study of Pippi Longstocking David Nagel's web page "The Evil of Pippi Longstocking: the Red-haired Harbinger of the Apocalypse" without any awareness of its parodic critical stance. Other students have quoted as scholarship the teacher guides from publishers' websites, showing little awareness of the potential conflicts of interest between the site's commercial and educational goals. Even style manuals may differ in authority and scope.

We are hardly the first to identify these problems: Cynthia Bowman (2000) and Carol Pope and Jeffrey Golub (2000) have raised similar concerns about information literacy in the preservice classroom. However, we believe that the problems we have described are more systemic than those scholars suggest. Even to create a WebQuest for Cynthia Bowman's class, as she describes for us in her essay "Infusing Technology-Based Instructional Frameworks: A Response to Pope and Golub" (2000), requires a degree of higher order thinking and critical evaluation skill than many of our students have demonstrated in our English classrooms. Clearly, there is much to be done in helping our students to use such resources efficiently and reliably, so they can in turn teach others.

In the time remaining today, we will outline several writing-based strategies designed to foster information literacy in preservice teachers. Our claim for the advantages of a writing-based technology curriculum develops from the results of our survey and the results of a pilot course here at Kansas State University that integrates technology into the teaching of a required literature course for Elementary Education majors, English 355 "Literature for Children." We initiated this pilot program with one section in June, 2001 and added two sections in Fall 2001; the pilot program continues with one section in Spring 2002 and 2 sections in Fall 2002. Each section caps at 23 students; the class meets in a computer lab classroom designed so that students sit at the computers or at a large seminar table. A ceiling-mounted projector allows the instructor to project images and text on a screen from a computer at the instructor's podium or from a visual presenter.

The course design emphasizes three components which are easily transferred to the K-12 classroom: computer-mediated writing practices, online research, and web page construction. In designing the course, we wanted to test our hypothesis that these three components foster the critical writing and reading skills necessary for information literacy. We also wanted to see if these interactive skills would demonstrate how to transfer essential technological skills to the teaching of literature. Preliminary results from student evaluations indicate the success of the pilot program. Through observation and hands-on projects, many of our preservice teachers have indeed increased their information literacy and acquire both "academic" knowledge and "tacit" knowledge (Willis, 2000) about integrating technology into the teaching of literature.

First, synchronous and asynchronous online discussions encourage our preservice teachers to be self-reflexive about the act of written communication and the audiences for whom they write. Our instructors asked their students to use real-time collaborative small group discussions during class and to post to a threaded bulletin board discussion outside of class. These two forms of online discussion emphasize features of group exchange which students often take for granted as they use words. Unable to rely on facial expressions, tone of voice, and gestures as they would in face-to-face conversations, students must exercise their linguistic resources and use written cues in order to communicate successfully with their peers and instructor, their intended audience. Our results indicate that synchronous and asynchronous discussion is even more of a "mindtool" than David Jonassen suggests (2000, p. 239). Since both the real-time chats and the threaded bulletin board postings are archived, students can return to these documents for review and further development of their ideas. The written conversations students have about the course material can then become stepping stones to more formal writing projects.

Though some students greeted these two technologies with skepticism, by the end of the course many students rated these components as "highly valuable" for analyzing class reading assignments, particularly because they were able to hear each classmate's analysis of the material. Recursive use of postings by instructors during class time not only connect online discussions to face-to-face discussions, illustrating a symbiotic relationship between traditional and technological pedagogies; it also offers various models for students to use in their own classrooms. In sum, these online discussions highlight the crucial role *written* communication plays in a technological society, where email, listservs, and text-based documents are the dominant forms for the exchange of ideas. To be literate in the information age, one must be able to communicate effectively through text-based technologies.

The second component, online research for a group web project, most directly addressed our concerns about information literacy in the preservice classroom: students work collaboratively to research and compose a biography and bibliography for one of the children's authors on the syllabus, drawing upon online and print resources. The resulting documents become part of their web site for their author. As instructors, we quickly learned that many students did not know the criteria they should use to evaluate resources available through the internet. Our preservice teachers were unfamiliar with strategies for directed searches in online subscription databases and on the web, and many were unable to identify the qualitative differences between a source located through a library database and one a search engine had retrieved. Our students' confusion was most evident when they were asked to create the bibliographic citations for the information on their computer screens: they did not know where to look on the web page for the requisite information, or why they might need to include an author or sponsoring organization, or why they should note if the resource was first published in print and then made available through a database or on a web page.

By instructing and modeling the evaluation process for students during class time, instructors could demonstrate the critical tools that the students would need for their own research. Knowing that their biography and bibliography would not only be read and graded by their instructor but also available to a general audience on a web site provided a strong warrant for their efforts. Held responsible for their research methods and the resulting information, our students wished to present themselves as credible and informed authors. After completing this part of the pilot course, our preservice teachers say that they are ready to apply those criteria to the many web pages they encounter now as students and to the pages they will help their own students evaluate. Even though we might hope or expect our preservice teachers to learn such critical reading skills in another course -- and some do -- it seems crucial to integrate these skills into a literature course, so that students connect a *skill* to its *application* in their work as teachers of language arts. Not only do they develop their own information literacy, but they also see the instructor modeling the process for a class of students.

The third component of our technology intensive pilot program is a group web project for which five to six students design and upload a series of linked web pages devoted to an author on the syllabus, such as Shel Silverstein or L. M. Montgomery. Web projects which receive high marks become part of the department's online resource site for children's literature. As David Jonassen notes, citing D. N. Perkins, K. E. Hayes and others, hypermedia offers yet another process-based learning strategy, one which facilitates learning by constructing knowledge (2000, p. 206; p. 211). Just as putting together a traditional research paper brings awareness of the processes of selection, inclusion, and elision that determine the resulting document, so, too, does constructing a web page and a web site. For the web project assignment, students create a site for an author, providing a researched biographical narrative (500-700 words), a two-part bibliography which includes works by the author and an annotated list of 8-10 sources about the author's work, and a series of "Critical Context" essays (400-500 words) on such topics as "History of Literary Production," "Style of Illustration/Art," and "Theme." Our preservice teachers are therefore asked to pay attention to the audience, the visual composition, the selection of content, and the location of the pages they create, as they enter an existing conversation about children's literature.

As earlier research studies would suggest (Lehrer, 1993; Carver et. al., 1992; Jonassen, 2000), student response to this component of the pilot class was overwhelmingly favorable; the web project was most frequently cited as the "most valuable skill" learned in the technology intensive course. In their evaluations, two students noted how the web project helped them research an author, and three stated it helped them learn more about an author. While a more traditional research project may have achieved similar results, the imperative to write for and persuade an audience beyond the classroom walls played a significant role in the project's success, motivating student performance. The project also boosted our students' confidence in and comfort with using technology -- important hurdles to overcome for many Education majors. "I am no longer afraid of web-building," announced one preservice teacher in her written evaluation. Web page design was also cited as one of the technologies which preservice teachers could already imagine adapting for their own classrooms, either as a tool to teach their students about selecting and presenting resources or as a way to communicate information to students and parents.

The study of literature, with its emphasis upon interpretation and implied readers, is the ideal setting for modeling applications of information technology. Our preservice teachers are able to experience, from their dual role as student and future teacher, how technology can enhance appreciation of literature and language. The instructional methods employed in this pilot course provide a model for Education majors' own use of technology in their future classrooms. Students' increasing comfort with and control over technology allows them to experience technology as a vital learning and teaching resource, a link between the written and spoken word.

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Trek 21 PT3 Project: Evolution of Professional Development

Karissa White
West Virginia University
United States
kposzywa@hotmail.com

Christine Weigandt
West Virginia University
United States
cweigandt@aol.com

John Wells
West Virginia University
United States
jgwells@wvnvm.wvnet.edu

Abstract: The West Virginia University PT3 grant (U.S. Department of Education's Preparing Tomorrow's Teachers to Use Technology) entitled "Trek 21-Educating Teachers As Agents of Technological Change" is a three-year grant designed to build, within the educators participating in West Virginia's Teacher Education program, the capacity to use and integrate instructional technologies for teaching and learning. Trek 21 professional development constituents include PK-12 teachers in five West Virginia counties. The Trek 21 model of professional development includes a sequence of annual events including a summer institute, continuity meetings, site visits, and mini-conferences. Details from Trek 21 events have evolved to formulate a durable and sustainable professional development model. Trek 21 aims to refine the design, implementation, and evaluation for the professional development delivered during the 2002 three-week summer institute. This paper examines how lessons learned from first and second year institutes impacted the professional development process and guided essential design revisions for year three.

Introduction

As educational technology continues to evolve from a supplemental skill to a fundamental requirement, educators are being challenged to integrate instructional technology into lessons. In order to make the best use of technology in the classroom, teachers are required to exceed simple proficiency in existing and emerging computer technologies. They must be capable of determining how to integrate this technology appropriately for classroom use.

Professional development with instructional technology as a focus is complex. Design and delivery must be flexible enough to accommodate the wide range of computer expertise and the variety of environments in which teachers work. In addition, this specialized training must be geared toward creating self-sufficiency and sustainability of skills for practicing teachers. The three-year design of the Trek 21 project provides a unique opportunity to gather both short-term and long-term feedback from project participants, resulting in a continuously evolving design of professional development.

Trek 21 PT3 Project

Grants from the PT3 Initiative provide funding for innovative programs to develop technologically proficient educators who are well prepared to meet the needs of 21st century learners. "Trek 21: Educating Teachers as Agents of Technological Change" is a 3-year PT3 implementation grant from the U. S. Department of Education designed to prepare educators involved in West Virginia University's five-year teacher preparation

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program to integrate instructional technologies into their teaching. The grant was awarded to the College of Human Resources and Education at West Virginia University (WVU) in 1999.

Trek 21 looks to impart lasting change in the culture of teacher practice. The Trek 21 professional development model is sequenced in such a manner so as to ensure long-term adoption of new practice, continuous support and feedback, and sustainability beyond the project. To help accomplish this change, the Trek 21 project includes an annual cycle of professional development events for PK-12 teachers. The cycle of events includes professional development institutes during the summer, continuity meetings in the fall and spring, school site visits, and mini conferences.

Summer Institutes

PDS Institutes address genres of instructional technology applications (Harris, 1998), target technical training, and prepare instructional technology materials and resources necessary for immediate integration into classroom instruction. The final outcome of this three-week institute is a teacher-developed, web-based instructional unit, which is implemented in the fall by the teacher in collaboration with a pre-service student intern.

Continuity Meetings/Site Visits

Following the summer institutes, Trek 21 holds continuity meetings with PDS faculty once each semester (fall and spring) to address issues related to the successful integration of instructional technologies at their location. School site visits occur throughout the year to provide continued support and gather data on unit implementation and local concerns.

Mini Conferences

Scheduled to occur twice each academic year, a mini-conference is held in partnership with West Virginia's "Technology, Teacher Education, Tomorrow" (T3) non-profit organization whose mission is to share best practices, receive technology enhancement training, and deliver presentations of activities related to the integration of instructional technologies. These conferences serve as our opportunity for state-wide dissemination of Trek 21 research results and presentation by participants of best practice where the integration of instructional technologies is central.

Year One

The institutes were designed to take place over a three-week period, to allow adequate time for technical training and unit development. A total of 47 participants were divided into three groups attending three separate institutes. The instructional technologies targeted were primarily web page development, electronic presentations, and conversion of paper-based to digital materials.

Prior to the summer institutes, participants received a packet containing surveys relating to computer use. Participants were asked to answer a series of questions about their current use and knowledge of computers. The data were analyzed, classifying participants as novice, intermediate, or advanced computer users. During year one, the majority of participants self-reported as novice computer users. As a result, the institutes were designed to provide clear expectations, concise instructions, and only the basics of each instructional technology targeted during the training sessions.

Week one of each institute emphasized pedagogical instruction, including topics such as reviews of teaching, lesson development, storyboarding, and examples of instructional technologies. Mid-week, participants were given a laptop computer and were trained on the fundamentals of computer use. By the end of week one, participants were introduced to basic web page creation. Week two included one or two training sessions per day on instructional technologies followed by development time, allowing participants ample opportunity to practice new skills and to develop their web-based units. Week three was devoted entirely to development time, with participants receiving individual help with the completion of their web pages and integration of instructional technologies into their units. At the end of week three, participants presented their units to the group.

Three reviewers (two from inside the project and one from outside the project) evaluated participant units using an externally-developed rubric. Initially a low percentage of teacher units passed the evaluation and were posted. The teachers whose units were not posted were notified of essential modifications. After revisions made during the fall continuity meeting, all 47 teacher units met the requirements of the rubric and were posted to the Trek 21 web site.

Year One Findings

A review of the year one institute showed that preparing for and implementing three separate summer institutes strained both staff and facility resources. Additionally, feedback from participants revealed a need for both consistently available technical assistance and sufficient pedagogical expertise as it relates to instructional technologies during unit development. Participants particularly stressed the need for more time for unit development. However, analysis of lessons brought to the institute by participants revealed that only 30% had come prepared with complete lessons plans, 32% had partially complete lesson plans, and 38% arrived with no lesson plans, requiring the allocation of critical development time to be put toward planning of content and lessons.

These findings emphasized the need in year two to design for optimal allocation and organization of time and resources, particularly in the areas of facility planning, staffing, organization, and communication.

Year Two

To better utilize available resources, the three institutes were combined so that 27 participants attended one three-week institute. Graduate assistant roles were restructured with emphasis on providing instructional design guidance, training on use of various instructional technologies, and technical support. In year two Instructional Leaders (ILs), made up of university faculty and PK-12 expert teachers, were added to perform the following functions: (1) provide participants with pedagogical expertise throughout the institute and establish comfort levels needed for progress, (2) bridge the knowledge gap between potential and actual implementation of a given instructional technology in participants' lessons, (3) serve as quality control by discussing with participants the connections between goal/objective statements as a classroom teacher, their chosen method of assessment, and their selected instructional technologies, and (4) serve as reviewers for completed units.

Efforts were taken to ensure that participants were adequately prepared before arriving at the institute. Packets of information completed by participants pre-institute were reviewed to make certain that each teacher arrived at the institute having fully documented lesson plans, thus allowing for the maximum allocation of institute time to be used for instructional technology training and integration. Templates were designed to assist participants in detailing units and lessons. A Leadership and Planning Committee, consisting of several first year participants and Trek 21 staff members, was established to provide suggestions for year two of the institute. The emphasis of the committee was the finalization of the unit/lesson templates. Institute participants were asked to complete the templates and submit copies prior to arriving at the institute. This pre-organization of units and lessons allowed the institute focus to be on the instructional technologies rather than on organization of content, as originally intended.

In addition, web page templates were designed to assist participants with the proper design and navigation of their web pages. Teachers could focus more on developing the content of their web pages and spend less time on the web-based instructional design issues.

During week one of the institute, participants were introduced to the project, as well as to topics such as reviews of teaching, lesson development, storyboarding, and examples of instructional technologies. Later in the week, participants were introduced to their notebook computer and the basics of web page development. Monday and Tuesday of week two included morning group instruction and afternoon development time. The same instructional technologies as year one were targeted, with the addition of concept mapping software. Participants were also instructed in the use of a File Transfer Protocol (FTP) application to enable them to independently post their information to the server. The rest of the week was devoted to development, with optional breakout sessions on various topics. Week three was devoted entirely to the development of units. This flexible design provided special-interest training and offered returning participants the opportunity to learn advanced topics while allowing other participants to concentrate on basic skills and unit development

Units were evaluated based on an internally-developed rubric. Seven unit reviewers were tasked with evaluating all units independently. Based on averaged scores from the seven reviewers, units were either posted to the Trek 21 web site or revisions were suggested. Of the 27 participant units, only four required minor revisions before posting. A Trek 21 representative met with the teacher, explained the necessary changes, and provided support in revising the unit.

Year Two Findings

Year two participants arrived with a greater range of skills due to the experienced status of year one participant returnees, as well as advances in computer use by many of the participants, as reported on computer use surveys. The greater number of units passing the initial review demonstrated the importance of pre-institute preparation of lessons and units by participants and the value of the Instructional Leaders' assistance and support. Participant feedback was largely positive. However, some participants pointed out inconsistencies between the terminology used in the templates and rubric and that used by PK-12 teachers. Planning for year three would emphasize refining pre-institute preparation, additional Instructional Leaders, standardizing the language used in the templates and rubric, and the scheduling of basic skills training with more advanced topic breakout sessions.

Year Three

Year three will accommodate a maximum of 60 participants attending one institute. In order to accommodate the expected range of technology skills, participants will be divided into three separate groups based on skill level

The template packet has been revised to include simplified and clearer instructions for the participants. Revisions include a revision of the terminology on the unit/lesson templates to better represent the language used by PK-12 educators. The evaluation rubric has also been slightly modified to align the rubric with the changes made to the unit/lesson templates.

Year two strategies will be employed again, although clearer daily and weekly goals will be communicated by the Instructional Leaders, ensuring that participants can reach benchmark accomplishments throughout each week of the institute. The same technology skills as year two will be presented.

During week one, examples of successful integration of various instructional technologies will be demonstrated by Instructional Leaders. This will assist participants in gathering ideas on the instructional technologies that will be appropriate for their particular units. In addition, a greater amount and variety of topics will be offered in both group and optional breakout sessions. These sessions will allow participants to focus on the technologies that they choose to learn and accommodate returnees who want to expand their existing skills. Early in the institute, teachers will be provided with a rubric checklist and encouraged to frequently review their web lessons during development. Instructional leaders will be instrumental in facilitating this process. This will provide additional guidance regarding expectations of the teacher units and help participants create units that will pass initial evaluation.

Conclusion

Because technology is an integral part of everyday life, educators have an added responsibility of utilizing instructional technology in their classrooms. Through durable and sustainable professional development, instructional technology can be successfully and appropriately integrated into teaching.

Professional development in the area of instructional technology requires effective communication and flexibility to meet individual teacher needs. As Trek 21 moves into its third and final project year the design and instruction of professional development has continually evolved to best facilitate the integration of instructional technology into lessons. The integration of experienced Instructional Leaders, the development of a Leadership and Planning Committee, the utilization of unit/lesson templates, the scheduling of breakout session on various topics, and the use of an evaluation rubric by both participants and external reviewers have all led to the specification of clear and distinct roles and appropriate support mechanisms for project participants. These refinements in design and implementation have resulted in a steady growth in the number units that can pass initial review, an increase in participant satisfaction, and as we enter the project's final year, a significant increase in the number ofPK-12 teachers wishing to participate in this professional development.

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"Building Partnerships: Creating the History Teaching Institute at Ohio State"

Gregory Wilson
Department of History
University of Akron
USA
Gwilson@uakron.edu

Brad Austin
Department of History
The Ohio State University
USA
Austin.102@osu.edu

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The History Teaching Institute (HTI) is a program designed by faculty, staff, and graduate students in the history department at Ohio State University to foster partnerships between historians in the academy and in-service Advanced Placement high school history teachers in Ohio. It focuses upon content development and use of new media in the classroom. Gregory Wilson, now at the University of Akron, directed the first year of the program and Brad Austin, the current director, took over in 2001. HTI has been funded through two $50,000 grants from the Battelle Endowment for Technology and Human Affairs. This paper addresses the process of conceiving, creating, and directing a program that seeks to leverage the resources of a large, nationally ranked history department to build a partnership with the K-12 community. It elaborates on the process of creating a user-friendly web site, complete with web reviews, lesson plans, and helpful links to other useful sites. It will focus particularly on the limitations and benefits of creating a community of practice between university staff and teachers through the mechanism of an on-line platform. Finally, by showing the pleasures and pitfalls of cooperative ventures between history faculty and teachers, the presentation will add to our understanding of both outreach and engagement between universities and K-12 teachers as well as teaching history with technology.

Context

Before discussing the details of the History Teaching Institute, it is necessary to place its creation in the larger public discourse regarding higher education and the K-12 system. From several directions, there is a growing concern with fostering partnerships between college faculty in specific disciplines and K-12 teachers. Many cite a crisis in K-12 education as a reason for such interest. For example, in the 17 August 2001 edition of the *Chronicle of Higher Education*, Vartan Gregorian, president of the Carnegie Corporation noted that higher education institutions "must accept much of the responsibility for the dismal state of public-school teaching today" (Gregorian, 2001, p. B7). He also pointed out that high numbers of teachers majored in

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Within the profession of history, as well as from organizations closely related to it, there has been a growing interest in creating partnerships and outreach programs between faculty and K-12 teachers. For example, both the American Historical Association and the Organization of American Historians have teaching divisions and in their journals and newsletters publish regular items on K-12 collaboration. More recently, the National Council on Education and Disciplines (NCED) created the National History Project (NHP) to strengthen education in the later years of high school and early years of college by fostering partnerships between college faculty and high school teachers (Bennett, 2002, p. 11).

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We chose AP because we felt that the content and scope of the classes most closely matched those found in a typical survey level class taught at Ohio State. For example, the AP U.S. history exam is given each May along with the other AP exams administered by the College Board and covers material from roughly 1450 to the present. It contains various sections including multiple choice, short answer, and essay questions, and a section called the Documents Based Question (DBQ). The DBQ is centered on a distinct 50-year period, which teachers know ahead of time, and asks students to answer a question based on their analysis of a set of primary sources that could include images, texts, graphs, charts, and diagrams. For those teaching the college survey class in U.S. history, the time period and types of questions follow closely the experience for most college teachers. The textbooks and the level of student also resembled those found in college. For these reasons, we believed focusing on AP would enable faculty and teachers to communicate more effectively and design a program based on shared experiences and goals.

Teachers

The 15 teachers we recruited in the first year came from across the state and showed a range of experience teaching and using new technology in the classroom. We used an on-line survey to gather information from teachers applying to the program. Those representing schools serving higher socioeconomic levels formed the majority, including private and suburban public schools. There were some from urban districts that served middle to lower socioeconomic communities; we had no teachers apply from rural districts. In terms of technology, roughly one-third were well acquainted with using software such as PowerPoint, using the web for resources, and creating class web sites. A few had little if any experience using technology beyond the overhead, and most occasionally used computers in the class and had some experience using the web for classroom teaching. Their teaching experience ranged from one who was just beginning to one who had been teaching for 30 years. On average, the group had taught for about 5 years and most had taught AP U.S. history before.

Structure

The nature of the grant and the expertise of those involved shaped the structure of program. The administration of the HTI consisted of a director, a faculty consultant, and three advanced graduate students who worked closely with groups of teachers. Originally we had planned to focus on both European and United

States history. However, after recruiting a staff whose expertise lay in the latter, we decided to open admissions to the program to only AP U.S. history teachers. Using a mailing list supplied by the Admissions office at Ohio State, we advertised our new program by sending each high school in Ohio a flyer that described the program and provided information on how to apply. Unfortunately, the timing of the flyer was such that it did not go out until June, when many teachers had already begun their summer break. Still, we received 15 applications and decided to accept all of them.

To provide a more intimate and, we hoped, a more rewarding experience, we created three workgroups with each one having five teachers and a graduate student who would assist teachers with content and technology applications. The director oversaw the program and with the faculty consultant began the process of searching for new grants. We also wanted to create a richer experience by moving beyond the traditional week long summer institute and create a year long program that would make a larger impact in the way teachers integrated technology into their classes and also in the content knowledge they had of United States history.

We used a web-based system of communication to foster discussion, send information, and answer questions from teachers across Ohio. We designed a web site and forged a partnership with Metacollege that gave HTI free use of their new web based learning platform similar to the ones offered by Blackboard and WebCT. (Metacollege has since gone out of business). To fuse content with technology, we then began writing web-based lesson plans on various topics in United States history that made use of resources found on the web and created PowerPoint lectures that we shared with teachers. In turn, we hoped teachers would share their ideas on content and on how they integrated technology into the classroom.

Implementation and Monitoring

Starting in June 2000, it took three months to establish the structure and we then brought the teachers to Ohio State for a one-day workshop in October on the AP grading process and using the web based platform. At the conclusion of the workshop, teachers and HTI staff made the verbal commitment to exchange information via the web and to plan classroom visits during the school year so HTI staff could monitor the program. The HTI staff also provided documents readers to the teachers to assist them further in promoting textual and image analysis.

There is a difference between creating web-based communication platforms and using them, and we learned this almost immediately. The HTI web site contained lesson plans, links, and announcements and the Metacollege platform provided a discussion board, an area to transfer files, and e-mail. From the start, the e-mail function worked intermittently and teachers found it difficult to upload and download PowerPoint and Word files to share and analyze. Given the varied range of experience of the teachers with new media, such difficulties led to dissatisfaction and disillusionment for many participants. In addition, we found that such frustrations combined with a busy schedule meant that most teachers abandoned active participation in the program after three months. Of the 15 who began, only 4 stayed in regular contact. We also found that most teachers had their lessons and curriculum already set for the year, which limited implementation of ideas presented on the HTI web page or in discussions.

Of those remaining, we visited three classrooms to assess the project and observe how they used technology in the classroom. In two of our classrooms, we found a constructivist approach to learning where students used new media to create classroom projects. At Indian Hill, in an affluent area just outside Cincinnati, our AP teacher had six computers in her classroom, a large lab facility, as well as a technical support person. During our one-day visit, she focused on Gilded-Age politics and assigned a project where groups of students searched the web for information on key political figures and reported back to the class what they found. We also viewed projects done earlier in the semester that consisted of PowerPoint presentations on presidents that utilized images, text, and in some cases audio files of songs pertinent to the time period. At Village Academy, a small private school in Powell, the teacher did not have computers in the class and on the day we visited, his students were presenting their PowerPoint projects on the Spanish American War in the school computer lab. As with the first school, these presentations incorporated text, images, and sound.

The third teacher we visited taught at Bay Village High, a large public school located outside of Cleveland. Here, the instructor had a large television in the class with a keyboard and internet access. As with the others, Bay Village also had a separate computer lab. On this day, the teacher had requested that we demonstrate some of our PowerPoint lessons on the Great Depression and New Deal art. In these presentations, we used images, text, graphs, an audio clip of a speech by Franklin Delano Roosevelt, and songs from the Great

Depression. The problem in this venue was that the television screen was not large enough to display effectively many of the images and artwork, thus students had to stand around the screen while we discussed.

Following these visits and after the AP exam in May, we held a concluding workshop to provide closure and assess the past year's experiences. Only two of the original 15 attended, which told us a great deal about the issue of sustaining interest in a yearlong program. Here, we invited Gary Kornblith of Oberlin College to discuss his experiences with using new media in the classroom and, since we received a one-year renewal grant from BETHA, followed this with a discussion of ways to improve the programs of HTI in the future.

Second Year Adjustments and Conclusions

The first issue in assessing this experience relates to grant funding. Grants are critical to fostering projects, but their limited nature can make it difficult to sustain a program. This was true for the HTI, which had $50,000 for one year to hire a staff, create a web-based communication system, recruit teachers, hold workshops, visit classes, and assess progress. In the meantime, the staff constantly scanned the horizon for additional funding; fortunately, the Board for BETHA granted a one-year extension. This provided some reprieve, but to truly make a difference, projects need the security of longer-term funding. Grants can also constrain the project in certain ways that may make it difficult to alter the methods or details. In this case, BETHA required a series of lesson plans based on the role of technology in U.S. and European history. By itself this is a worthwhile effort, but not all teachers were able to make use of these lessons, especially when they did not fit into the plan for the upcoming AP exam.

The second area related to technology and new media, and here the evidence from our project is mixed. Given that many teachers have little or no experience with using new media, or simply do not have much time, any web platform designed to foster a virtual community of practice must be seamless. There exists potential for learning communities of faculty, teachers, and students that can foster the exchange of ideas and information. However, all the teachers involved expressed their strong desire that regular, face-to-face contact be an integral part of any project. In so far as expectations of use, we found that teachers rely more on having students use software and Internet resources than they themselves do. Teachers did not regularly integrate new media into their lectures or discussions, but rather relied on students to create projects that required searching for images, texts, and sounds.

In the second year of our project, we have tried to address many of the problems that we identified during our first year. First, we altered the History Teaching Institute's structure, eliminating the group leader positions and hiring a full-time director to coordinate all aspects of the Institute's operations. We also added European history. Second, in response to what our first-year participants had recommended, we lengthened the summer workshop to four days. Simply put, we had placed too much faith in the ability of our one-day summer session and our web site to create a community of practice. Teachers and staff wanted more time to get to know each other, and the absence of a sense of camaraderie hurt the program for the rest of the year. During our second summer session, we scheduled 7 meals together and built into our agenda plenty of discussion time. This fostered group spirit, but more importantly it allowed teachers the time to share their experience and insights from the high school classroom – something college faculty could not provide. Even so, in their evaluations of the workshop, the teachers recommended even more time to share ideas face-to-face.

Finally, we recognized that no matter how well conceived a virtual community might be one-on-one contact is critical to maintain teacher interest in a professional development program. Consequently, the director visited most of the teachers' classrooms, some more than once, during the first half of the second year.

Did all this help students with the AP test? We don't know. Given the difficulty of sustaining interest in the program over one year, it was impossible to measure in any statistically significant way the impact of technology on AP scores. Presumably, there exists potential for a research project that does this; but such a project would require a larger amount of money and a longer time frame then was possible under the BETHA grants that funded HTI.

Did teachers gain from this project? In interviews and surveys at the end of the first year of the project, those that stayed with it said yes; and two expressed a desire to be part of the second year project underway now. The evaluations at the end of our second summer session were even more positive. For example, one teacher thought that it was "fantastic that OSU is reaching out to the high school teachers in Ohio" and was "truly impressed by the enthusiasm and dedication to teaching of all involved instructors (I

could name them all as being outstanding)." Another participant captured the open and collegial atmosphere of the most recent seminar with his comments: "I was at first skeptical that I would learn a great deal, yet I was surprised by how much I actually gained from the institute. First of all, the instructors were excellent. All previous academic experience with history professors had left me with the impression that condescension and pretentious attitudes were prerequisites for the job. However, the professors at the institute were intelligent, enthusiastic, and truly concerned with advancing the technological teaching methods. The instructors were sincerely a breath of fresh air as they showed their dedication to teaching (as opposed to dedication to research)." This teacher concluded, "In sum, the HTI emphasized practical and realistic technological teaching methods that I can and will utilize in the classroom as opposed to theoretical/philosophical issues that do not advance teaching and learning. The HTI gets an A+ and should be expanded in order to reach more of Ohio's history teachers."

Our experience shows that teachers enjoy being part of a community of practice, sharing ideas, and being seen as professionals. This point is crucial for any cooperative venture between faculty and K-12 teachers. Teachers in the HTI also gained ideas about using new media in the classroom, even if they did not completely overhaul their teaching methods or lesson plans. Most often they used images located on the web site as well as those exchanged through e-mail to supplement their lectures and discussions. Teachers also made use of the readers given out at the beginning of the program. Finally, as faculty educated themselves about the AP process and what was and was not useful for teachers, they were able to discuss their ideas with teachers, enriching the dialogue for all involved.

The structure of the HTI reflect some of the best practices of professional development for teachers (Corcoran, 1995). Giving teachers time to debate and discuss both during workshops and on-line models constructivist teaching. Providing a four-day workshop, as well as classroom visits and virtual discussions, offers teachers the opportunity for deep, intellectual engagement. Finally, throughout the program, we demonstrated a respect for teachers as professionals and offered opportunities for teachers of various degrees of experience to share their expertise and understanding.

Clearly there are still areas we need to improve. Certainly the attrition rate was too high in the first year, and although it is much better in the second it is quite clear that we underestimated the difficulty of sustaining interest and commitment to the program. We also need to recruit and maintain contact with more teachers from under-served districts, including inner cities and rural communities. Rather than a statewide effort, with such a small staff and budget, having all teachers be in a local district may have helped sustain interest. Not only would doing so reduce travel costs and time, this more concentrated and focused project would have the added benefit of creating a more natural cadre of interested teachers who would be more likely to stay in contact and continue sharing resources and ideas after their participation in the program.

In the end, programs like the History Teaching Institute have as their goals to improve teaching, enrich student interest and knowledge about a subject, and to improve student performance in class and on various tests like the AP exams. The HTI has accomplished some of the first two goals and could not assess the third. While it has been successful, it has not been a complete success. However, it does provide an example of both the promises and pitfalls of cooperative ventures between faculty and K-12 teachers and provides the groundwork for future, more sustainable projects that should receive support and funding from universities and K-12 personnel.

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There is a difference between creating web-based communication platforms and using them, and we learned this almost immediately. The HTI web site contained lesson plans, links, and announcements and the Metacollege platform provided a discussion board, an area to transfer files, and e-mail. From the start, the e-mail function worked intermittently and teachers found it difficult to upload and download PowerPoint and Word files to share and analyze. Given the varied range of experience of the teachers with new media, such difficulties led to dissatisfaction and disillusionment for many participants. In addition, we found that such frustrations combined with a busy schedule meant that most teachers abandoned active participation in the program after three months. Of the 15 who began, only 4 stayed in regular contact. We also found that most teachers had their lessons and curriculum already set for the year, which limited implementation of ideas presented on the HTI web page or in discussions.

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Second Year Adjustments and Conclusions

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In the second year of our project, we have tried to address many of the problems that we identified during our first year. First, we altered the History Teaching Institute's structure, eliminating the group leader positions and hiring a full-time director to coordinate all aspects of the Institute's operations. We also added European history. Second, in response to what our first-year participants had recommended, we lengthened the summer workshop to four days. Simply put, we had placed too much faith in the ability of our one-day summer session and our web site to create a community of practice. Teachers and staff wanted more time to get to know each other, and the absence of a sense of camaraderie hurt the program for the rest of the year. During our second summer session, we scheduled 7 meals together and built into our agenda plenty of discussion time. This fostered group spirit, but more importantly it allowed teachers the time to share their experience and insights from the high school classroom – something college faculty could not provide. Even so, in their evaluations of the workshop, the teachers recommended even more time to share ideas face-to-face.

Finally, we recognized that no matter how well conceived a virtual community might be one-on-one contact is critical to maintain teacher interest in a professional development program. Consequently, the director visited most of the teachers' classrooms, some more than once, during the first half of the second year.

Did all this help students with the AP test? We don't know. Given the difficulty of sustaining interest in the program over one year, it was impossible to measure in any statistically significant way the impact of technology on AP scores. Presumably, there exists potential for a research project that does this; but such a project would require a larger amount of money and a longer time frame then was possible under the BETHA grants that funded HTI.

Did teachers gain from this project? In interviews and surveys at the end of the first year of the project, those that stayed with it said yes; and two expressed a desire to be part of the second year project underway now. The evaluations at the end of our second summer session were even more positive. For example, one teacher thought that it was "fantastic that OSU is reaching out to the high school teachers in Ohio" and was "truly impressed by the enthusiasm and dedication to teaching of all involved instructors (I

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In the end, programs like the History Teaching Institute have as their goals to improve teaching, enrich student interest and knowledge about a subject, and to improve student performance in class and on various tests like the AP exams. The HTI has accomplished some of the first two goals and could not assess the third. While it has been successful, it has not been a complete success. However, it does provide an example of both the promises and pitfalls of cooperative ventures between faculty and K-12 teachers and provides the groundwork for future, more sustainable projects that should receive support and funding from universities and K-12 personnel.

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Gregory Wilson
Department of History
University of Akron
USA
Gwilson@uakron.edu

Brad Austin
Department of History
The Ohio State University
USA
Austin.102@osu.edu

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Introduction

The History Teaching Institute (HTI) is a program designed by faculty, staff, and graduate students in the history department at Ohio State University to foster partnerships between historians in the academy and in-service Advanced Placement high school history teachers in Ohio. It focuses upon content development and use of new media in the classroom. Gregory Wilson, now at the University of Akron, directed the first year of the program and Brad Austin, the current director, took over in 2001. HTI has been funded through two $50,000 grants from the Battelle Endowment for Technology and Human Affairs. This paper addresses the process of conceiving, creating, and directing a program that seeks to leverage the resources of a large, nationally ranked history department to build a partnership with the K-12 community. It elaborates on the process of creating a user-friendly web site, complete with web reviews, lesson plans, and helpful links to other useful sites. It will focus particularly on the limitations and benefits of creating a community of practice between university staff and teachers through the mechanism of an on-line platform. Finally, by showing the pleasures and pitfalls of cooperative ventures between history faculty and teachers, the presentation will add to our understanding of both outreach and engagement between universities and K-12 teachers as well as teaching history with technology.

Context

Before discussing the details of the History Teaching Institute, it is necessary to place its creation in the larger public discourse regarding higher education and the K-12 system. From several directions, there is a growing concern with fostering partnerships between college faculty in specific disciplines and K-12 teachers. Many cite a crisis in K-12 education as a reason for such interest. For example, in the 17 August 2001 edition of the *Chronicle of Higher Education*, Vartan Gregorian, president of the Carnegie Corporation noted that higher education institutions "must accept much of the responsibility for the dismal state of public-school teaching today" (Gregorian, 2001, p. B7). He also pointed out that high numbers of teachers majored in

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Within the profession of history, as well as from organizations closely related to it, there has been a growing interest in creating partnerships and outreach programs between faculty and K-12 teachers. For example, both the American Historical Association and the Organization of American Historians have teaching divisions and in their journals and newsletters publish regular items on K-12 collaboration. More recently, the National Council on Education and Disciplines (NCED) created the National History Project (NHP) to strengthen education in the later years of high school and early years of college by fostering partnerships between college faculty and high school teachers (Bennett, 2002, p. 11).

Beginnings

While part of this larger context, the immediate impetus for the Ohio State project came from faculty, staff, and graduate students involved with the Goldberg Program for Excellence in Teaching in the history department. The Goldberg Program has an emphasis on fostering the best practices of using new technology in the classroom and those involved wanted to expand into professional development for teachers. However, neither Ohio State nor the history department had the resources to fund such a project, and so it began with a one year grant from the Battelle Endowment for Technology and Human Affairs (BETHA) and focused on advanced placement (AP) high school history teachers from around Ohio.

We chose AP because we felt that the content and scope of the classes most closely matched those found in a typical survey level class taught at Ohio State. For example, the AP U.S. history exam is given each May along with the other AP exams administered by the College Board and covers material from roughly 1450 to the present. It contains various sections including multiple choice, short answer, and essay questions, and a section called the Documents Based Question (DBQ). The DBQ is centered on a distinct 50-year period, which teachers know ahead of time, and asks students to answer a question based on their analysis of a set of primary sources that could include images, texts, graphs, charts, and diagrams. For those teaching the college survey class in U.S. history, the time period and types of questions follow closely the experience for most college teachers. The textbooks and the level of student also resembled those found in college. For these reasons, we believed focusing on AP would enable faculty and teachers to communicate more effectively and design a program based on shared experiences and goals.

Teachers

The 15 teachers we recruited in the first year came from across the state and showed a range of experience teaching and using new technology in the classroom. We used an on-line survey to gather information from teachers applying to the program. Those representing schools serving higher socioeconomic levels formed the majority, including private and suburban public schools. There were some from urban districts that served middle to lower socioeconomic communities; we had no teachers apply from rural districts. In terms of technology, roughly one-third were well acquainted with using software such as PowerPoint, using the web for resources, and creating class web sites. A few had little if any experience using technology beyond the overhead, and most occasionally used computers in the class and had some experience using the web for classroom teaching. Their teaching experience ranged from one who was just beginning to one who had been teaching for 30 years. On average, the group had taught for about 5 years and most had taught AP U.S. history before.

Structure

The nature of the grant and the expertise of those involved shaped the structure of program. The administration of the HTI consisted of a director, a faculty consultant, and three advanced graduate students who worked closely with groups of teachers. Originally we had planned to focus on both European and United

States history. However, after recruiting a staff whose expertise lay in the latter, we decided to open admissions to the program to only AP U.S. history teachers. Using a mailing list supplied by the Admissions office at Ohio State, we advertised our new program by sending each high school in Ohio a flyer that described the program and provided information on how to apply. Unfortunately, the timing of the flyer was such that it did not go out until June, when many teachers had already begun their summer break. Still, we received 15 applications and decided to accept all of them.

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Implementation and Monitoring

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Within the profession of history, as well as from organizations closely related to it, there has been a growing interest in creating partnerships and outreach programs between faculty and K-12 teachers. For example, both the American Historical Association and the Organization of American Historians have teaching divisions and in their journals and newsletters publish regular items on K-12 collaboration. More recently, the National Council on Education and Disciplines (NCED) created the National History Project (NHP) to strengthen education in the later years of high school and early years of college by fostering partnerships between college faculty and high school teachers (Bennett, 2002, p. 11).

Beginnings

While part of this larger context, the immediate impetus for the Ohio State project came from faculty, staff, and graduate students involved with the Goldberg Program for Excellence in Teaching in the history department. The Goldberg Program has an emphasis on fostering the best practices of using new technology in the classroom and those involved wanted to expand into professional development for teachers. However, neither Ohio State nor the history department had the resources to fund such a project, and so it began with a one year grant from the Battelle Endowment for Technology and Human Affairs (BETHA) and focused on advanced placement (AP) high school history teachers from around Ohio.

We chose AP because we felt that the content and scope of the classes most closely matched those found in a typical survey level class taught at Ohio State. For example, the AP U.S. history exam is given each May along with the other AP exams administered by the College Board and covers material from roughly 1450 to the present. It contains various sections including multiple choice, short answer, and essay questions, and a section called the Documents Based Question (DBQ). The DBQ is centered on a distinct 50-year period, which teachers know ahead of time, and asks students to answer a question based on their analysis of a set of primary sources that could include images, texts, graphs, charts, and diagrams. For those teaching the college survey class in U.S. history, the time period and types of questions follow closely the experience for most college teachers. The textbooks and the level of student also resembled those found in college. For these reasons, we believed focusing on AP would enable faculty and teachers to communicate more effectively and design a program based on shared experiences and goals.

Teachers

The 15 teachers we recruited in the first year came from across the state and showed a range of experience teaching and using new technology in the classroom. We used an on-line survey to gather information from teachers applying to the program. Those representing schools serving higher socioeconomic levels formed the majority, including private and suburban public schools. There were some from urban districts that served middle to lower socioeconomic communities; we had no teachers apply from rural districts. In terms of technology, roughly one-third were well acquainted with using software such as PowerPoint, using the web for resources, and creating class web sites. A few had little if any experience using technology beyond the overhead, and most occasionally used computers in the class and had some experience using the web for classroom teaching. Their teaching experience ranged from one who was just beginning to one who had been teaching for 30 years. On average, the group had taught for about 5 years and most had taught AP U.S. history before.

Structure

The nature of the grant and the expertise of those involved shaped the structure of program. The administration of the HTI consisted of a director, a faculty consultant, and three advanced graduate students who worked closely with groups of teachers. Originally we had planned to focus on both European and United

States history. However, after recruiting a staff whose expertise lay in the latter, we decided to open admissions to the program to only AP U.S. history teachers. Using a mailing list supplied by the Admissions office at Ohio State, we advertised our new program by sending each high school in Ohio a flyer that described the program and provided information on how to apply. Unfortunately, the timing of the flyer was such that it did not go out until June, when many teachers had already begun their summer break. Still, we received 15 applications and decided to accept all of them.

To provide a more intimate and, we hoped, a more rewarding experience, we created three workgroups with each one having five teachers and a graduate student who would assist teachers with content and technology applications. The director oversaw the program and with the faculty consultant began the process of searching for new grants. We also wanted to create a richer experience by moving beyond the traditional week long summer institute and create a year long program that would make a larger impact in the way teachers integrated technology into their classes and also in the content knowledge they had of United States history.

We used a web-based system of communication to foster discussion, send information, and answer questions from teachers across Ohio. We designed a web site and forged a partnership with Metacollege that gave HTI free use of their new web based learning platform similar to the ones offered by Blackboard and WebCT. (Metacollege has since gone out of business). To fuse content with technology, we then began writing web-based lesson plans on various topics in United States history that made use of resources found on the web and created PowerPoint lectures that we shared with teachers. In turn, we hoped teachers would share their ideas on content and on how they integrated technology into the classroom.

Implementation and Monitoring

Starting in June 2000, it took three months to establish the structure and we then brought the teachers to Ohio State for a one-day workshop in October on the AP grading process and using the web based platform. At the conclusion of the workshop, teachers and HTI staff made the verbal commitment to exchange information via the web and to plan classroom visits during the school year so HTI staff could monitor the program. The HTI staff also provided documents readers to the teachers to assist them further in promoting textual and image analysis.

There is a difference between creating web-based communication platforms and using them, and we learned this almost immediately. The HTI web site contained lesson plans, links, and announcements and the Metacollege platform provided a discussion board, an area to transfer files, and e-mail. From the start, the e-mail function worked intermittently and teachers found it difficult to upload and download PowerPoint and Word files to share and analyze. Given the varied range of experience of the teachers with new media, such difficulties led to dissatisfaction and disillusionment for many participants. In addition, we found that such frustrations combined with a busy schedule meant that most teachers abandoned active participation in the program after three months. Of the 15 who began, only 4 stayed in regular contact. We also found that most teachers had their lessons and curriculum already set for the year, which limited implementation of ideas presented on the HTI web page or in discussions.

Of those remaining, we visited three classrooms to assess the project and observe how they used technology in the classroom. In two of our classrooms, we found a constructivist approach to learning where students used new media to create classroom projects. At Indian Hill, in an affluent area just outside Cincinnati, our AP teacher had six computers in her classroom, a large lab facility, as well as a technical support person. During our one-day visit, she focused on Gilded-Age politics and assigned a project where groups of students searched the web for information on key political figures and reported back to the class what they found. We also viewed projects done earlier in the semester that consisted of PowerPoint presentations on presidents that utilized images, text, and in some cases audio files of songs pertinent to the time period. At Village Academy, a small private school in Powell, the teacher did not have computers in the class and on the day we visited, his students were presenting their PowerPoint projects on the Spanish American War in the school computer lab. As with the first school, these presentations incorporated text, images, and sound.

The third teacher we visited taught at Bay Village High, a large public school located outside of Cleveland. Here, the instructor had a large television in the class with a keyboard and internet access. As with the others, Bay Village also had a separate computer lab. On this day, the teacher had requested that we demonstrate some of our PowerPoint lessons on the Great Depression and New Deal art. In these presentations, we used images, text, graphs, an audio clip of a speech by Franklin Delano Roosevelt, and songs from the Great

Depression. The problem in his venue was that the television screen was not large enough to display effectively many of the images and artwork, thus students had to stand around the screen while we discussed.

Following these visits and after the AP exam in May, we held a concluding workshop to provide closure and assess the past year's experiences. Only two of the original 15 attended, which told us a great deal about the issue of sustaining interest in a yearlong program. Here, we invited Gary Kornblith of Oberlin College to discuss his experiences with using new media in the classroom and, since we received a one-year renewal grant from BETHA, followed this with a discussion of ways to improve the programs of HTI in the future.

Second Year Adjustments and Conclusions

The first issue in assessing this experience relates to grant funding. Grants are critical to fostering projects, but their limited nature can make it difficult to sustain a program. This was true for the HTI, which had $50,000 for one year to hire a staff, create a web-based communication system, recruit teachers, hold workshops, visit classes, and assess progress. In the meantime, the staff constantly scanned the horizon for additional funding; fortunately, the Board for BETHA granted a one-year extension. This provided some reprieve, but to truly make a difference, projects need the security of longer-term funding. Grants can also constrain the project in certain ways that may make it difficult to alter the methods or details. In this case, BETHA required a series of lesson plans based on the role of technology in U.S. and European history. By itself this is a worthwhile effort, but not all teachers were able to make use of these lessons, especially when they did not fit into the plan for the upcoming AP exam.

The second area related to technology and new media, and here the evidence from our project is mixed. Given that many teachers have little or no experience with using new media, or simply do not have much time, any web platform designed to foster a virtual community of practice must be seamless. There exists potential for learning communities of faculty, teachers, and students that can foster the exchange of ideas and information. However, all the teachers involved expressed their strong desire that regular, face-to-face contact be an integral part of any project. In so far as expectations of use, we found that teachers rely more on having students use software and Internet resources than they themselves do. Teachers did not regularly integrate new media into their lectures or discussions, but rather relied on students to create projects that required searching for images, texts, and sounds.

In the second year of our project, we have tried to address many of the problems that we identified during our first year. First, we altered the History Teaching Institute's structure, eliminating the group leader positions and hiring a full-time director to coordinate all aspects of the Institute's operations. We also added European history. Second, in response to what our first-year participants had recommended, we lengthened the summer workshop to four days. Simply put, we had placed too much faith in the ability of our one-day summer session and our web site to create a community of practice. Teachers and staff wanted more time to get to know each other, and the absence of a sense of camaraderie hurt the program for the rest of the year. During our second summer session, we scheduled 7 meals together and built into our agenda plenty of discussion time. This fostered group spirit, but more importantly it allowed teachers the time to share their experience and insights from the high school classroom – something college faculty could not provide. Even so, in their evaluations of the workshop, the teachers recommended even more time to share ideas face-to-face.

Finally, we recognized that no matter how well conceived a virtual community might be one-on-one contact is critical to maintain teacher interest in a professional development program.. Consequently, the director visited most of the teachers' classrooms, some more than once, during the first half of the second year.

Did all this help students with the AP test? We don't know. Given the difficulty of sustaining interest in the program over one year, it was impossible to measure in any statistically significant way the impact of technology on AP scores. Presumably, there exists potential for a research project that does this; but such a project would require a larger amount of money and a longer time frame then was possible under the BETHA grants that funded HTI.

Did teachers gain from this project? In interviews and surveys at the end of the first year of the project, those that stayed with it said yes; and two expressed a desire to be part of the second year project underway now. The evaluations at the end of our second summer session were even more positive. For example, one teacher thought that it was "fantastic that OSU is reaching out to the high school teachers in Ohio" and was "truly impressed by the enthusiasm and dedication to teaching of all involved instructors (I

could name them all as being outstanding)." Another participant captured the open and collegial atmosphere of the most recent seminar with his comments: "I was at first skeptical that I would learn a great deal, yet I was surprised by how much I actually gained from the institute. First of all, the instructors were excellent. All previous academic experience with history professors had left me with the impression that condescension and pretentious attitudes were prerequisites for the job. However, the professors at the institute were intelligent, enthusiastic, and truly concerned with advancing the technological teaching methods. The instructors were sincerely a breath of fresh air as they showed their dedication to teaching (as opposed to dedication to research)." This teacher concluded, "In sum, the HTI emphasized practical and realistic technological teaching methods that I can and will utilize in the classroom as opposed to theoretical/philosophical issues that do not advance teaching and learning. The HTI gets an A+ and should be expanded in order to reach more of Ohio's history teachers."

Our experience shows that teachers enjoy being part of a community of practice, sharing ideas, and being seen as professionals. This point is crucial for any cooperative venture between faculty and K-12 teachers. Teachers in the HTI also gained ideas about using new media in the classroom, even if they did not completely overhaul their teaching methods or lesson plans. Most often they used images located on the web site as well as those exchanged through e-mail to supplement their lectures and discussions. Teachers also made use of the readers given out at the beginning of the program. Finally, as faculty educated themselves about the AP process and what was and was not useful for teachers, they were able to discuss their ideas with teachers, enriching the dialogue for all involved.

The structure of the HTI reflect some of the best practices of professional development for teachers (Corcoran, 1995). Giving teachers time to debate and discuss both during workshops and on-line models constructivist teaching. Providing a four-day workshop, as well as classroom visits and virtual discussions, offers teachers the opportunity for deep, intellectual engagement. Finally, throughout the program, we demonstrated a respect for teachers as professionals and offered opportunities for teachers of various degrees of experience to share their expertise and understanding.

Clearly there are still areas we need to improve. Certainly the attrition rate was too high in the first year, and although it is much better in the second it is quite clear that we underestimated the difficulty of sustaining interest and commitment to the program. We also need to recruit and maintain contact with more teachers from under-served districts, including inner cities and rural communities. Rather than a statewide effort, with such a small staff and budget, having all teachers be in a local district may have helped sustain interest. Not only would doing so reduce travel costs and time, this more concentrated and focused project would have the added benefit of creating a more natural cadre of interested teachers who would be more likely to stay in contact and continue sharing resources and ideas after their participation in the program.

In the end, programs like the History Teaching Institute have as their goals to improve teaching, enrich student interest and knowledge about a subject, and to improve student performance in class and on various tests like the AP exams. The HTI has accomplished some of the first two goals and could not assess the third. While it has been successful, it has not been a complete success. However, it does provide an example of both the promises and pitfalls of cooperative ventures between faculty and K-12 teachers and provides the groundwork for future, more sustainable projects that should receive support and funding from universities and K-12 personnel.

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Moving K-12 Teachers into 21st Century Science with 21st Century Technology: Building the Educational Grid for Pre-Service Training

Edee Wiziecki, NCSA, University of Illinois, US
Kenneth Travers, University of Illinois, US
Gypsy Abbott, University of Alabama in Birmingham, US
Umesh Thakkar, University of Illinois at Urbana-Champaign, US
Linda Grisham, Lesley University, US
Lisa Bievenue, NCSA, University of Illinois, US

Appeals to citizens about global warming, alternative medicine, and water quality indicate the need for citizens to understand the models presented to them, to sensibly evaluate predictions, to consider validity of models, and to understand the power and limits of modeling. The sheer complexity of policy questions settled by models from this or that agency in the body politics calls for citizens to understand scientific models. For the sciences and the humanities alike the underlying goals of education form a democratic liberal tradition that promotes freedom of the individual and requires an awakening and deep application of critical thinking (Nussbaum, 1997). The revolution in computational modeling and computer intensive informatics such as data mining have become essential new 21st Century methodologies of deep critical inquiry. Teachers in training need to know how to use these new tools in the classroom and to make them available to our next generation of students. Through computer simulations, 3D models and extensive web-based resources designed for the learner we can make concepts available to students that twenty years ago were only understood by those upper 5% of students skilled in the formal mathematics.

A major recommendation of the report Setting a Research and Planning Agenda for Computer Modeling in the Pre-College Curriculum (Final Report: NSF RED-9255877) is that "[c]omputational modeling ideas and activities should have a key and central role throughout the science curriculum - not peripherally, and not only as part of a special or optional course." Models help "abstract from reality key features that enable us to gain insight into the fundamental processes underlying external complexity." Relationships between variables must be made explicit in both a qualitative and a quantitative sense. Observation, measurement, graphing, curve fitting, modeling, and visualization are all part of a continuum of doing science. Curriculum issues are also addressed in this report. "There is a need for a set of guidelines and models for use in integrating models and simulations into locally-relevant curriculum in a way that allows students to achieve the new goals."

The AAAS Benchmark science standards also indicate the need for computer-based modeling. The benchmark common themes emphasize connections between seemingly disparate science content. In using and creating computer models, student attention can be focused on similar structures and behavior. For example, a predator prey interaction model and a physical spring model share the oscillation structure. Disruption and resumption of equilibrium can be found in both biological and earth systems. Assimilating an understanding of such structure and behavior leads to acquisition of the "schemas" of science content which have been shown to distinguish experts from novices. (Chandler, & Sweller, 1991)

The PT3 funded EdGrid program sponsors seven teams to explore various models of integrating modeling and visualization as methods of discovery and scientific analysis into teacher preparation. This panel will present what we have learned and focus on some the most promising strategies. The teams include:

University of Alabama in Birmingham

The School of Education at the University of Alabama at Birmingham (UAB) and the ASPIRE program at the University of Alabama at Huntsville are collaborating in the formation of an EdGrid team to accomplish three objectives in the pre-service teacher education program at UAB. First, concepts of modeling and visualization are being infused in existing teaching methodology courses for the K-12 curriculum that will provide training for all students in the secondary mathematics and science pre-service program. Second, a course in mathematics modeling is being developed by the mathematics department faculty that will replace an existing course. The new course will be required for all secondary education majors. Finally, a new advanced technology course emphasizing advanced topics in the use of Excel and Web-based tools is being developed. Planning is underway for a senior research project using modeling and/or visualization for those who wish to complete a project.

Biology Student Workbench

Biology is increasingly becoming an "information-driven" science. Biological research involves constructing meaning using the vast amounts of information compiled from experiments in the laboratory and observations in the field. The application of information technology to molecular biology research is evolving into a new discipline, bioinformatics. Biology Workbench, a bioinformatics tool, provides access to biological databases and analysis tools through a web browser. Biology Student Workbench is a growing collection of education enhancements to the Biology Workbench including, tutorials, inquiry-based laboratories and resource materials, all of which help high school students and teachers to conduct open-ended investigations in molecular biology. The project specifically addresses a pre-service teacher audience, and it supports the use of the inquiry-based learning and teaching approach to science education. The project objectives are to:

- Develop inquiry-based bioinformatics curricula in collaboration and cooperation with the faculty and students in the teacher certification programs.
- Integrate the curricula into science and math methods courses.
- Disseminate the curricula nationwide.

Lesley University

Currently, the Technology-in-Education Program at Lesley University is the only pre-service education program at the University that requires its students to take a course in computer modeling. The goal is to have computational science formally included in all pre-service education programs at Lesley University. The intended audience is students enrolled in non-science, non-technology teacher training programs. One product of this project is the development of a module, "Introduction to Computational Science," that will be used in Lesley University undergraduate and graduate teacher education programs. The module is being adopted for use in all teacher education programs as part of the on-going curriculum revisions. As with K-12 classroom teachers, university instructors need opportunities for professional development to support their learning how to teach science. A module training and mentoring program for the education faculty has been created and is being implemented.

Maryland Virtual High School

The MVHS EdGrid Collaborative Team intends to influence the secondary mathematics and science teacher preparation programs in the state of Maryland and beyond by demonstrating that computational modeling and scientific visualization can be incorporated successfully into existing mathematics, science, and teacher preparation courses at community colleges, independent colleges and state universities. Team members, which include college faculty, science and math teachers, and pre-service teachers, are developing and field-testing instructional materials which use modeling and visualization. In-service teachers provide real-world feedback for the materials being developed for pre-service teachers. These modules take advantage of existing computational tools and materials and will incorporate constructivist instructional strategies.

The project has four main objectives. They are to:

- create two-week modules that include modeling and visualization tools as essential components of the module, complete with teacher support materials, student activity materials, and performance assessments, and that encourage higher thinking skill development.
- hold design institutes whose product will be at least one, two-week module each year that will be used in appropriate college courses and K-12 classrooms.
- participate in regional and national workshops to share expertise, ideas and materials.
- foster broad scale dissemination of materials into teacher preparation programs in the state of Maryland and nationally.

Shodor Education Foundation

Building on the award-winning courseware, Project Interactivate (http://www.shodor.org/interactivate/), this project has developed additional lesson materials that incorporate computational technology integrated with the content of the middle school mathematics curriculum. These materials are currently indexed to the leading NSF standards-based curricula. Links to each state's specific curricular guidelines will be made. Each campus has identified one or more courses for specific modification to incorporate modeling and visualization to both content and methods courses. Finally, inter-institutional exchanges are supported; faculty from each campus travel to other campuses to

share their experiences and to lend assistance with modeling and technology.
The project has three main objectives. They are to:

- create summer institutes for faculty that focus on modeling and visualization in undergraduate curriculum.
- develop curriculum for middle school mathematics education that includes lesson materials, incorporates computational technology with middle school mathematics content, is indexed to standards-based curricula, and provides links to each state's specific curricular guidelines.
- facilitate and design inter-institutional exchanges for faculty on each campus to lend support and assistance to other faculty and institutions who will spread the reforms across both states.

SRI International
Advances in 3D visualization have led to the development of scientific tools that allow complex data sets to be rendered in ways that facilitate the discovery of patterns. Research in education has shown that these tools can be adapted for use by middle and high school students. In the Earth Sciences curriculum at the high school level, California state standards specify that students gain an understanding of Energy in the Earth System: solar radiation, movement of heat, and climate. Each of these areas of Earth Science involve working with data and models. Measured and derived data such as incoming solar energy, carbon release, ocean currents, plant green up, and temperature differences can be displayed and analyzed by students to ask questions for inquiry and understand patterns and models. SRI International has developed TerraAnalysis, a terrain visualization tool that can allow a viewer to discern patterns that are terrain dependent. The visualization being mapped usually represents a variable related to the terrain such as a remotely sensed image, temperature, or vegetation growth.

The project has three main objectives. They are to:

- Develop at least two, online learning modules that show how visualization and modeling can be used for learning.
- Write a "lessons learned" document that describes the barriers and affordances to adoption by preservice teachers.
- Infuse the concepts of modeling and visualization into the existing CalStateTEACH Technology Enhancement Project (CSTEP) in the development of indices to relevant visualization and modeling resources.

University of Illinois at Urbana-Champaign
The goal of this project is to develop materials to assist pre-service and in-service secondary mathematics and science teachers to learn to incorporate visualization technology into their teaching, and to integrate mathematics and science. Several faculty members of the College of Education in collaboration with the National Center for Supercomputing Applications are focusing their efforts on developing activities that will prepare teachers to use visualization technology to enhance and extend students' learning of integrated mathematics and sciences. Teachers can use technology effectively to present information, search for information, keep records and communicate, and such uses of technology by teachers can result in improved student learning. However, the most direct and effective way to bring about enhanced student learning of mathematics/sciences through visualization technology is to prepare teachers to incorporate it into their teaching.

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Towson University PT3 Mentoring to Master Technology Integration Project

Cheryl Wood, Towson University, Towson, Maryland, US
Patricia Ryan, Towson University, Towson, Maryland, US
William Sadera, Towson University, Towson, Maryland, US

There is little doubt about the ubiquitous nature of technology use in our culture. What has followed is a call to infuse technology within schools as an essential tool to enhance instruction and provide vivid, useful and creative learning experiences. A range of educational organizations such as the CEO Forum, SITE, ISTE, NCATE, and most content specialty associations recommend the use and infusion of technology within teacher preparation programs. Technology offers possibilities for solving "emerging" educational problems, but only if teachers are prepared to use the technology in support of student learning, thinking and problem solving. The Towson University teacher preparation program requires pre-service teacher candidates to become active participants in meeting this challenge. The purpose of this FY2002 PT3 Implementation project entitled, **Mentoring to Master Technology Integration Project (MM-TIP),** is to enhance teaching and learning through the increased use of technology within the University teacher education program and regional consortium. The University views the appropriate integration of technology as a vehicle to enhance learning and to change the nature of the learning community associated with the University. This mentoring project is centered around three major goals: first, to assist faculty in developing their own skills in using technology; second, to encourage faculty to utilize and integrate those technology skills into their teaching in effective and meaningful ways; and, finally, to model best practices in teaching with technology and to guide pre-service teacher candidates in incorporating technology into their own lesson planning and teaching.

The teacher education program extends across multiple colleges within the university framework, including faculty from the College of Education (COE) at Towson University, the Colleges of Liberal Arts (CLA), and Mathematics and Science (CMS) who teach pre-service teacher candidates in their classes. The members of the regional consortium are from several of the Professional Development Schools (PDS) Network associated with Towson University within two public school systems in the Baltimore area (Baltimore and Howard Counties), and faculty members at Harford Community College, a two-year institution which transfers a large number of teacher education candidates to Towson University each year. In addition, the Towson University Center for Instructional Advancement through Technology (CIAT) and the Center for Technology in Education (at Johns Hopkins University) serve as partners for this project.

The vehicle for infusing technology into teaching and learning in this project is a mentor-protégé staff development model with additional targeted staff development and on-going electronic communications. The keys to success in the FY2000 PT3 Capacity Building grant project were (a) the ongoing work and assistance of a mentor to help each faculty integrate technology into their teaching, (b) a supportive environment for collaboration and learning for each protégé, (c) all faculty involved as protégés were required to use technology in their teaching with a focus of student learning, and, (d) clear and specific rewards for integrating technology into teaching. As a result of that successful project, there is an improved system that supports faculty initiative and innovation with technology. Enthusiastic educators at Towson University and in the Professional Development Schools (PDS) K-12 classrooms are using technology on a regular basis for a variety of activities.

The results of the mentor-protégé model implemented in the FY2000 Capacity Building PT3 project serve as the motivation in extending the focus of that project beyond the original 20 University faculty and 8 PDS K-12 faculty to include the current eight consortium partners. In addition, we have expanded our faculty support efforts by providing an electronic learning community (ELC) for on-going discussion, sharing of best practices, and technical support for the consortium partners.

Our conference presentation will include an overview of the MM-TIP project including its goals and objectives, procedures for developing and monitoring the mentor/protégée partnerships, the framework for moving protégées from learning skills to modeling best practices, and the data collection and evaluation processes. In addition, we will share some of the projects that have been developed by faculty who participated as protégés in the project.

Toward Improving Reflective Practice: An Online Model for Student Teaching

Dr. Martha Jeanne Yanes and Dr. James B. Curts
Department of Curriculum and Instruction
University of Texas-Pan American
United States

yanesm@panam.edu

Abstract: This paper discusses how the University of Texas-Pan American's PT3 Grant program extends the field-based teacher preparation program to include new modes of online communication to improve reflective practice. The formation of action research teams and their online activities are explained. Initial results are discussed and plans for quantitative and qualitative analysis of the interaction process and project effectiveness are presented.

The University of Texas – Pan American (UTPA) is the largest producer of teachers in the State of Texas and graduates more than 1000 teachers annually. The undergraduate teacher preparation program includes a field-based component that comprises 50% of student activity. The program is based in the concept of a Professional Development School as defined by the Sid W. Richardson Foundation. "The Professional Development School borrows heavily from the tested medical model of teaching hospitals, where practitioners, researchers and clinical professors work together to expand the knowledge base of medicine, improve medical services to patients and prepare future practitioners." The ideal outcome of the Professional Development School model is that university faculty, pre-service teachers, teacher intern, and mentor teacher practitioners collaborate in the investigation of learning and instruction, the implementation of effective teaching practices, and the dissemination of their findings. But unlike the teaching hospital, the separation resulting from dispersing interns into area schools isolates the constituents. The task of supervising the growing population of UTPA's pre-service teachers at multiple sites tended to reduce substantive interactions between university researchers and field practitioners.

A desire to correspond as closely as possible to the Professional School Model led to an analysis of the standing program. During pre-service teacher internships a field supervisor from the field observation office has the primary responsibility to maintain contact with university faculty. Field supervision is an especially time-consuming task given the number of interns and the size of the service area. It was found that little time existed for the field supervisor to consult with university teaching and research faculty and that there was no formalized mechanism to maintain personal contact between interns and professors. The program followed the typical linear model of preparation in which the student moves forward through three distinct phases, from general studies to major and minor studies, and then on to pedagogical preparation. The departmentalization innate to university structure limits opportunity for close collaboration among faculty units to actually follow students through the preparation cycle. The effect is that the three preparation phases appear as "ends" unto themselves. It is assumed that intern teachers engender the theoretical connection from phase-to-phase, into the internship classroom, and finally into professional practice. The communication breaks at the end of each phase do not project a holistic model of successful teaching perceived as a continuum of interaction between content, theoretical and pedagogical knowledge. These thoughts turned attention to the process of reflective practice as an activity that focuses on skills necessary to this desired ongoing interaction.

State teaching standards follow the trend to identify reflective practice (Schon, 198,1987) as an essential skill for teachers. Some feel that only a strong foundation in reflective practice supported by a theoretical foundation will adequately equip teachers with the skills that promote the adaptability needed to meet the challenges of changing contemporary classrooms (Norton, 1994). However, there appears to be no agreed-upon definition of the skills that contribute to reflective practice. Students voiced a need to know precisely "what to observe, how to observe, and how to reflect on the information from observations and how do something about the information." It is commonly accepted that the skills for reflective practice are developed through dynamic activities that involve ongoing observation, modification and evaluation of learning. The writers feel that professional interpretation and evaluation of observation data is dependent not only upon personal creative insight but also on a connection to theory. Methods associated with action research seem to provide a practical mechanism to connect data from classroom observation to theory as well as provide formats for follow-up activity. Parsons & Brown (2002) state than an "action researcher engages in a process of observing-doing-observing-adjusting and doing again." The writers felt that clear identification of the steps in action research and practice with that process could potentially strengthen teachers' mental models to support reflective practice and sustain professional activity toward ongoing solution of learning problems. "Action research offers teachers and teacher educators an opportunity for individual professional growth through ongoing dialogues with people and texts and an equally important opportunity to create a learning community within a school" (Squire, 1999). Obvious societal factors like rapid globalization, technological, social and economic changes have a dynamic impact on education that demand ongoing professional development among practitioners and researchers. The stated considerations intensified interest to insert an explicit model for reflective practice based in action research that would include experienced faculty researchers in the internship phase of the teacher preparation program. It was determined that to support such a model a means to bridge the physical distance between field interns and university research faculty was needed.

The PT3 Grant provided resources to develop technological skill among pre-service teachers and faculty. Grant activity and also presented the opportunity to explore Web-based communication as a tool to bridge the physical distance between university faculty and field placement sites in the standing teacher preparation model. These investigations stimulated the initiation of the infrastructure for an online learning community to provide a virtual place for collaboration and training. This infrastructure supported the initiation of the online student-teaching component that enables frequent communication between university faculty and mentor-intern teams at remote sites. It is important to state that the new online student teaching activity is an enhancement to the standing successful internship model and not a substitute. The goal of the online component is to strengthen intern teachers' skill in reflective practice through action research activities that extend university researchers' expertise to situate practical theoretical applications in the remote classrooms during the internship phase of preparation. The use of an online environment provided means:

1. To ease communication and consultation among university faculty, mentor teachers and interns separated by distance;
2. To collaborate to conduct action research activities that models skills innate to reflective practice;
3. To affirm the essential relationship between content, theoretical and pedagogical knowledge as the basis for reflective practice;
4. To support development of technological skill and an understanding of technology-supported learning;
5. To encourage technology-supported instructional activity in order to expand possibilities for innovative instructional solutions; and,
6. To demonstrate a broader process for professional consultation that provides example of collaboration empowered by web-based communication.

To implement the online student-teaching component action research teams are formed in the following manner. Questionnaires are distributed to identify mentors, interns and faculty who have expressed interest in technology-supported learning. Once identified, a faculty content specialist from a teaching discipline is teamed with a COE faculty. They are then matched with five mentor-intern teams that have expressed specific interest in learning issues related to faculties' research agenda. The criteria for participation are that team members must have a genuine interest in collaborative research and demonstrate willingness to develop necessary technology skills. Targeted technological skills include use of Web browsers, email, uploading and downloading documents, file transfer protocols, online library resources, Internet search engines, discussion boards, chat, video conferencing, and instructional design procedures. Support systems provided by the PT3 project include the Web-based infrastructure, individualized just-in-time technical assistance from PT3 staff, consultation with an instructional designer, and online tutorials. Additionally, each intern-mentor team is issued a laptop equipped with a wireless modem to assure capability and ease of Web access. To maintain consistency with the approach of the UTPA PT3 Grant, that technology is best learned when it becomes a tool for learning, explicit instruction in the use of technology is embedded as team activities indicate need. The PT3 Instructional Developer handles the daily activities necessary to mediate the online environment. The PT3 co-directors and Instructional Developer survey team activities to insure that team needs are met in a timely manner.

Once activated, the comprised team follows an agreed-upon routine common to action research: observe, identify a learning issue for treatment, research, analyze, design instructional treatment, apply, evaluate student performance, assess effectiveness, and report findings. All team communication takes place in a private space provided within a Web-based environment called the Electronic Learning Community (ELC). By substituting online communication for physical meetings at remote sites, time spent for team collaboration ranges from one to three hours per week for an eight-week period during the internship. An eight-week period is specified to contain the activities within a practical time period that allows the teacher intern the opportunity to realize all the steps of the research project and to participate in authoring the final report. Varied online technologies support communication, email, file transfer protocols, video conferencing, etc., so that faculty members can virtually join the mentor and intern in an analysis of the content covered at the placement site during the internship.

The team begins collaboration through online discussions about the content to be covered at the placement site in order to identify a learning issue relevant to the instructional setting and of interest to faculty. When an issue is identified, they develop a research agenda that includes a timeline for observations and investigations. The analysis of observation data and research findings assists the team to develop a hypothesis and a plan for instructional treatment. In the case of this project, at least one technology-based instructional activity must be included in the plan. The PT3 instructional developer is available to assist the team with instructional design processes and the creation of the technology-based lesson. Teaching strategies and lesson activities derived from the analysis and design are applied in the classroom. Data regarding student response and performance during the instructional treatment is recorded according to agreed upon protocols. Video of actual student activity is recorded and field supervisors also provide valuable on-site observations. The team analyzes the recorded results to evaluate the effectiveness of the instructional treatment. Finally, a report of team activity and findings is collaboratively authored, and posted to the public area of the ELC. The video is included with the analysis so that other teachers can view the authentic examples as well as access the theoretical and instructional design information.

The end products of the online student-teaching component are; a demonstration of action research skills to support reflective practice, a higher technology skill level among participants and a growing archive of best teaching practices. The project report and video become part of faculty's research information and are also included in the teacher intern's electronic portfolio.

Important to implementation of any change is the stakeholders' motivation to participate. That motivation is dependent upon perceived benefits. By using Web-based communication to eliminate the time-consuming travel to field sites the online student-teaching component appears to comprise significant benefit to all stakeholders in the following ways:

1. It establishes and strengthens the professional relationships among collaborating members.
2. Content and pedagogical experts acquire a closer connection to the real classroom.
3. The action research model provides the interns and mentors with a clearly defined format for reflective practice that reinforces the relationship between theory and practice.
4. The results provide faculty with ongoing access to practitioners and field data not readily accessible through traditional means.
5. The mentor teacher, intern and field supervisor have access to content and research expertise when developing instructional activities.
6. All participants improve technological skills while using technology to learn about learning and to enhance instructional treatment.
7. A growing online archive of best-teaching practices is available to other researchers and practitioners.

Another implicit goal of the online student-teaching component is that participation in the online learning community will be extended beyond the internship period. Reports from beginning teachers that relate a feeling of isolation compel interest in providing formats for broader communication models. With this in mind, the online student-teaching component presents Web-based communication as an activity that can easily be extended into professional life. Though at this writing the online student-teaching component is in the first semester of implementation, it does demonstrate potential to benefit team members and the larger teaching community by providing a precise model for reflective practice that demonstrates a process for continued collaboration and professional growth. Formal assessment of the project includes both quantitative and qualitative evaluations. The following records are maintained; team logs to measure time input, records of training, frequency and type of technical assistance; and questionnaires to measure participants satisfaction. A count and evaluation of final reports and archived examples will be conducted at the end of the semester. Surveys to measure continued use by participating intern teachers of the online community are planned during their first year of professional practice. These studies and resulting best practice archives will provide data to assess the overall effectiveness of the project.

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Student Teachers Supported by Technology

Elizabeth Years
School of Education
St. Bonaventure University
United States
yearsel@sbu.edu

Student Teaching Technology Sites (STTS) are student teaching placements that are equipped with a media cart. On the media cart is a laptop, projector, scanner, digital microscope, printer, and digital camera. Each laptop is ready to run *HyperStudio*, *Inspiration*, *Timeliner*, *PowerPoint*, and more. It is very simple to install other software. The Friedsam Library on campus at St. Bonaventure University has an extensive software collection, and STTS sites are located within a reasonable distance from campus -- so borrowing software is not difficult.

The STTS student teachers are required to incorporate technology into their lessons as much as possible, but there is not a required number of times to use technology per placement. The student teacher's goal should be to have the students use as much technology as possible in the classroom.

The STTS program offers a great deal to everyone involved. First, teachers in the student teaching placements must have an interest in taking a student teacher who will be working and incorporating technology. It is beneficial to the cooperating teacher because he or she will learn from the student teacher how to incorporate technology into lessons.

The students benefit from this experience because they are presented with more technology, and they have the opportunity to become actively involved with technology. In my student teaching experience, the students used Microsoft *Word*, *Inspiration*, *PowerPoint*, *National Inspirer*, a short vowel interactive game, *Story Maker Deluxe*, and a digital camera. The students are excited about having a media cart in the classroom, and they are eager to get involved in the lessons when technology is being used.

The student teacher benefits from STTS because she has more access to technology as a result of the equipment provided with the university's PT3 grant. The student teacher learns right along with the students. The student teacher also has the opportunity to see her students become engaged in an interesting lesson. Another benefit is being closer to campus, which means a shorter drive (a real advantage in rural NY where some student teachers must drive up to an hour each way)!

In my personal experience as a student teacher, I have learned that it is harder than it looks to fit everything planned into one day. Using technology requires more time in terms of planning and class time. It takes dedication to teaching and technology to be a part of STTS. For example, in my third grade placement I presented a slide show, on Monarch butterflies, using *PowerPoint* to the students. After doing their own research on different aspects of the Monarch the students, in pairs, created their own slide. We compiled the slides together and the students presented their work. This took a fair amount of planning on my part, as well as class time. However, it was well worth it, as the students gained something from this lesson. The students were so proud of their own work, but they were also eager to discover what their peers had to present. The day following the students' presentation, the daily journal prompt was "I learned Monarch butterflies…" It was incredible to see how much the students got out of a *PowerPoint* slide show. Students who had never become engaged did this time. This was a very rewarding experience for a student teacher.

In some cases it does take a lot of preparation to use technology in the classroom. However, some times it takes little preparation at all. For example, in a third grade class I was reviewing short vowel sounds. I used *Short Vowel* software as an anticipatory set. The students were eager to use the laptop and projector in the classroom. Each student had the opportunity to come up to the laptop, call on a peer, and use the mouse to categorize objects according to the short vowel sounds in the objects' name. In this situation, the prep time for this activity was very short. To prepare for this anticipatory set I had to obtain the software from the library and download it onto the laptop.

Another wonderful way to incorporate technology into the classroom is by using the Internet. I use the Internet frequently when writing lesson plans; there are wonderful ideas for teachers on the Internet. Even more importantly I encourage my students to use the Internet as a resource. When completing a reading unit on discovery I took my fifth grade class to the computer lab to research a place they would like to "discover". The places ranged from Colorado to the Bahamas. The students were given a short time to learn something about their place using the Internet. They were allowed to print one page of information. Next, the students had to practice their public speaking skills and present one interesting fact that they "discovered" about the place to the class. This lesson was very easy to plan and it encouraged students to use technology as a resource.

One of the most incredible pieces of technology we are provided with at STTS is a digital camera. When teaching a lesson on Descriptive writing in fifth grade, the student had to work in groups to create a list describing the Oreo and how to take it apart. Each student was given an Oreo to manipulate. I took pictures of the students completing the activity. The following day the students were required to take their list and put it into paragraph form. Before giving the second half of this assignment I felt is was important to review Descriptive writing. I created a *PowerPoint* presentation that included the steps to writing a descriptive piece and the pictures of the students working with the Oreos the previous day. The students were so excited to see their peers working together. I had their full attention during the presentation. The pictures of the students working in cooperative groups are beneficial to me because I am able to import the pictures into my electronic portfolio.

The pictures taken while the students are learning may also be used in a classroom newsletter that may be sent home to the parents. My cooperating teacher was eager to learn how to import pictures taken with the digital camera into Word documents. We used several pictures from a variety of lessons that I taught to be in the newsletter sent home. It really helps parents to see that their children are constructing their knowledge and interacting with one another.

Students are also able to use the digital camera. The camera conveniently comes with a strap to hang the camera around the neck. In both third and fifth grade the students in my classes were able to use the digital camera confidently. In third grade the students took pictures of one another to display on a bulletin board for open house. In fifth grade the students wrote and typed their goals. On the final copy of their goals they took pictures of one another to import into a Word document. These were also put on display. In both situation the students were able to learn from one another and demonstrate their ability to use the digital camera.

I realized that it is a little easier to do more with older students with technology. They are able to use a word processor fairly quickly. When using *Inspiration* with fifth graders, I was able to pick a "student helper" to guide students at the laptop. In my third grade experience using Inspiration, I had to be there to guide the students at the computer.

Overall, being a student teacher in an STTS has been a wonderful experience. I feel more prepared to use technology in the classroom. However, it has been a realistic experience for me as well. Even though it has been a good experience for me, I am confident that it has been a learning experience for the children too, and that is what is most important.

READING, LANGUAGE ARTS & LITERACY

SECTION EDITOR:
Kathy Matthew, Louisiana Tech University

Using technology to teach reading and writing is exciting, challenging, and rewarding. Discovering and learning to use new pieces of technology and new software programs is an ongoing endeavor. Even more challenging is creating software to meet students' needs. Exploring ways to use technology to effectively enhance literacy instruction is also time consuming. Undaunted by these challenges the authors of these papers share the ways they use technology in their teaching. Papers include discussions of methods courses developed for preservice teachers, ways to use the Internet in methods courses, how to integrate technology in English as a second language instruction and English as a foreign language instruction, and ideas for using technology to teach writing.

Liu's paper describes the development and implementation of a course designed to prepare students to teach reading using technology. Students learn to use a variety of technologies, to evaluate software packages, to examine web resources, and to design reading instruction that incorporate appropriate technologies and software. Baker writes about her experiences using case-based instruction and field experiences in a block of literacy courses. Students perceive that these activities help them grow as literacy teachers.

Language arts teacher candidates working with Marquez-Zenkov and Hamon participated in a unique methods course centered on the proposed renovations of public schools in their area. Students combined technology and language arts as they interviewed constituents, researched the topic, and wrote reports using a course web site for online peer editing. An introduction to WebQuests was included in the course. Teacher candidates in Kimbell-Lopez's reading methods class developed WebQuests. Her students discovered that imbedded within their WebQuests were a number of reading/language arts processes. Students in these methods classes learned how to incorporate authentic learning opportunities into their classroom teaching.

Several papers in this section provide descriptions of ways to combine technology and writing. O'Donoghue writes about critical issues involved in the integration of technology in writing programs and offers ideas for addressing these issues. Skillen's article describes *Journal Zone* an online environment that includes journal writing, collaboration, and cognitive scaffolding. Costa and Maraschin describe how students in an English as a foreign language class are using *EquiText*, a web-based collaborative writing tool.

Marquez-Chisholm combines Multiple Intelligences Theory, the language objectives from the ESL Standards for PreK-12 Students, and technology. This interactive session will allow participants to experience a multi-disciplinary lesson. Illera's interactive session will demonstrate how to use *Lektor* for creating and reading electronic books. *Nexos*, a language portal for cultural learning and collaboration for teachers and learners of Spanish, will be presented by Hellebrandt during an interactive session.

This is a brief introduction to the many interesting papers included in this section. They describe challenging projects and discuss intriguing topics related to reading, language arts, literacy, and foreign language learning. These papers challenge readers to critically examine them, to discover new ideas to use in their own classrooms, and to contact the authors for additional information.

PT3 Facilitates Technology Use in Preservice Teacher Reading Courses

Dana Arrowood
Institute for the Integration of Technology into Teaching and Learning
University of North Texas
United States
arrowood@coefs.coe.unt.edu

Michele Maldonado
Institute for the Integration of Technology into Teaching and Learning
University of North Texas
United States
mlm0012@coefs.coe.unt.edu

Abstract: Two doctoral candidates majoring in reading education at the University of North Texas developed technology related literacy activities for their preservice reading education courses. These activities were designed to show the place technology has in the language arts curriculum by facilitating the acquisition of literacy skills related to reading and writing. The response of the preservice teachers to the activities featuring technology integration was overwhelmingly positive. Through funding from PT3 grants, new activities are being developed to complement coursework and preservice teachers are being introduced to new technologies as they become available.

Many new and exciting opportunities for teaching reading and writing skills exist for teachers who integrate technology into their language arts curriculum. Preservice teachers at the University of North Texas were able to experience technology integration into language arts methods courses through the efforts of two teaching fellows.

Teaching Reading K-12 is an introductory reading course that is required of all students in the college of education at the University of North Texas. It covers a variety of topics that include knowledge of the reading process, stages of reading and writing development, techniques for teaching reading skills, and an overview of reading assessment. It is a prerequisite of the second course, Assessment in Reading. Assessment of Reading is required for all preservice teachers specializing in elementary education. This course is designed to teach students how to perform reading assessments and provide remedial recommendations for elementary grade students. These preservice teachers assess and tutor children each week.

During the first week of courses, instructions were given to the preservice teachers enrolled in both courses describing how to obtain a free email account provided for all students by the university. Email addresses were collected; a list was created, and then given to the members of each class.

The preservice teachers enrolled in Teaching Reading K-12 met in a computer classroom on February 2. Small groups of students who were not yet comfortable searching the World Wide Web were lead by a peer who was experienced in web searches. After a brief demonstration, the preservice teachers were asked to find resources related to Ground Hog Day and Valentine's Day that could be used in teaching language arts. The class later met in the computer education classroom to learn how to make word puzzles (see http://puzzlemaker.school.discovery.com/). The students were assigned vocabulary words from their textbook and asked to bring short definitions to class in order to be ready to create puzzles. After they finished constructing the puzzles, the instructor made copies for all the students to help them learn the required vocabulary for the course.

PowerPoint presentations were used in both courses to highlight important points in textbook chapters and lectures. The preservice teachers were first attracted by its bright colors and with the ease of which they could see the presentations projected onto the screen by the LCD panel. The students soon began to appreciate other features of PowerPoint, most notably the handouts that could be easily produced for their use. Their comments included, "It saves time in class in not having to write everything" and that it facilitated class discussion because they did not have to concentrate on taking notes. After being viewed in class, the presentations were posted on the course website in HTML and downloadable format for future reference.

Teaching Reading K-12 again met in the computer classroom. They were divided into small groups and taught how to create their own PowerPoint presentations. Each group was given a section of a chapter in their textbook, and in a collaborative effort, the group members designed their own slide show presentations and presented them to their classmates. The students found this activity "helpful" and some felt that they became "more familiar with the chapter."

The preservice teachers were asked at the end of the semester how they might use PowerPoint in their future classrooms. Their ideas covered a broader scope of uses than those they had seen modeled in the reading courses. The ideas given could be divided into two types, those for teacher use and those for children's use. Among the suggestions for teacher use were presentations covering dental care, fire safety, stranger-danger, and other topics that are routinely taught in elementary school classrooms. One student felt that PowerPoint presentations would be useful when used in conjunction with content area textbooks that often prove difficult for beginning readers. Another strength mentioned was its ability to "stimulate visual learners."

The majority of the preservice teachers could foresee uses for PowerPoint as a tool in the hands of their future students. Several believed that PowerPoint should be made available in the writing center in the classroom. Book reports and other types of information gathered by students could be presented to their peers via slide show presentations. Since PowerPoint is user friendly, they felt that even young children could create presentations and would enjoy illustrating their work with graphics. One preservice teacher elaborated on this activity by stating, "Filling up a PowerPoint (and adding pictures) would be less intimidating than having to fill an 8 ½ x 11 page" for a young child.

An email exchange between the preservice teachers in Teaching Reading K-12 and those in Assessment in Reading was planned by the instructors as a way to demonstrate to their students the value of classroom communication with those who have knowledge that is beneficial in some way and how having e-pals could be a way to motivate children to refine their reading and writing skills. Reading assessment was the last major topic covered in Teaching Reading K-12 and the timing of the email exchange was planned to correspond with that topic.

The majority of the preservice teachers in Teaching Reading K-12 were curious to learn how the content they were learning was applied in a real teaching situation. Since most of the preservice teachers in Teaching Reading K-12 would be required to take Assessment in Reading, they considered the email exchange an opportunity to learn more about the course and its requirements. The instructors monitored the exchange by requiring each email to be carbon copied to them in order for the students to receive participation points.

Comments by the preservice teachers provided positive feedback on the e-pal exchange. The students in Teaching Reading K-12 gave the following responses: "It was neat to be able to talk with people who are further along than I am in their degree plan. It made me look forward to Assessment in Reading", "It was good because it helped tie in what we are learning now to real life as the Assessment in Reading students are experiencing it," and "It was great! It should have been done throughout the whole year."

Preservice teachers in the Assessment of Reading course found themselves in the role of teacher as is illustrated by the following comments, "This was a good experience for me. We tend to learn better when we have to explain to someone else answers to questions. It provided a way to reflect on our own learning about assessment this semester," "I really liked the email discussions. I found it useful to review the information discussed in class. I think it would be good to have the email discussions throughout the entire semester," and "I thought that the E-mail exchange was fun - because I got to play 'the teacher'. It forced me to think broadly about concepts in child development and literacy."

After the email exchange between the two courses was completed, the students were asked to comment on how they might use an email exchange in their future classes. The comments included "I would use this to have young students talk about a certain book", "I think children of all ages would like to email kids from other schools, states, or countries and learn about each other and where they are from."

The university received a PT3 grant and the instructor received a laptop for use in integrating technology into her reading course. A listserv is used each semester to keep the preservice teachers in close contact as they assess and tutor children. It promotes the exchange ideas and allows the preservice teachers to provide support for each other between class meetings. Funding from PT3 was used to purchase digital cameras for preservice teacher use and this new technology resulted in an assignment change. Previously, students had used PowerPoint for presenting chapters in textbook or article summaries. Now they are able to give presentations that feature the highlights of their tutoring sessions and are able to include pictures of projects their students have completed as well as pictures of themselves working with their students. This has become a favorite show and tell activity at end of each semester.

PT3 Technology Enhanced Lesson Plans for the Elementary School

Mary Kay Bacallao, Ed. D.
St. Thomas University
16400 NW 32nd Avenue
Miami, Florida 33054 U.S.A
mbacalla@stu.edu

Candace Lacey, Ph. D.
Barry University
Miami Shores, Florida, U.S.A.
clacey@mail.barry.edu

Joseph Furner, Ph. D.
Florida Atlantic University
Boca Raton, Florida, U.S.A.
jfurner@fau.edu

Tom W. Frederick, Ed. D.
Golden Glades Elementary
Miami, Florida, U.S.A
tomwfred@yahoo.com

Abstract: The concept of virtual teams is relatively new. However, a virtual team, like any other team, progress through various stages of development and is dependent upon the clarity with which performance outcomes and goals are communicated for achieving success. This presentation focuses on the analysis of the transcripts of on-line meetings of a PT3 virtual team composed of subject area team leaders and project administrators. The lessons learned from this experience helped develop an understanding of the role that clear communication and trust play in building bridges across the digital divide. Lessons from practice will include Internet Field Trips.

The St. Thomas University Plan to Bridge the Digital Divide in South Florida

A consortium of schools with St. Thomas University in Miami, Florida as the lead partner was awarded a PT3 Capacity Building grant during the first year of the PT3 program. The teacher education program at St. Thomas University serves students of many ethnic groups. It is located in an urban area with a large African American population along with immigrants from many Hispanic countries and the Caribbean.

The purpose of the initial grant was to work with area elementary schools, such as Welleby Elementary, to train the pre-service teachers at St. Thomas University and Trinity International University to use computers effectively in classroom instruction and thereby impact the diverse students in Miami-Dade County. The grant sought to train teachers who will not only teach in the inner city schools but stay in the inner city schools. By serving pre-service teachers who represent these underserved populations, the program sought to impact inner city classroom instruction.

What Has This Program Accomplished?

All of the program objectives were met in the first year and a three-year PT3 Implementation Grant was awarded the following year with more partners, including Florida Gulf Coast University and Golden Glades Elementary. The purpose of the Implementation grant changed the focus from the pre-service teachers to a team of professors, pre-service teachers, and K-6 teachers. It became apparent that, in order to effect systemic change, it was essential to train the professors. It was also essential that practicing K-6 teachers become an integral part of the process. Golden Glades Elementary, located several blocks from St. Thomas University, is a school with a student population that is completely either African American or Black American from the Caribbean. Florida Gulf Coast University is the newest Florida State University located on the West Coast of Florida and equipped with the latest technology in each college classroom.

How Did the Virtual Teams Work Together?

Subject area teams of professors, pre-service teachers, and K-6 teachers were formed. The teams focused on Math, Science, Reading/Language Arts, Social Studies, Exceptional Student Education, Curriculum, General Methods, and English as a Second Language. The focus on ESOL is important in Miami-Dade County because all teachers who are hired must also be certified to teach ESOL because of the large number of immigrant children attending school in Miami-Dade County.

During the first year, each team communicated on-line weekly. They met to discuss both successes and failures in their attempts to integrate technology into their classes. They also completed 50 hours of professional development in technology. In the second year, they worked together as a team to write and field test technology integrated lessons. It was determined that the convergence of learning that takes place in the classroom can be written in detail through lesson planning. The professors and pre-service teachers would begin their attempts to integrate technology into the curriculum with written lesson plans. With assistance from a new partner, BEACON, which hosts an on-line database of lessons, from Bay County, Florida, the professors and pre-service teachers worked together to write lessons that are field tested in the K-6 teacher's classrooms. In this process of working together, the professors and pre-service teachers learned about the technology available in the partner schools and the classroom conditions such as class size, high stakes testing pressures, and behavior management concerns that they need to consider as they write their lessons.

How Important is Technology Support?

The participants in this program have benefited from expert technology support. The support they have received seeks to decrease reliance on outside sources by empowering the participants to do things for themselves. The effort will be sustained when the federal funding ends as the participants learn enough about technology to be self-sufficient. Instead of the technology support specialist holding the mouse while others stand amazed, the learner maintains control of the mouse. The process is similar to learning how to drive. The technology support specialist is there to assist and direct, but encourages the learner to take charge.

Why is it Important to form a Collaborative?

The fact that this grant is applied for and awarded as a collaborative can serve to strengthen the work effort and bridge the digital divide. In the first year of Implementation, a cost share crisis developed for the collaborative at St. Thomas University. Two of the original partners, Trinity International University and The 21st Century Teacher's Network, dropped out of the program; their cost share commitment was lost. St. Thomas University also had a problem with resources whereby they were not able to meet the cost share they had committed. Because the PT3 program requires a matching commitment of funds, officials at St. Thomas University temporarily suspended the grant program until documentation of cost share could be established. This was where the title of the grant, "Bridging the Digital Divide in South Florida," became the reality of what happened. Representatives from Florida Gulf Coast University were able to supply the missing cost share. Other partners responded in the same way and contributed more then they had committed in the grant application. In this way, the digital divide was bridged because those on one side of the digital divide were able to rely on their partners to help them in a time of need.

On-Line Presence

Information about our project may be viewed at: http://garnet.fgcu.edu. To view these discussions, one may register for the PT3 Fall and/or spring courses and create an identity. Once this is done, posting will be enabled for the viewer. Our website also contains information that documents our workshop activities with our partners. Our website is located at: http://coe.fgcu.edu/PT3/home.htm.

Case Study: Internet Field Trips with Dr. Joseph Furner

Internet Field Trips in Mathematics are exciting. There is a need for technology use in mathematics teaching. This is emphasized in the National Council of Teachers of Mathematics Standards. There is a wealth of websites available for teaching math concepts using the Internet. Dr. Joseph Furner from Florida Atlantic University has participated on the Math team. His role as professor and lesson author has enabled him to produce lessons that can be used by his future teachers. He will present some sample lessons he has written with websites that are available on BEACON at www.beaconlc.org

National Educational Technology Standard-Based Lesson Plans Are Written

The technology enhanced lesson plans for the Fall 2001 Semester are written and can be viewed on the BEACON database. The website for BEACON is www.beaconlc.org. Selected lessons will be shown at this session.

Teaching Teachers How to Reach the Reluctant Reader Through Multimedia (When Theory-to-Practice Hits the Wall)

Lawrence Baines, College of Education, Texas Tech University, USA, lawrence.baines@ttu.edu

Peggie Price, College of Education, Texas Tech University, USA, peggie.price@ttu.edu

Abstract: During fall 2001, a cohort of prospective teachers worked with reluctant readers (students who are at least two grade levels behind in reading proficiency) in local schools. These prospective teachers experimented with traditional readingstrategies as well as some promising, new multimedia approaches with the goal of enhancingthe reading and writing skills of reluctant readers. Although these graduate students were knowledgeable and enthusiastic about multimedia approaches, they found classroom environments in local schools hostile to technology. In general, classrooms lacked any sort of technological infrastructure, teachers exhibited openly negative attitudes towards technology, and there was no support for innovative approaches to teaching reluctant readers. Surprisingly, half of the cooperating teachers were philosophically opposed to individualization, and forbade students from working with reluctant readers at all.

Traditional approaches to enhancing the writing, reading, and thinking skills of adolescent reluctant readers have been drawn from research with young children. Elements from programs such as Reading Recovery (Sensenbaugh, 1994) and Success for All (Slavin & Moore 2000) have been adapted to serve the burgeoning population of aliterate and illiterate American teenagers. According to recent results from the National Assessment of Educational Progress (Greenwald, Persky, Campbell, & Mazzeo 1999), less than 20% of American teens are able to write proficiently or better. Millions of children cannot understand or correctly interpret written materials at an elementary level and may be classified as functionally illiterate (Kaestle, Campbell, Finn, Johnson, & Mickulecky 2001).

Stanovich (2000) and Alverman & Moore (1991) have noted the deleterious presence of Mathew Effects in adolescents. In many ways, reading is an intellectual multiplier. The more students read, the larger their vocabularies become, and the more proficient they become as readers. Likewise, when students rarely read, their skills deteriorate, especially as the level of difficulty with texts escalates as they matriculate through secondary school. So, an ineffective reader in second grade may likely become a non-reader by tenth grade.

Popular, traditional techniques for reluctant adolescent readers include K-W-L (in which the student writes all that he/she knows about a subject, what he/she might want to know, and what they eventually learned), Think-Pair-Share, reading aloud, repetitive reading, vocabulary enhancement strategies such as semantic feature analysis, guided reading, and structured free reading.

Among the most successful adapters of such strategies are the teachers at the Benchmark School in Pennsylvania, a school expressly designed for students who read two or more grade levels behind their peers. Benchmark uses a rigorous, structured learning environment that emphasizes goal-setting, repetition, phonics, choral reading, extensive reading at and below grade level in a variety of genres, and much intensive, one-on-one instruction. If all goes well, after several years of work, students eventually begin to read at or above grade level (Gaskins 1997).

Some researchers (Babbitt & Byrne 2000, Crowley 1995, and McBride 1999) have suggested that problems of self-esteem and self-efficacy, not reading comprehension, are as likely to contribute to poor reading performance as more intellectual causes. Such researchers usually advocate discovering student strengths and interests and using them as springboards to spur interest and achievement in reading.

Elementary schools have been at the forefront in adopting programs which allow students to choose reading materials in their areas of interest. Programs such as DEAR (drop everything and read) and Accelerated Reader require that students be allowed to self-select books and mandate time for free reading during the school day. However, with these programs, teachers usually organize, manage, and chart the books that have been read rather than help provide remedial instruction for students who have difficulties with the act of reading. Still, Davies and Beaucamps (1999) found evidence that when programs such as AR and DEAR are adapted for use in secondary school, overall reading achievement among participants has improved.

Recently, Baines (1997, 1999, 2000, 2001) has reported impressive results from utilizing multimedia to enhance students' reading comprehension and writing skills. According to Baines, electronic media help concretize thoughts and feelings so reading and writing become less daunting to reluctant readers. When a teacher uses images, music, and other non-linguistic stimuli as integral components in reading and writing, the quality of student engagement and achievement have been shown to take dramatic leaps. In a recent study of 12 reluctant readers who had previously failed a state competency test for writing, using multimedia techniques resulted in a 100% pass rate on the second administration of the state exam (Baines 1999).

One example of the multimedia approach is the Powerpoint poem, in which students begin by responding to a series of prompts. Student responses are revised into a poem. Then, students draw images or find and cut out images in magazines to correspond with every line in the poem. Next, students scan the images onto disk. Once images for each line of the poem have been scanned, students create a presentation, downloading the images into Powerpoint, typing out the appropriate text so that each Powerpoint slide represents one line of the poem, and adding sound effects and music. As a final step, students revise their original poems to include descriptions of the images and music.

Classroom Instruction and Field Experience

Most preservice and practicing secondary teachers never have had a course in reading nor do they perceive the teaching of reading to be within the domain of their job responsibilities. When confronted with a non-reader in the classroom, most secondary teachers would respond, "I'm a science teacher (or whatever their field of expertise), not a reading teacher!" (Lortie 1975, Price, Schultz, & Verdi 2001). To ameliorate the lack of training for secondary teachers in reading, a new graduate course was developed.

The new graduate course, required of graduate students also seeking teacher certification, covers a variety of approaches to helping the adolescent reluctant reader, including technologically-intensive approaches. Of the ten graduate students enrolled in the initial offering of the course, only one had any previous experience with using computers. (The student with some experience had a spouse who worked for the Public Broadcasting System and she had helped with editing a film once). Prior to the course, no student had used Powerpoint or created a webpage. Only half had ever used email. Of the ten, four were seeking certification in social studies, three in English, two in mathematics, and one in Spanish.

In addition to time spent on campus, the ten graduate students were required to work with a struggling reader in a local school for at least 40 hours during the course of the semester. As part of their coursework, students created films (many used I-movie), Powerpoint presentations, and webpages explicitly for use in their interactions with reluctant readers in the field experience. In their one-on-one interactions with reluctant readers, students were instructed to use both traditional and multimedia approaches, to document the effectiveness of all approaches that they tried, and to write up a case study depicting their successes, failures, and frustrations.

Cooperating teachers were alerted to the duties of the student and the contours of their assignment via a letter of introduction. The cooperating teachers were responsible for matching the student with a reluctant reader. At the end of the term, cooperating teachers were asked to complete an assessment of the student's attendance, progress, and professionalism.

Results of the Hypothetical Case Study

As part of their final exams, students were given a hypothetical case study depicting the plight of two tenth grade football players named Augie and Javier who tended to misbehave and whose achievement tests indicated that they read on the third grade level. As in the field experience, students were asked to devise a set of lessons and activities that would help improve the reading and writing skills of Augie and Javier, who were failing badly in most of their classes.

In the hypothetical case study, 8 of 10 students chose both traditional and multimedia approaches. The most popular traditional approaches included K-W-L, allowing students to self-select books (through programs such as Accelerated Reader or DEAR), learning logs, goal-setting, and utilizing reading recovery. K-W-L and other traditional approaches were seen as "innovative" by students, who had little familiarity with such pedagogical techniques. The most popular multimedia approaches included using Powerpoint, the Internet, film, and the creation of a webpage describing favorite books and magazines.

Students	Traditional approaches	Multimedia approaches
10	10	8

Table 1: Student use of traditional and multimedia approaches in the hypothetical case study

Although the final exam did not ask students to expressly address it, most students also paid great heed to affective issues:

"Knowing that Javier has a violent temper, I would first make sure that the class as a whole is constantly kept busy so that all students would have less time to engage in unwanted behavior."

"To improve their knowledge of English, I would try to draw on their strengths as much as possible in order to increase their sense of self-efficacy, which appears to be very low."

"A probable cause for their continued classroom disruptions is their inability to read and to comprehend text."

Obviously, most students in the graduate course viewed teaching from an affective perspective, a view Schwartz (1987) has called the "missionary mythology" of teaching. In their position as inexperienced teachers, especially the area of reading diagnostics, their prescriptive solutions indicated affective rather than cognitive concerns. In explaining how multimedia might be used to enhance reading, students wrote:

"If Augie liked baseball, I might ask him to do a Powerpoint presentation over the beginnings of baseball. Who were the important people and what were the names of the teams? Are any of the teams still around? One book that would help Augie is *A History of America's Game*."

"I would have Javier and Augie collect pictures and find music to accompany a Powerpoint poem written about football."

"To teach Augie and Javier Spanish, I would use a bouncy audio tape which combines the capitals of South America with lots of percussion, clips from Walt Disney videos in Spanish...perhaps involve them in designing a website if there's any interest in computers."

Two students chose not to even try multimedia approaches, even in the case study.

Hitting the Wall

Students were required to complete 40 hours of work with a reluctant reader in a local school. In general, the response from cooperating teachers to having a graduate student in the classroom was not overly enthusiastic. In Texas, where an obsession with student performance on the state assessment (TAAS—Texas Assessment of Academic Skills) is de rigueur, half of the cooperating teachers (five of ten) forbade graduate students from working one-on-one with an individual student. Representative of the attitude of "not singling out students" was a cooperating teacher who wrote, "When you ask your class to work with only one student, that student's self-esteem is damaged. Everyone in class will know who needs the help. That humiliates the student."

On the other hand, in the case studies of the five students who were allowed to work individually with reluctant readers, most registered surprise by the willingness of reluctant readers to participate. Representative responses from graduate students about how well they were received are as follows:

"Sam and Terry were relegated to a permanent seat in the hall so they wouldn't disrupt class. Although I figured that I would meet with great resistance, they seemed anxious to participate. Even giddy sometimes."

"Delanie told me, 'I think it is fun when you come hang out in my classroom!' That made me feel pretty good."

"Bill plays sports and hasn't been doing well at all in most of his courses. So, in addition to helping him in class, I have shown up at a couple of his games. As a result, he has started pulling up his grades and his attitude seems to have changed.

Despite the apparent successes of the five graduate students who were allowed to work individually with reluctant readers, no graduate student used any multimedia approaches. Although the school district had recently received millions of dollars in funding for technology, graduate students noted the dearth of equipment in the classroom designated for student use. Not only did none of the ten cooperating teachers use technology in instruction (a computer, a camcorder, or anything electronic beyond a transparency machine) at any point during the semester, seven advocated against the use of technology in teaching. Student responses included the following:

"Mrs. Paulito says that teaching is too complicated already, that throwing technology in won't improve student learning. She seems too busy with the TAAS and discipline problems to think about much else."

"When I asked Mr. Suarez why he doesn't use technology, he laughed. He said that the district tried to force them to use computers once, but that they backed off because he knew they couldn't enforce it."

Although students learned the multimedia approaches and even applied them in the hypothetical case studies, they viewed the classroom environment as antithetical to innovation. No students used multimedia in their field experience. One student adapted the Powerpoint poem so that it could be done by using construction paper (with each line of the poem and corresponding images pasted on separate pieces of paper) and a cassette player.

Students	Students allowed to work 1-on-1 with a reluctant reader	Traditional approaches	Multimedia ap
10	5	5	0

Table 2: Student use of traditional and multimedia approaches in field experience

Providing Help Where Help is Needed

Although multimedia approaches to teaching reading to reluctant readers are new, exciting, and powerful, several factors militated against their successful implementation in our study. In general, cooperating teachers perceived that any technologically-intense form of instruction added unnecessary complications to their lessons, thus making them feel more "stressed out." Also, cooperating teachers acknowledged that they lacked the appropriate technological infrastructure and training to use multimedia approaches effectively, though they didn't really want equipment or training. One teacher commented, "I have enough to do already without worrying about computers, too!"

On the bright side, despite their initial lack of technological expertise, the graduate students in the new course seemed willing and able to implement multimedia approaches had they had access to the appropriate technologies and a modicum of support from their cooperating teachers. However, with the strong bias against technology openly displayed by cooperating teachers, many of the graduate students came away from the experience questioning the feasibility of implementing multimedia approaches at all.

The most surprising finding from our study was the reticence of cooperating teachers to allow any individualization for reluctant readers. Although each teacher acknowledged that they had several poor readers and that poor readers were the most likely to fail the course, they forbade 1-on-1 contact, usually on the grounds that such individual attention would likely endanger a student's self esteem. Yet, graduate students reported reluctant readers as open, even anxious to receive personal attention. In the five cases in which cooperating teachers allowed graduate students to help individual students, all five reported some degree of success using traditional approaches. One can only wonder how reluctant readers, who have always struggled with text, can be expected to suddenly transform themselves into accomplished readers without some guidance and direction. Paradoxically, it is the reluctant readers who are the farthest behind who could most benefit from the kinds of jumps in reading and writing competence possible through new multimedia approaches. In our study, these most reluctant of readers were the ones least likely to receive such instruction.

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Can Preservice Teacher Education Really Help Me Grow As A Literacy Teacher?: Examining Preservice Teachers' Perceptions Of Multimedia Case-Based Instruction

Elizabeth A. (Betsy) Baker, University of Missouri - Columbia, US

PURPOSE

In 1985, Feiman-Nemser and Buchmann reported evidence that teachers overwhelmingly perceived that their preservice education did not adequately prepare them to be teachers. Since that time, teacher education programs have made purposeful strides toward improving preservice teacher education. For example, instead of providing student teaching as the only clinical experience, most programs now provide field experiences throughout teacher preparation.

Case-based instruction (CBI) is being used successfully in several professional schools (see Christensen, Garvin, & Sweet, 1991; Merseth, 1997; Shulman, 1992; Silverman & Welty, 1992). Risko and Kinzer (1994) argue that CBI can address weaknesses commonly found in teacher education (see also Lundeberg, Levin, & Harrington, 1999). A variety of cases have been used in teacher education. However, they commonly focus on the teacher, not the students. We wanted to help preservice teachers develop their kidwatching abilities so they can make instructional plans with the needs of children foremost in their minds.

With the support of two grants from USED/FIPSE, we videotaped and collected work samples from 10 elementary children throughout a school year. We digitized the video and work samples to create multimedia materials that are being used for CBI. We refer to these multimedia materials as the Digital Literacy Portfolio Series (DLPS). While we have conducted other studies that examined the effectiveness of using DLPS (Author, 2000a; Author, 2000b), in this study we examined whether the preservice teachers perceived that a seven-semester-hour block of literacy courses that incorporated DLPS and a related field experience helped them grow as literacy teachers.

During our presentation, we will demonstrate DLPS which allow users to track elementary children's literacy development during seven-eight months of school. DLPS includes video of children reading and writing during math, science, social studies, and literature. DLPS also has scenarios that users can read to understand the video context. Finally, DLPS includes writing samples and portions of children's books that correspond with the video. This series consists of 18 CD-ROMs that each contain approximately an hour of video.

Our guiding questions were: Do preservice teachers, involved in multimedia case-based instruction, perceive that a block of literacy courses coupled with a field experience helped them grow as literacy teachers? If so, to what do they attribute their growth? These findings contribute to the growing body of knowledge regarding different types of case-based instruction and various effects on preparing teachers to enter the profession.

THEORETICAL FRAMEWORK

Theories of anchored instruction (Cognition and Technology Group at Vanderbilt, 1990) suggest that learners benefit from discussions when they share common experiences. For example, literacy teachers who work in the same classroom benefit from the ability to discuss what happens in their classroom. These shared experiences become the anchor of their discussions. However, providing a similar anchor during teacher education courses is a challenge. It is difficult to place 20-35 preservice teachers in the same elementary classroom so they will have a common classroom experience to discuss. With CBI, the learners' common experience is a case. Because the learners are familiar with the same cases, they can discuss how their different field experiences are similar and dissimilar to the case. Herein, the learners can gain an understanding of one another's divergent field experiences and potentially help one another understand each other's field situations.

Research indicates that effective teachers reflect on their practice (Schon, 1983; Zeichner & Tabachnik, 1984). In other words, they ask themselves questions such as: Are my teaching methods and materials effective? How can I improve my instruction to meet the needs of my students? What can I do differently? What teaching methods and materials work for which students? What information am I lacking and where will I find it? Because reflection is critical for effective instruction, preservice teachers must develop appropriate reflection practices. Such reflection can be addressed in field placements. However, comparing reflections is difficult because of differences in field placements. Thus, peers and instructors can offer only limited feedback, which leaves preservice teachers to develop their own reflection skills. CBI provides an anchor that preservice teachers and instructors can use to discuss and hone their reflective skills.

Theories of situated cognition argue that "knowledge is situated, being in part a product of the activity, context, and culture in which it is developed and used" (Brown, Collins, & Duguid, 1989, p. 32). In terms of teacher education, just because preservice teachers demonstrate the knowledge to pass tests and write papers about teaching children to read, does not mean they will be able to teach children to read. Theories of situated cognition imply that field experiences are vital for preservice teachers. However, without anchored situations, preservice teachers are limited to their own insights and making their own connections between course work and practice. Due to the common experiences provided by CBI, peers can generate and discuss these connections with the potential of implementing them in the field.

Theories of generative knowledge argue that learners do not commonly make connections between knowledge that is dispensed to them (i.e., via lectures) and situations where that knowledge can be used (i.e., elementary classrooms) (Bransford, Franks, Vye, & Sherwood, 1989; Bereiter, & Scardamalia, 1985; Whitehead, 1929). Instead, learners make better connections when they generate knowledge (Risko, McAllister, Peter, & Bigenho, 1994). CBI purposely requires learners to generate their analyses of the cases (Christensen, 1987; Christensen, Garvin, & Sweet, 1991; Merseth, 1997; Shulman, 1992; Silverman & Welty, 1992).

Teaching is an ill-structured task (Clark, 1988; Greeno, & Leinhardt, 1986). This means that teachers need to be able to make decisions based on constantly changing sources of information; they need to be problem-solvers. Field experiences give preservice teachers opportunities to try methods discussed in courses, but little experience in dealing with the ill-structured, complex nature of teaching. Furthermore, the ill-structured nature of teaching requires preservice teachers to understand the viability of different perspectives. We purposely developed DLPS to capture a variety of classroom complexities that can be discussed from a variety of theoretical and pragmatic perspectives.

METHOD

Participants and Setting

This study occurred in a midwestern state university in a section of a course entitled, "Emergent Literacy for Elementary Teachers." The section was selected because Author 1 was the instructor and one of the DLPS developers. The students were first semester Juniors who had taken 8 semester hours of introductory education courses during their Freshman and Sophomore years. They had also done over 20 hours of classroom observations during their Freshman and Sophomore years. This was however, their first semester of taking methods courses. There were 26 students in the class, 24 females and 2 males. All the students were Elementary Education majors.

The course was part of a block of literacy courses that included 2 semester hours of Children's Literature, 2 semester hours of Emergent Language, and 3 semester hours of Emergent Literacy for Elementary Teachers. These preservice teachers also participated in 2 semester hours of field experience in which they worked with a partner to teach 8-10 literacy lessons to a small group of elementary children. They collaborated with the elementary children's teacher to design, implement, and reflect on their lessons and the progress of the children's literacy abilities. The participants took this block of literacy courses as a cohort. In other words, the same group of preservice teachers attended Children's Literature, Emergent Language, Emergent Literacy, and Literacy Field Experience (9 hours per week) together.

Author 1 is a professor of literacy education. At the time of this study, Author 1 had taught literacy courses to preservice elementary teachers for 9 years. She had used Multimedia Cases in Teacher Education (Kinzer & Risko, 1998) as well as book-based cases (i.e., Avery, 1993; Harp, 1993; Routman, 1994) for 5 years. This was the second semester she used DLPS.

The course met once a week, for three hours, during a 16 week semester. The course was divided into three modules: children's literacy processes, teacher decision-making, and professional development. Case-based instruction was used throughout the semester. Case-based instruction was used during 11 of the 15 classes (3 other classes were used to complete pre and post tests and provide a general introduction to the course). Specifically, six classes were dedicated to analyzing a multimedia case of a child named Zane, four to Helen, and one to Kenneth. These three cases were collected in the same first-grade classroom. At the beginning of the school year, Zane (European American, male) was considered an emergent reader, Helen (Asian immigrant, bilingual, female) was a developing reader, and Kenneth (Asian American, English First Language, male) was a proficient reader.

Data Sources and Analysis

At the end of the semester each preservice teacher voluntarily participated in an individual interview. A trained research assistant conducted and audiotaped the interviews which lasted approximately 30 minutes. These interviews were designed to address the question: How do the preservice literacy teachers, involved in multimedia case-based instruction, perceive the efficacy of their teacher education course work? The preservice teachers were given a folder that contained their case analyses and field reflections throughout the semester. They were asked to examine their own work and answer among other questions: a) have you grown as a literacy teacher this semester, b) if so, list experiences that contributed to your growth, c) rank order the experiences you listed.

The interview data were transcribed and analyzed by sorting each participant's list of experiences into common categories (i.e., field experiences, case assignments, class readings, etc.). Finally, the categories weighed according to the rankings given by the preservice teachers.

FINDINGS AND DISCUSSION

Analysis of the students' answers revealed three categories of responses: (a) DLPS (class discussions, comparing the digital portfolios to one another, homework, examining DLPS), (b) field experiences (teaching, reflecting about teaching, discussions of field with instructors and supervisor, substitute teaching), and (c) other course assignments (readings, activity demonstrations, analyzing basals). This interview question was open-ended. The students could list anything. Yet, DLPS emerged as one of the three factors that influenced their growth.

In order to understand further how important DLPS was to the students' kidwatching growth, we assigned points to the students' rankings (5 points for first ranking, 4 for second ranking, and so on). Analysis revealed that 51.6% of the weighted statements identified DLPS, 24.2% identified field experiences, 21.4% identified other course assignments, and 1.6% were miscellaneous. In other words, the preservice teachers overwhelmingly attributed their growth to using DLPS.

These findings are significant because one might expect the students to overwhelmingly identify field experiences. After all, during field experiences they discuss topics, model strategies, ask questions, and conduct observations with real children. This data does not indicate that field experiences are insignificant--on the contrary, they outweighed all of the other course assignments combined (except using DLPS).

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Training the Trainers: Technology for District ESOL Specialists

Cathy Cavanaugh, Ph.D., Curriculum & Instruction, University of North Florida, USA. ccavanau@unf.edu

Terry Cavanaugh, Ph.D., Curriculum & Instruction, University of North Florida, USA. tcavanau@unf.edu

Abstract: Based on knowledge of ESOL learners, adult education, and teacher integration of technology, two faculty members from a regional state university partnered with the local school district to develop a training program that would ultimately improve the learning of ESOL students. The faculty members, instructional technology professors, worked closely with the school district ESOL director to develop and deliver training that would meet the needs of school ESOL coordinators who work directly with teachers. During the course of one academic year, this organizing team conducted a needs analysis, created training opportunities, and carried out training for all district ESOL coordinators.

The goal of the project described here was to improve the skills of teachers to effectively integrate technology into standards-based lessons for improved achievement of students in programs such as ESOL (English as a Second Language, also known as EFL, ESL, EFL). This training project, using the train the trainers model, provided knowledge, skills and resources to school district ESOL coordinators who would provide training to the ESOL teacher. The research grounding comes from studies of how children learn best using technology, and how teachers best learn to integrate technology into teaching. The standards include National Staff Development Standards, national student and teacher ESOL standards, International Technology Education Association Standards for Technology Literacy, state technology standards, and International Society for Technology in Education (ISTE) student and teacher standards. Because a major barrier to teaching with technology is lack of resources to enhance integration of technology with classroom learning, this project worked to ensure that ESOL teachers received guidance in effective practice for teaching ESOL students with technology with the technology currently deployed in their classrooms.

Nationally, the number of students enrolling in school ESOL programs has increased steadily in recent years. According to the US Census Bureau, the number of Americans in 1990 between the ages of 5 and 17 who did not speak English well was 907,563. In the 2000 Census, the number had grown to 1,161,055 (US Census 2001). ESOL students are often children who come from economically disadvantaged households, and they are far less likely than their native English-speaking classmates to arrive in school with technology skills. In fact, the National Telecommunications and Information Administration reports on the digital divide in "Falling through the Net" that about half as many minority households have computers as white households (NTIA 2000). The same report states that "schools, libraries and other public access points continue to serve those groups who do not have access at home". Further, groups such as Blacks, Asian Americans and Pacific Islanders are far more likely to use public libraries to access the Internet. Internet access and the skills to use the Internet and the resources found there are important in improving the lives of ESOL students and their families. If ESOL teachers do not use technology in their classes and teach their students to use the technology, students in ESOL classes may not otherwise acquire computer access and skills. The state guide for ESOL teachers and administrators (Florida Department of Education 2000) states, "technology holds an important place in the implementation of the curriculum, linking schools, community, and the world".

The national teacher shortage includes a shortage in teachers trained and experienced in meeting the unique educational challenges of the ESOL student. ESOL students face challenges of assimilating into a new culture, learning a new language, and learning subject matter in a new language. For these children technology is a tool that has the potential to help them meet content standards, and it is a pathway to employment and further education. Not only can educational technology provide tools especially designed for the language development and content area learning of ESOL students, but technology in ESOL classrooms can also begin to close the digital divide for these students. Through training school district ESOL specialists, area ESOL students are more likely to have teachers with the skills and knowledge to use technology in ways that increase ESOL student achievement. The aim of this training was ensuring academic benefits for students that can be attributed to improvements in teacher practice using technology.

Educational technology is a powerful teaching and learning tool and it requires specific abilities and knowledge to reach maximum effectiveness. Teachers have expressed a need for assistance in integrating technology into their standards-based classroom lessons. The components of the training provided in this program were intended to meet the need expressed by teachers and ESOL coordinators. Adult education principles state that professionals must have time, support and access to technology as well as scaffolds to assist them in using technology in meaningful ways in their jobs (MacKenzie 1999). Because The ESOL coordinators belonged to each of the skill stages of technology use by teachers, the project's professional development activities addressed teachers at each level with the goal of guiding teachers from their current stage to at least the next stage, and to guide teachers at the Invention stage to higher competence within that stage. The resources and experiences included in the training gave ESOL coordinators the capabilities that will increase their competence in using the technology to move from the Entry stage toward the Invention stage, and therefore to lead classroom teachers through the continuum.

Surveys of employers and higher education institutions show that students should leave school with strong skills in communication, cooperation, problem solving, and self-direction. ESOL students begin their education in Florida's schools with a significant deficit in English communication. The training of ESOL specialists was intended to give ESOL students in the area schools the pedagogy, tools and expert teachers they need to improve their communications abilities from beginning to fluent levels. Technology is one of the tools that students and teachers can use to achieve language fluency.

In order for the learning, language and technology gaps to be closed, teachers of ESOL children need expanded access to technology equipment, resources, and effective integration methods for the specific needs of their students. The training resulted from a vision of technology-rich classrooms where ESOL students effectively use modern computers and peripherals, with software, online resources and network resources in learning to engage in authentic communications experiences with peers, their families and subject matter experts.

According to ISTE (2000), the most effective learning environments meld traditional approaches and new approaches to facilitate learning of relevant content while addressing individual needs.

The resulting learning environments should prepare students to

- Communicate using a variety of media and formats
- Access and exchange information in a variety of ways
- Compile, organize and synthesize information
- Know content and be able to locate additional information as needed
- Become self-directed learners
- Collaborate and cooperate in team efforts
- Interact with others in ethical and appropriate ways

The national Teachers of English as a Second Language (TESOL) organization suggests that teachers use the following strategies in implementing standards-based instruction (Irujo, ed. 2000):

- Organize learning around what students need to know and be able to do
- Enrich their teaching by cultivating students' higher order thinking skills
- Guide student inquiry by posing real-world tasks
- Emphasize holistic concepts
- Provide a variety of opportunities for students to explore and confront concepts and situations
- Use multiple sources of information
- Work in interdisciplinary teams
- Use multiple forms of assessment to gather concrete evidence of student abilities

Research on students using technology within the context of specific subject areas shows many benefits. For example, students using word processing feel more positive about their writing skills, improve the quality and fluency of their writing, are more self-motivated in writing, are motivated to achieve literacy, improved in literacy, and want to write more. Word processing lead to more time spent on revising writing drafts, higher quality revisions, and increased the length of writing. When using word processors students more readily developed conceptual abilities, composed more fluently, and produced enhanced science-related documents. Word processing caused students to overlook fewer errors and make fewer errors (Poole 1997). Students had higher comprehension scores after reading electronic text than after reading printed text (Bitter & Pierson 1999).

Students using computers for learning math and problem-solving showed greater achievement gains, learned concepts more effectively, and scored higher on measures of ability to transfer skills to other areas of mathematics. Students who used computers in the science classroom achieved more from computer-based labs than from conventional activities, more effectively learned to generate graphs and analyze data, more easily transferred understanding from one type of physical activity to another, and gained data-handling skills likely to be valuable throughout life. Students accessing information electronically were able to get information faster and develop research skills (Poole 1997).

Studies of teachers who effectively integrated technology into teaching will serve as a guide in the development of model professional development activities in this project. Properly trained teachers make the difference between success and failure of an integration effort. Teacher training programs are most effective with:

- a hands-on, integration emphasis and a focus on how to use the technology tools on the classroom
- training over time
- modeling, mentoring and coaching, learning through colleague interaction and information sharing
- post-training access to the technology for practice and implementation

(Roblyer & Edwards 2000).

The local public school district involved in this project currently serves 2128 active ESOL students in grades preK through 12. Over 39% of the district's teachers work with ESOL students in two-thirds of the district's schools. The district's New Century Commission on Education has developed key recommendations for improving area schools. The first is to hold all students in the district to the same high expectations for learning and academic performance. Another goal of the Commission is to provide all students with access to competent and expert teaching. Based on knowledge of ESOL learners, adult education, and teacher integration of technology, two faculty members from a regional state university partnered with the school district to develop a training program that would ultimately improve the learning of ESOL students. The university faculty members, instructional technology professors with ESOL experience, worked closely with the school district ESOL director in the process of developing and delivering training that would best meet the needs of school ESOL coordinators who work directly with teachers. During the course of one academic year, this organizing team conducted a needs analysis, created training opportunities, and carried out training for all district ESOL coordinators.

The needs analysis for the ESOL technology training program took into account the district's technology assets and infrastructure, the technology ability level of the ESOL teachers, and constraints on scheduling training. The district's A+ Goals (Academic Excellence and Achievement for All Students) emphasize increased use of technology, high-tech learning tools, and the use of computer technology to pinpoint, monitor, and report every student's strengths and weaknesses to help each student reach academic goals in every subject. To meet these goals, the district has implemented a technology model that specifies network connectivity and computer equipment for each classroom. When the model is fully realized, each classroom will have network connectivity, eight data drops, four student workstations, and a teacher laptop plus peripherals. The model is currently being implemented at the high school level, and middle schools will be the focus next.

A main goal of the ESOL technology training was to complement and facilitate implementation of the district model in the target schools. All of the technology skills and resources provided by this project to ESOL coordinators was fully compatible with district standards and integrated seamlessly with current and future network infrastructure. Because each ESOL coordinator involved in this program served schools and teachers with unique needs, the project had a different role in each case. Based on the results of the needs analysis, the structure of the training evolved to include skills, standards and strategies. The training would focus on a set of technology skills that could be broadly applied by the teachers in helping K-12 students to meet essential academic and technology standards using technology that commonly available in ESOL classrooms. The training would be aimed at teachers working at the entry level in educational technology, and it would be offered during district staff development times to reduce the burden on busy schedules.

The training took a four-pronged approach. As an introduction to the integration of technology for improving ESOL learning, the district ESOL coordinators attended sessions given by the university faculty members at the state ESOL conference. The benefits of this method were that the coordinators did not need to make time in their schedules for beginning to learn about technology, and the coordinators received the information along with their colleagues from across the state, enabling them to hear how others were successfully using the technology. The conference sessions, developed at the request of area ESOL specialists, focused on digital cameras, the web, concept maps, writing tools, web resources and word processing. The coordinators received printed handouts and web links to review before participating in the next phase of the training project. They also had time to observe the teachers and the technology in the schools before participating in more immersive experiences.

For their second collective educational technology experience, the ESOL coordinators attended a half-day session during which the university faculty members demonstrated and discussed a range of technology options within the specific context of the area schools. The coordinators then prioritized the technology skills they felt were most beneficial for their teachers and most practical for their schools and students. The university professors designed a full-day hands-on workshop centering on six core technologies presented in centers in a technology lab. Because a goal of this project was improving ESOL student achievement in communication, equipment, software and Internet resources were chosen to support student reading, writing and speaking abilities. The workshop provided the coordinators with printed guides to using the technology in ESOL classrooms, a CD-ROM with related guides and software, and time to become comfortable using the technology. The components of the training were an overview of national ESOL standards pertaining to technology, uses of the computer as an audio tool, concept mapping software, digital cameras, uses of DVD for language development, improvement of word processing, and the web. Computers connected to the Internet can bring the world of the English language and American culture into the ESOL classroom, and allow student products to leave the classroom through email, enhanced by photos taken by students using digital cameras. Work produced during these enriched communication experiences can be printed using networked printers, so students can carry their new language home to share with their families.

Quality software and digital content resources give teachers the power to address individual learning needs and styles. By providing the coordinators with software recognized for strengthening communications and thinking skills, the training gave coordinators tools to share with teachers that facilitate improved student achievement. Software recommended in the state software catalog and other sources were featured in the training. Software for thinking and communicating had priority, including developmentally appropriate writing, speaking and reading software, and cognitive mapping software. This component met state and federal goals by increasing access to effective software and online resources, thereby assisting teachers in development of technology-supported curriculum integrating district and state standards for content learning, ESOL education, and learning with technology.

In the final stage of training, the ESOL coordinators and the university professors met to plan the redesign of district ESOL teacher training materials. Currently, all teachers of self-contained or mainstreamed ESOL students must obtain state ESOL endorsement. The endorsement requires between 30 and 360 hours of training depending upon the teacher's certification area. The district ESOL coordinators are responsible for the teacher training. The existing technology component of the training used audiotapes and laserdiscs. Together, the district and university partners constructed a teacher training module that could be taught face-to-face, on a CD-ROM, or online. The revised activities incorporated concept mapping software, web resources, CD and online audio, word processing, digital photography, mult imedia presentations, electronic books, and CD-ROM creation.

The components of the training helped the district to meet two of the state and federal goals for teaching and technology: (1) All teachers will have the training and support they need to help all students learn through computers and through the information superhighway, and (2) All schools will have the assistance needed to develop technology-supported curriculum integration strategies which are thoroughly described and aligned with specific state standards. The training and materials helped meet goal 1 by supporting teachers with examples of approaches for teaching with computers and the Internet. They addressed goal 2 by assisting teachers to develop technology-supported lessons aligned with state standards, and by assisting them in meeting state performance standards for ESOL teachers.

The participants did process evaluation of the ESOL teaching with technology professional development activities. Participant feedback was obtained regarding:

- The quality and quantity of the content
- The pace and organization of the activity
- The quality and quantity of the instructional materials provided
- The amount and appropriateness of the tasks for ESOL education

As a result of the range of technology training experiences they received, the district ESOL coordinators are now beginning to diffuse their knowledge, skills and resources to the teachers in ESOL classrooms. However, like many school districts across the country, the local school district is strongly committed to school reform efforts. These efforts require much in the way of teacher professional development, adapting instruction, and change in the operation of schools. As a consequence of these efforts, not all of which include technology as a priority, teachers are left with little time and energy for changing their methods further to integrate technology. While the district ESOL leadership and the majority of the ESOL teachers agree with the importance of technology for their students, other demands have so far prevented significant progress in implementing the new technology approaches with students. Even computer-literate ESOL teachers have been overwhelmed with National Board certification, graduate courses, America's Choice rollout, and new school-based programs. An additional obstacle for some teachers has been theft of classroom computers.

In order to share the technology approaches developed in this project beyond the local district, the university faculty are beginning a regular technology integration feature in the state TESOL journal. In conclusion, the training program has prepared and will continue to prepare ESOL specialists to guide teachers in integrating technology into instruction, but priorities or conditions faced by teachers will have to change before conditions are optimal for the integration to occur on a large scale.

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Understanding technological narratives and their roles in teaching and learning: An investigation of electronic narrative tools in education

Minchu Chen, University of Florida, US
Richard Ferdig, University of Florida, US

Electronic narratives are becoming prevalent in education as one way to teach students about narrative structure, content, and even technology (Lehrer, Erickson & Connel, 1994; Downes & Fatouros, 1995; Eagleton, 1999; Leu & Kinzer, 2000; Eagleton & Hamilton, 2001). The reason they are become popular is because they enable the invention of new media and forms for stories, reaching beyond oral speech, handwriting, and movable type (John S. & Anna Lorien, 2001) Electronic narratives provoke amazing plays on the ways that oral or written stories tell events for characters who move among their settings. They allow students to use a variety of technological and information resources to gather and synthesize information and to create and communicate knowledge (NCTE/IRA 2001) around local, state, and national standards.

Many examples of electronic narratives have been developed in response to this new educational technological possibility. Universities and educational institutions in specific are following an interest in narrative by incorporating narrative, interaction, and virtual reality structures in the development of educational technologies for teaching and learning (Karraker, 1996). For example, MIT's Papert's Epistemology and Learning (Papert, 2001) highlights some of these concepts in the form of constructionism; HITL (Human Interface Technology Laboratory) researchers at the University of Washington address educational issues in virtual reality (HITL 2001*)*; the Virtual Theater a' Stanford University explores the areas of narrative, characters, agents and coherent scenario structure related to children's learning development (Education index , 2001); finally, the text -based virtual communities of MUDs (Multi-User Dungeon) and MOOs (MUD Object-Oriented) find users collaborating to create virtual stories about their lives and their worlds (MUDS, MOO, etc., for Education, 2001*)*

Within the genre of electronic narratives, there are various applications of both theory and practice (Roussos, 1996). At one end of this scale are simple levels of interaction such as cartoon video with animation, sound effects, and varying levels of user control *(*Folk legends of Japan 2001*)*. The more advanced products infuse human experience in developing the electronic story. An example of these more elaborate models is Laurel's Interactive Fantasy (Laurel, 1991), where users deal with narrative, characters, and plot structure. The software requires the user's control and manipulation to form the plot, content, and outcome of the story (Steiner & Moher, 1992; Steiner & Moher, 1994; Steiner, 1995).

At either end of the spectrum, one major benefit of the electronic narrative is its ability to integrate concepts of learning theories and curriculum objectives into a computer-based setting, and the opportunity to extend the above efforts into a complete environment that shares common characteristics and experiences between teacher and learners (John S. Nelson &Anna Lorien Nelson). Then therefore, the model of an electronic narrative is indeed a desired educational approach to provide a natural, simple, and familiar mode of access, operation and interaction (Labbo, 1996).

However, while numerous designs of multiple interfaces and hand-on computer software are being developed—and developed for different audiences like teachers, children and parents--there is an increasing need for rubrics to help differentiate between the good and bad products. The field of educational technology would benefit from a further exploration of the term 'electronic narrative', as well as a categorization of the different types of available products and how they might be used in education. Rather than focusing on specific products, there is a call to describe the characteristics behind the development of various types of electronic narratives, assessing them on the quality of presentation and design, the educational value, ease of use, play life, and factors of importance to educators and parents. This approach allows us to continue discussions of important rubrics rather than judging specific software (Review of Children's Educational Software April 1998 *http://www.sil.org/ched/edsoft.html)*.

Therefore, the main goal of this paper is to further investigate and define the electronic narrative, and to address the strength of electronic narratives as fundamental units of knowledge, memory, and ways we make sense of our lives. Through the existing models and examples of electronic narratives, this paper presents the power of this uniquely engaging, flexible environment for accessing, analyzing, and producing modern forms of communication (Hamilton, 1998). It explores how the application of an electronic environment can simulate a storyteller, which provides the essentials of communication for teaching and learning that are based on the human stories experience (Melanie, 1998). Further, it provides evidence that stories are represented and integrated within technology with less constraints of form. Finally, we describe how an electronic narrative can be developed and integrated in more engaging and meaningful ways in education.

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A Distance Education ESL Endorsement Program: Failures and Successes

Nedra A. Crow, National University, San Diego, CA, USA, ncrow@nu.edu
Joan P. Sebastian, National University, San Diego, CA, USA, jsebasti@nu.edu
Peter Serdyukov, National University, San Diego, CA, USA, pserdyuv@nu.edu

Abstract: This paper describes a distance education model for an ESL endorsement program designed for K12 educators. The program evolved through several critical changes based upon technological challenges. Finally, the paper highlights the successes, failures, and lessons learned.

With the increasing population and urbanization of city centers within Utah, the complexion of Utah's children has rapidly changed, mirroring the changes that have taken place throughout the United States. These population changes created a growing demand for professional development programs to prepare educators to meet the specific linguistic and cultural needs of their students. However, the ESL preparation programs at institutions like the University of Utah were very small endeavors incapable of producing no more that a few ESL teachers. Out of such a dilemma came a unique and innovative partnership among six school districts as well as two colleges within the University of Utah dedicated to the development and implementation of a distance education ESL endorsement program for a projected 1800 experienced teachers. The program required that educators take the courses over a three-year period. Three groups of educators would complete the three-year sequence of 26 credits. Each group was called a Round. Each Round was scheduled to begin during Autumn Semester.

This program became known as DEEEP (Distance Education ESL Endorsement Program), and evolved throughout its five-year history because of changing program needs and technological challenges. Given the limited space of this paper, we will: 1) describe the evolution of the program and the distance education delivery approaches and 2) discuss lessons learned.

Evolution of Program and Distance Education Delivery Approaches

In the fall of 1998, Round I began and consisted of eight graduate level courses. These courses were delivered to 18 teaching sites in one rural and five urban school districts. The districts comprised about 75% of Utah's public school population. There were three courses in Year One that used satellite technology delivered and supported at each site by content facilitators. Satellite transmission was contracted through a private provider called Educational Management Group (EMG). Because of the heavy theoretical base of the courses in Year Two, the program developers decided that these courses should be delivered using onsite instruction provided by University clinical faculty members. Year Three consisted of three courses delivered to the participants through video-based instruction, web-enhanced curriculum strategies, and onsite facilitators. Again, EMG was contracted to develop and provide these video modules created by University faculty.

In January of 1999, EMG representatives informed program directors that the company was purchased by Pearson Publishing Company who then determined that EMG was not a viable entity. During contract re-negotiations with EMG and Pearson representatives, Echostar Company was selected to provide the satellite delivery for the Year One courses to Round II and Round III participants. Contract changes also meant that the Year Three video and web-based courses would be developed and implemented by a University of Utah applied technology group called Media Solutions.

The transition to Echostar was difficult, complex, and complicated for several reasons. Firstly, all satellite equipment that was located on 20 K12 school buildings as well as the uplink facilities at the University of Utah needed to be changed by mid-August of 1999. However, discussions between Echostar and Pearson representatives were not completed until July. Once satellite and needed computers were installed at the K12 sites, local school educators immediately began to cannibalize the computers and associated hardware, including TVs and cable connectors. Therefore, when Echostar system testing began a few days before the start of Autumn Semester, communication was non-existent at most sites. This situation strained relationships with K12 educators as well as Echostar managers and technical staff. Furthermore, technical training for the onsite facilitators was delayed and compromised because of a lack of functioning equipment.

With the start of the Round II, Year One courses, full compromised, satellite transmission became the next challenge. The quality of the transmission was always a point of concern for all parties. From the Echostar standpoint, they were frustrated with the "low tech" equipment at the University of Utah's uplink studio site. They noted that the non-commercial studio cameras resulted in poor picture quality that was unacceptable to them. Furthermore, the uplink transmission station in Wyoming was not communicating with Echostar facilities in Denver nor K12 downlink sites in Salt Lake City, let alone the University studio facilities. As a result, chaos prevailed and instructional sessions did not. Ultimately, by October of 1999, the satellite transmissions were abandoned in favor of video taped lectures, quickly dubed, and sent to 10 teaching sites by Federal Express.

Also, during Fall of 1999, video production for Year Three courses began. Because Media Solutions was a University based agency, the DEEEP Directors worked closely to link video production personnel with the instructor for Year Three courses. However, challenges also became evident by November of 1999 when the faculty member did not meet any script or filming deadlines. Therefore, videos crews, studio schedules, and print material were delayed and rescheduled multiple times. These delays compromised the implementation of Year Three

With development of the Year Three courses behind schedule, and the advent of a new DEEEP Director, new challenges were effecting the program. Then, in May 2000, due to changes in the state's ESL endorsement requirements and lack of educators' participation in DEEEP, the program was modified into a two-year, six courses sequence and offered at six teaching sites. The new Director guided development of the website and completion of the program through Round I and II. Under his leadership and that of the previous directors, over 400 K12 educators received a high quality ESL endorsement program influencing countless children. While this number was greatly reduced from the originally projected 1800 educators, the impact is still believed to be significant to these school districts and children.

Lessons Learned

The lessons learned were numerous, painful and revealing. These lessons will be briefly outlined in four themes. Firstly, the closer you can maintain control over the technology, the greater the likelihood of program success and stress reduction. Working with commercial and non-educational providers created a myriad of challenges, the greatest of which was communication and expectation.

Secondly, being on the technical cutting edge with so many stakeholders and for such a large and a complex endeavour is a good formula for failure. Sometimes, being on the technical cutting edge means bleeding.

Thirdly, it is important to start small when dealing with highly complex, collaborative, and technologically sophisticated programs. Attempting to deliver an academically rigorous, eight course endorsement program using high level technology to K12 teachers, many of whom, expected workshop, "how to" techniques is a recipe for disaster.

Finally, working with diverse professional stakeholders, including higher education faculty and administrators, K12 administrators, commercial providers, and classroom teachers' results in cultural conflicts and stressed communication. While the concept of multi-professional collaboration is intriguing and has merit, in reality it is fraught with inherent barriers, competing needs, and often, insurmountable conflicts. This is not to suggest that such collaborative endeavours should not be attempted, it is to stress the need to always put the K12 students in the middle of the table and never lose sight of them. For this is the only reason, that such competing interests and people would and should come together.

Literature, Differentiated Instruction, and the Internet

Gail Hymel Dack
Department of Curriculum and Instruction
University of Louisiana at Lafayette
United States
gdack@louisiana.edu

Sally McClure Dobyns
Department of Curriculum and Instruction
University of Louisiana at Lafayette
United States
sdobyns@louisiana.edu

Mary Jane Ford
Department of Curriculum and Instruction
University of Louisiana at Lafayette
United States
mjford@louisiana.edu

Abstract: The purpose of this project was to develop a differentiated learning activity that accommodated a variety of reading abilities, interests, learning profiles, and experiences in using technology. Project objectives were (a) exposing participants to a variety of stories written by Beatrix Potter, (b) using the appeal of technology to overcome participants' impression of Potter's works as "babyish" or for "little kids, (c) using the Internet to provide reading texts when multiple copies were unavailable, and (d) developing or enhancing skills in the use of Internet resources.

Introduction

Among popular children's literature, few selections rival the timeless quality of Beatrix Potter's classic works (Lipson, 2000). Many youngsters in today's primary grades fail to read works by Potter because of the discrepancy between the higher readability levels of the books and the young age at which the stories are presented. The majority of these works are suggested for preschool or first graders (Hirsch, 1997).

To assist students who must cope with reading texts that are long or difficult, Mackey & McClay (2000) reported the effectiveness of electronic rather than print books and noted "the introduction of new media and technologies make new demands on readers as they organize and interpret complex forms of text" (par. 1). Studies (Seng, 1998) supported the integration of technology in the early childhood classroom as tools to enhance social, language and cognitive skills.

Students in elementary classrooms vary greatly in important ways, yet a "one-size-fits-all" approach to teaching and learning largely ignores these individual differences. With convincing evidence that success in school is enhanced when teachers attend to differences in readiness levels (Vygotsky, 1986), interests (Csikszentmihalyi, 1997), and learning profiles, (Sternberg, Torff, & Grigorenko, 1998), all too often little meaningful differentiation takes place in most third grade classrooms (Westberg, Archambault, Dobyns, & Salvin, 1993). Tomlinson (1999) described differentiation as "an organized yet flexible way of proactively adjusting teaching and learning to meet kids where they are and help them to achieve maximum growth as learners" (p. 14). She suggested that teachers differentiate content, process, and product according to students' readiness, interests, and learning profile.

Egan (1999) recommended the use of graphic organizers in classroom instruction to make learning more meaningful. She noted the interactive nature of learning activities that employ such organizers and encouraged educators to incorporate them as tools for positive social interaction. McLoughlin and Oliver (1998) reported that since students must share resources, technology-using environments are usually collaborative.

Purpose and Procedures

Participants included 11 boys and 9 girls in grade 3. Students displayed a variety of reading levels, interests, and skills. On entry-level reading measures, six students scored above grade level, nine scored on grade level, and five scored below grade level. Two had repeated a grade; another was slated to repeat third grade the following academic year. Four students participated in a special reading remediation program. Four students attended enrichment classes, although none was identified as gifted. The ethnicity of the student participants was as follows: 15 Caucasian, 2 African-American, and 3 Hispanic-American, 2 of whom had received ESL instruction. The school was in a low income neighborhood; more than 50% of its population were eligible for free or reduced lunch. However, fewer than half of this class qualified for that program.

A reading unit was designed to feature books by Beatrix Potter when it was discovered that only three of the twenty students had read *Peter Rabbit* and that none of the children was familiar with other works by Potter. The teacher introduced the unit by featuring *Peter Rabbit* as a read-aloud. A two-session Internet activity was planned for the required weekly visit to the school's computer lab, using a literature-based website (www.tcom.ohio.edu/books/kids.htm) which included nine of Potter's works. The lab instructor introduced the website to the class. Additional computer time was available on three classroom computers. Students served as peer coaches. Participants read two of Potter's e-books and selected two graphic organizers from among five choices of varying complexity for a four-page booklet.

Results and Conclusions

Students completed two teacher-selected organizers based on *Peter Rabbit*. They selected two of the remaining five organizers; although they were encouraged to use the second story at least once, all reported on *Peter Rabbit* exclusively. Each organizer was selected at least once. Although students were allowed choice in the tasks they designed for the organizers, all participants elected at least one character analysis. Other areas of interest included story sequencing, setting analysis, plot analysis: Peter's problems, and vocabulary development. Peer coaches aided with computer use and with selection and use of organizers. Future replication of the project will include a change in the use of the two assigned organizers. The story map will be assigned for one student-read book and the story sequence organizer for the other. *Peter Rabbit* will be used for modeling only.

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Information and Communication Technologies for Mother Tongue Education

Mabel Encinas S.
Centro de Informática y Educación
Universidad Pedagógica Nacional
México
mabel@upn.mx

Abstract: This poster demonstration will show different learning activities for mother tongue education using information and communication technologies from a communicative perspective. The demonstration will show video, audio and the writing process for the students. This paper gives an overview of the project and offers a list of resources used in the project to be shown.

Sec^{21} Project: information and communication technologies in secondary education in Mexico

Sec^{21} is a national project that promotes and supports the use of information and communication technologies (ICTs) for teaching and learning in secondary school (junior high school). Sec^{21} means secondary for the XXI century and suppose the integration of two components to regular activities: video and informatics. They are implemented through a local area network with (a) two servers, one for digital video, the other one for telecommunication and other facilities sharing, (b) computers and televisions in each subject room, and (c) one or more computer laboratories. The project has developed materials and courses for some of the subjects, particularly mathematics, physics, biology, geography, history, civic and ethical education, and Spanish (mother tongue) and offers some specific equipment or materials in each particular subject. For example, programmable calculators are offered for mathematics or audio materials for Spanish language. The national project includes the technical support for the initial installation and training for the personal in the school, including principals and teachers of all the subjects involved.

In Spanish language the activities and materials are design within a communicative and functional perspective to allow the participation of students for the development of communicative competencies. The videos are less than ten minutes long and offer mini-classes, propose activities or can be used inside an activity developed by the teacher for written or oral activities. The audios are less than three minutes long and can be used in several ways. There are two series: *Sec^{21} for the (stand up) ears* (a play on words in Spanish) and *Voices of the literature*. In the informatics component, the proposal offers activities for using the word processor for writing, the presentation generator for supporting students' conferences, the navigator for visiting selected sites on the web for supporting initial research activities, the sound recorder for oral activities and the local area network for sharing products.

The resources to be shown

The demonstration will show up some videos, some audios and the strategies for integrating the work in the classroom with the work in the media classroom. The strategies include the computer accessories and general-purpose software, the local area network facilities, and Internet resources.

Teacher Education for Mother Tongue Teaching and Learning Using Information and Communication Technologies

Mabel Encinas S.
Centro de Informática y Educación
Universidad Pedagógica Nacional
México
mabel@upn.mx

Abstract: This paper presents the teacher education process inside a project that uses information and communication technologies for mother tongue teaching in secondary school (7th to 9th grades) and the research project that is starting. The paper has three parts: an overview of the development project, the teacher education process inside the project, and the research project. The development project is founded on a communicative and functional perspective on language teaching, according to the national curriculum in Mexico. The materials developed in the project include video, audio, and integrated activities between the Spanish classroom and the media laboratory. The teacher education process has been face to face, with some support by e-mail. The research is oriented to the comprehension of how do teachers appropriate of information and communication technologies for mother tongue teaching.

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Teacher Education

Teacher education in the project has been has not been very successful, particularly because of the duration. The local support varies from state to state, although in some of them there is an effort on supporting *in situ* and the central team efforts have not been enough to follow teachers' processes of learning. Therefore teachers do not use the equipments and materials with the frequency expected or even do not use them at all.

The training they receive lasts two days and, generally without a focus on the use for language teaching and learning.

The Research Project

The question to which the research aims to answer is: How do teachers appropriate of ICTs for mother tongue teaching? The sense of the term "appropriation" comes from the sociocultural perspective, as we will see below. The central question involves many other questions like: How do teachers use ICT's? How do they interpret their activities? How do they explain their work? How do they organise the work in the classroom and in the media classroom? What kind of a community do they integrate, if they work inside isolated classrooms? How do they perceive themselves as teachers? How do they participate in the processes of change? How do they learn in all these processes?

The approach will be qualitative, this means in depth investigation of the processes of teachers participation in the school, teaching mother tongue and using ICTs. The case study will focus on a group of teachers that integrate one school in one turn. In this way, as "the case is studied in its own right" (Robson 1993) the project does not aspire to arrive at generalisations. On the contrary, it will intend to have a depth understanding of a school community and of the ways in which each individual person participates in it. The readers of the results will make "generalisations" or comparisons with their other "cases".

For approaching to school, sociocultural perspectives, particularly activity theory (Engeström et *al.*, 1999), offers a starting point to the comprehension of teachers' actions in context, and the process of teachers' appropriation of ICTs for teaching mother tongue in secondary school. On the one hand a sociocultural approach allows researchers to transit from the social to the individual in two senses. Firstly, this perspective do not isolate the individual subjects, reduce the subjectivity to biology or mental activities, nor attribute to them a sense of omnipotence on the context in which they act. Secondly, this standpoint can explain how the agent acts in a context that opens a limited number of options among which the individual subject decides. In other words, the conditions in which the individual or group moves has two aspects: opening possibilities and setting up limits to action. The agent is not only determined by the situations. However change is not a process from willing, but a process where different perspectives, dependent on the own place in the social context, interplay to construct options. In this way, the starting point for the understanding of human beings, and specifically of teachers' processes of changing, remaining, learning, felling willing, engaging, being creative: acting in the world, would be the processes of participating in communities of practices (Wenger, 1998). Particularly, teachers act in the social world of the school and in the particular social world of the communities to whom each school serves.

The concept of appropriation, the social comprehension of learning (Newman, Griffin et al. 1989), implies two aspects of the same process (Cole et al, 1999). The first one is that the subject appropriates something that does not belong to him / her in the first moment. In the case of the teachers, they have to make computers their *property*, which means to make them useful tools for their activities. However, to make this possible, they need to make them appropriate, adequate, to their own purposes. This aspect of appropriation implies the transformation in use of the tools they "receive". Thus, the process of appropriation of a tool is an active process. This active process is what is going to be investigated.

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Giving a "Hand" to the Writing Workshop with PDAs

Candace Figg
College of Education
University of Louisiana at-Lafayette
United States
cfigg@louisiana.edu

Jenny Burson
College of Education
University of Texas at Austin
United States
jenny_burson@teachnet.edb.utexas.edu

Abstract: Lack of student access to computers in the classroom (or lack of adequate computer lab access) has limited the computer's usefulness in the writing process to the "publish" stage. Although publishing an attractive, professional-looking document as a result of the writing process is important to the development of good writers, it should not overshadow the real need—developing thoughtful writers who can appropriately use technology during the revision process. Teachers of writing understand that the real work of the writing process comes during the creative brainstorming, drafting, editing, and re-writing stages. Handheld PDA devices may hold the key to integrating technology into the creative work of the writing process.

Introduction

Surveys regarding the current state of technology use in classrooms indicate two important facts. First, although more students have access to computers, either in the classroom or at home, than ever before, 78% of classroom teachers still view access to computers in the classroom as a barrier to their efforts to integrate technology into their daily teaching practices (U.S. Department of Education, 2000). Secondly, teachers who do use technology within their instruction most frequently assign the use of word processing technologies to their students for purposes of keyboarding and formatting their writing projects (Becker, Ravitz, & Wong, 1999; U.S. Department of Education, 2000). The challenge, then, to educators responsible for providing preservice and inservice teachers with the skills necessary to infuse technology into their daily teaching practices is to provide teachers with options to overcome the access barrier as well as inform them of practices that strengthen writing skills of students throughout the writing process, not just during the final publication stage of keyboarding and formatting writing projects. Meeting this challenge may have received a helping "hand" with the recent drop in prices of the Personal Digital Assistant (PDA), a handheld device that allows a portable and relatively inexpensive means of gathering, recording, and organizing information into meaningful forms of communication. For under $200 per student, the teacher is able to provide a student with a PDA and a keyboard that will enable the student to take notes, jot down ideas, record thoughts, memories, words, and responses to readings/experiences, and collect "scraps" of life that can later be used for writing purposes—all of which are important procedures necessary to the writing process. This paper will explore the Writing Workshop, a process of teaching writing that has gained acceptance throughout the United States as an authentic means of not only teaching the art of writing but creating a community of writers, and will demonstrate how the use of PDAs within this workshop approach enhances the establishment of conditions necessary in the creation of student writers.

The Writing Workshop: The Process

Lucy McCormick Calkins has stated that the student act of creating written pieces in the classroom is often "little more than a place to display—to expose—(students') command of spelling, penmanship, and grammar," rather than a process of growing meaning from "real, human reasons to write" (Calkins, 1994, p. 12, 13). The use of the Writing Workshop to provide students with opportunities to view the world with a "writer's eye" and develop those views to express ideas and communicate perceptions to others is a powerful and authentic learning experience designed to develop students who view themselves as writers. The writing process then becomes an important part of participating in a learning community. Briefly stated, the Writing Workshop is structured so that a block of 30-60 minutes (two to five times a week) is scheduled on a regular basis for students to write on projects of their own choosing. During the writing block, students work independently on pieces of writing in various stages of progress according to the writing process, share this writing with peers through participation in small group peer review sessions, participate in individual teacher-author conferences, and listen to tips or writing strategies shared by the teacher as "mini-lessons." An essential ingredient for the success of the Writing Workshop is for the students to understand the writing process: the cyclical processes of prewriting, drafting, revision, and editing, that are the necessary stages of development in taking a piece of writing from an idea, memory or thought bouncing around in the head of the author to the published finished product.

The PDA and the writing process

Introducing the PDA into this workshop experience is a true illustration of seamless integration in which the technology not only supports the learning experience, but also enhances the process. For example, the initial stages of the writing process, called prewriting or rehearsing, involve the collection of ideas, the jotting down of memories, thoughts, or words, brainstorming things to write about, drawing pictures or collecting pictures that the individual likes, doodling, making lists, reading aloud, talking to others, and capturing thinking responses to readings or experiences in text notes. These kernels of thought may or may not find their way into a writing draft, but the collection process is crucial to the foundational development of the idea that writing evolves from life experiences, not from the story starters or motivational activities supplied by the teacher. Experts in the field of writing and authors who have written about their writing experiences, such as Donald Graves, Lucy Calkins, Betsy Byars, and Donald Murray, suggest gathering these ideas into a "container" such as a notebook, journal, box, or file that can be carried with the author as they go about their daily experiences. This is the basic purpose of the PDA. The note taking capabilities through such software as Memo Pad, TakeNote!, Thought Manager or word processing applications, such as QuickWord, FreeWrite, or Documents to Go, allow the individual to make such collections easily with the added capacity of organizing these files into categories for later retrieval of files on the same topic—the next necessary step in the process of topic generation.

In addition to helping students collect and organize their thoughts and bits of writing into categories, the PDA can support the student's need to visualize the relationship between the topic once it is chosen and possible subtopics through the use of concept mapping tools, such as PicoMap. The limitation of screen size for mapping purposes creates a need for the student to visualize no more than three to four possible relationships or subtopics to the central topic, which in many cases, is an appropriate management technique for leading the student from collection of related "bits" to understanding the relationships between the "bits" and writing about those relationships.

Even the drafting process is enhanced for beginning writers with the use of PDAs because often students new to the writing process are more concerned with the way the text looks on the page than getting the ideas recorded. Viewing the text on the small screen focuses the writer's attention on the text and its meaning rather than the way the text looks as it shapes into a paragraph. And, the use of formatting tools in most of the word processing applications for the PDA is limited to Cut, Copy, Paste, and Delete, which allows the student to use the power of the word processor to move and re-arrange text as needed for clarification of expression, but prevents the student from "making the page look neat" or inserting cutesy graphics and WordArt. As student writers mature in their abilities to concentrate on and value the process of drafting thoughts into cohesive statements, the need for focus becomes less of a concern; however, the use of the PDA for drafting purposes remains valid.

And, finally, the sharing of writing with others is an integral part of the workshop experience. Participants in the workshop share drafts of stories, poems, and thought pieces with other individuals or small groups or in conferencing with the teacher, soliciting feedback, encouragement, and suggestions for improvement. The PDA supports this process by making it simple for participants to share files by beaming the draft file from the author's PDA to the reviewer's PDA. Reviewers are then able review and comment on the piece, and beam the file back to the author complete with added comments and suggestions.

Conclusion

For teachers interested in integrating technology seamlessly into their daily practices, the challenge remains how to use the technology so that the tools become an invisible support structure for the learning process. The use of PDAs within the writing process of the Writing Workshop is indeed an instructional design that builds upon the natural learning processes and scaffolds the learning processes in ways appropriate for the technology. In addition to the appropriateness of the technology to the learning process, the ability to provide all students with the technology in a relatively inexpensive manner addresses the desire of teachers for all students to participate in the learning experience in the same way. Pretty handy!

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Software Resources

FreeWrite and *PicoMap*, created by the Center for Highly Interactive Computing in Education at the University of Michigan, available for free download at http://www.handheld.hice-dev.org/download.htm.

QuickWord, available from Cutting Edge Software at http://www.cesinc.com/quickword/

Documents To Go, available from DataViz at http://www.dataviz.com

TakeNote!, available from Landware at http://www.landware.com/takenote/

ThoughtManager, available from Hands High Software at http://www.handshigh.com/index.html

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Evaluation of an Instructors' Training Programme from the Instructors' Point of View.

Hara Giouroglou, hara@uom.gr
Anastasios Economides, economid@uom.gr
University of Macedonia,
156 Egnatia, 54006 Thessaloniki
Greece.

Abstract: In the premises of the educational reform across Europe, many countries have funded teacher training programmes regarding the integration of the Information and Communication Technologies (ICTs) in all areas of the curriculum, in the primary and secondary education sector. Apart from the infrastructure required, it is essential to focus on the human resources of education and to train teachers in order for them to acquire the skills necessary to integrate ICT into their courses and help their students attain knowledge in a constructivist way. Greece is also fostering educational reform and is running a number of projects towards this direction. One of these projects, EPENDYSH (http://www.ithaca.uom.gr) aims – among other things – in the postgraduate training of 40 secondary education teachers of all disciplines, who will be distributed to schools in order to train their colleagues. They are being trained to use ICT in the teaching of their subjects. The paper firstly states the overall philosophy and main issues regarding teacher training on ICT. We support a constructivist approach to teacher training, focusing on the training of a sub-group of trainees, teachers of foreign languages. The aim of this paper is to present the attitudes of this sub-group, based on the results of a questionnaire handed to them after completing their training at the University of Macedonia (http://www.uom.gr). It is therefore desirable to investigate how successful the actual training was viewed by teachers of foreign languages, whose subject matter is not affiliated with computing and computer science. These results are subjected to further discussion for future improvements on teacher training.

INTRODUCTION

Information and Communication Technologies (ICTs) have become indispensable in all educational environments. Firstly, ICTs have changed the way people access and process information. Nowadays, information is not a static entity, given 'as such' to those interested, but it is dynamic, ever-changing, characterized by diversity and subjectivity. Knowledge is not built behavioristically, but it is a cognitive process built constructively that includes searching for information and evaluating it in order to solve problems. Students have access to an open bank of knowledge and information that needs critical thinking skills in order to be fully exploited. Secondly, ICTs have opened new communication channels, both synchronous and asynchronous, for students, teachers, administrators and parents, which are global, multicultural and multilingual in nature. To keep new generations up-to-date with these developments, major changes need to take place in public schools regarding the integration of ICTs in all curriculum subject-areas. Apart from the infrastructure required, it is essential to focus on the human resources of education and to train teachers in order for them to acquire the skills necessary to integrate ICTs into their courses and help their students attain knowledge in a constructivist way. It is therefore the aim of this study to investigate how successful current initiatives in teacher training are from the teachers' point of view and particularly from teachers of disciplines that, though not affiliated with computer science, are highly promoted and enhanced by ICTs, such as foreign languages.

TEACHER TRAINING

Apart from equipping schools with the appropriate infrastructure, it is mutually important to affiliate the staff with the suitability and usability of ICTs in education. Teachers need to believe in the supportive use of technology, in order to fully exploit the capabilities of ICTs and motivate their students to actively participate in the learning process. Similarly, teachers need to acquire the computer skills necessary in order to be able to operate ICTs. Finally, teachers need to develop an autonomous approach to life-long learning and construct their own understanding from the stimuli and experiences they gather from their immediate environment.

Current European initiatives [1,3,5,7] invest billions in teacher training (TT) and have common grounds and objectives. The organisation, the content, and the outcomes of a TT course are of major importance and different trends seem to exist. Especially in the field of course content, there is rivalry between those persisting in the instruction of educational packages and those following a more 'open' training strategy [4].

We assume that the teachers' objective should not be the mastering of one or more computer programs but the development of critical thinking skills and global perspectives on educational technology. The teacher should not be a passive recipient of new knowledge but he/she needs to be actively enrolled in the learning process. Therefore, as long as the training takes place, the trainee should assume the role of the learner in order to develop the thinking skills required to act in a constructivist way. A TT program as such should include courses from the disciplines of Education, Educational Psychology, Informatics, Learning Theories, Computer Networks and e-Learning, and should prompt the trainees to critically interrelate and construct the knowledge acquired by each discipline in conjunction with their prior experience and their students' needs. Thus, teachers will be able to consciously identify their target group's needs, in order to adapt new technologies to their schools/institutions. Similarly, the optimal assessment tool for teachers should be project-based in the form of authentic case studies or problem-solving activities that trainees need to explore, process and evaluate in order to propose possible solutions.

Specifically, regarding the training of foreign language (FL) teachers, we propose the following strategic points. The theoretical academic background of FL teachers necessitates initiatives that increase teacher motivation and teacher attitude, and promote technical expertise. It is generally accepted that the teacher's attitude is a central element and it is highly influenced by the lack of technical knowledge [6,14]. This fact is partly due to a certain degree of technophobia among those teachers who share a positive view towards new developments but lack the technical knowledge and infrastructure to practice computer skills. What is therefore highly suggested, is substantial, high-level TT as well as the providence of a PC to each trainee for home practice. TT programmes need to focus on both directions and promote teachers' attitude as well as ICTs actual use. However, TT in ICTs should always preserve its pedagogical orientation, as the ultimate goal is not to build computer experts but 'IT Pedagogy specialists' [8,13].

Finally, TT initiatives need to focus on their own target group needs, considering variables such as trainees' nationality, cultural background, age, computer literacy, and target areas of interest (higher, secondary, or primary education). Trainees' attitudes regarding the training program's success can be officially measured by means of interviews or questionnaires. Though numerous similar TT programs are currently running worldwide, the methodology used and the needs that ought to be covered are literally depending on the aforementioned variables and may be divergent.

To sum up, we propose that TT initiatives should focus on a specific target group, such as 'FL teachers from the Greek secondary education sector'. In this case, the structure of the program proceeds as follows. In the first phase, trainees focus on basic computer and Internet skills, while at the same time they rehearse some major educational subject areas (e.g. methodology, learning theories, curriculum design). In the second phase, they proceed with the e-learning philosophy and principles, focusing on Computer Assisted Language Learning (CALL). Parallel to this, they learn authoring skills, and the use of authoring tools. Finally, they should be given adequate time for practical training, in order to become dynamic participants instead of passive recipients. Overall, teachers need to develop a new philosophical perspective and a flexible pedagogical approach, rather than confine their training in the operation of ready-made packages.

THE PROJECT

Greece, together with the rest European countries, runs a number of educational projects focusing on three directions: construction of fully equipped computer labs in public schools, development of educational software and TT [10]. The project EP.E.N.D.Y.SH (Training of Trainers in the Modern Network and Information Systems) focuses on the third direction and provides one-year postgraduate training courses for in-service secondary education teachers, who are trained to provide in-school training for their colleagues. In 2000, the University of Macedonia undertook the postgraduate specialization of 40 teachers from the following disciplines: Computer science, mathematics, FL, and economics.

The training programme consisted of 'horizontal' tutorials to which trainees (Ts) of all disciplines were participating and 'vertical' training for trainees of each discipline separately. Specifically, the FL domain received 72 hours of vertical training that covered theoretical and practical tuition.

METHOD

The Trainees (Ts)

The Ts of this study were five FL teachers who were selected on the basis of their 'personal qualities [and] intellectual abilities' [9] regarding their background, teaching experience, postgraduate studies and involvement in pedagogical activities, that was viewed in their 'expression of interest' application form and during a personalized interview. Their age spanned between 30 and 50, while their affiliation with new technologies before the programme ranged between very good and average. Therefore, we assume that they were motivated to participate in this programme, due to the fact that they were responsible of expressing interest and they were computer literate, at least at an initial stage.

The Questionnaire (Q)

The Ts' training at the University of Macedonia officially ended with a graduation ceremony on 27 June 2001, the date when the questionnaire (Q) was handed in. The Q was structured on the basis of Q construction standards in the field of educational research [18]. It had four sections that were comprised of 31 closed-ended questions and one to three open-ended questions at the end of each section. The over-use of closed-ended questions was due to the fact that they produce more accurate and measurable results, and they do not require long time to be completed by the Ts avoiding the Ts' loss of patience or frustration and the resultant improvised completion of the Q. The questions were short, direct, carefully structured and focused on one topic, in order to avoid ambiguity and to ensure that Ts fully perceived the author's queries. The first three sections regarded the quality of the lectures during the 'vertical' training, the quality of the learning materials and the evaluation of the expertness gained by the Ts, and they had five scale point closed-ended questions. The last section dealt with the trainees' capability to instruct other teachers in ICTs and had three scale point closed-ended questions.

Results

The first section asked Ts to evaluate the knowledge they gained from the 'vertical' lectures regarding the pedagogical use of the ICTs in FL teaching. The overall impression was good. The Ts declared that they received good training in the subjects 'General Teaching Principles', 'FL Teaching Models' and 'Special Teaching Problems per Language' but they also stated an average to poor level of competence gained from the lectures on 'The Use of Multimedia in FL Teaching' and 'Teleteaching of FL', which are the subjects that directly apply to use of ICTs in language learning (LL). In the open-ended question that followed and regarded recommended changes, the Ts stressed the fact that they were not taught *Xenios*, an e-slate learning environment and authoring tool, developed by the Computer Technology Institute [2] in order to be taught to in-service FL teachers and to be distributed to all Greek secondary schools. In a privet talk with the Ts, we noted a feeling of insecurity regarding their competence in training other teachers on the specific piece of software without having initial training on it themselves. One trainee characterized as 'loss of time' the instruction of old authoring programs, such as *WIDA*, and suggested a more 'up-to-date' approach, while other Ts stressed the absence of model teaching scenarios that integrate ICTs. This attitude is indicative of the fact that the Ts showed an implicit indifference regarding the general pedagogical values of ICTs in education and the history of educational technology. Instead, they complained that they were not trained on a specific piece of software and they were not given ready-made teaching scenarios. We deduct that our Ts were not in a position – or did not want – to function autonomously and constructively.

The second section dealt with the quality and quantity of the learning materials presented and offered to the Ts. Three types of materials were presented and evaluated: printed materials, software and web-based software. Ts were trained in how to use, integrate and evaluate such learning materials. As regards the materials' quality, Ts' opinions were divergent. According to the them, the quality of printed materials ranged from very good to average and the quality of software from good to below average. The web-based software together with the overall estimation regarding materials' quality was evaluated as average.

Concerning the quantity of learning materials, the Ts agreed that they received a satisfying amount of printed materials, but their opinion on software and web-based software quantity ranged from good to below average. In the open-ended question, asking Ts to identify the best piece of software that would be serviceable in the Greek secondary education sector, they all named *English Discoveries* and *Xenios*. This unanimity in an open-ended question is indicative of the fact that either the Ts did not receive training on a large number of foreign language teaching packages or they only focused on the very limited number of the packages that were going to be distributed to public schools.

The third section of the Q measured the degree of attaining the objectives of the programme and specifically the skills acquired on the general use and integration of ICTs in a FL environment. The Ts considered as average the skills they acquired in multimedia applications, pedagogical applications of the ICTs and strategic pedagogical planning. In the open-ended question, they stressed the necessity for more hours of training in the above areas.

Regarding ICTs integration in the FL environment, the Ts had divergent opinions. Answers ranged from good to below average regarding the skills acquired in the production and development of ICTs-supported language activities, in the design and support of interactive LL activities and in the selection and evaluation of the appropriate CALL materials. However, the Ts considered that they received good theoretical tutoring and good to average 'hands-on' training. On the whole, we assume that the Ts admitted receiving good training, but they tended to be skeptical when it came to specific subject areas.

The last section of the Q dealt with the level of the Ts' ability to transmit the expertise they gained to their colleagues. This section had unanimity, and all Ts answered that had acquired the skills needed to inform, motivate and familiarize their colleagues in the use of ICTs in education, as well as to train their colleagues in ICTs integration and in the design of electronic or web-based learning materials. Thus, if we exclude some degree of dissatisfaction regarding certain areas of the training, we can assume that the TT project managed to develop competent teacher trainers, that are conscious of the knowledge they gained and feel competent to deliver it to their colleagues.

At the end, there were three open-ended questions in order to investigate the Ts' overall opinion on what went well, what went wrong, and what changes should be considered for the future. To sum up, Ts praised the computer lab, which was designed and equipped to fulfill the needs of the particular group, and stressed how facilitating the spirit of cooperation among them was. Discussion, questioning and ideas exchange between people of the same status can accelerate the process of turning the outside stimuli into acquired knowledge. To this end, some teamwork projects were extremely helpful.

The lack of homogeneity regarding the Ts' level of computer literacy frustrated all of them, as the less competent could not easily acquire what they were being taught, whereas the more competent felt hindered to proceed to more advanced activities. Apart from that, the Ts criticized the great emphasis given to informatics, which, as they claimed, impeded the saving of extra hours dedicated to subject-specific aspects.

FUTURE CONSIDERATIONS

Based on the aforementioned results, we can draw up some conclusions for future FL TT initiatives. The relatively high degree of divergence is mainly due to the fact that all Ts received the same training, regardless of their level of computer literacy at the beginning of the course. Therefore, the Ts perceived the training course differently, according to their prior experiences and computer competence. This problem has been also noted in other similar programmes [11]. One solution could be to split Ts in groups on the basis of their computer competence. Yet, the small number of Ts per subject matter prohibits such initiatives. For this reason, it is preferable to offer extra hours of optional training as well as to provide all trainees with personal computers for autonomous training. Finally, TT courses need to administer constructivist group-work projects that will give Ts the opportunity to exchange ideas and share their own understandings with their colleagues, in order to have gains from each other's knowledge.

Additionally, in order to avoid the Ts' frustration and insecurity, their training should include model teaching scenarios that integrate ICTs in the educational process. Ts will thus feel more competent to train their colleagues. On the other hand, Ts should also be exposed to numerous educational software packages in order to be able to think critically, make their own judgments and learn how to evaluate, compare and contrast existing and future electronic learning materials. To accomplish this, TT programmes should also invest on learning materials and equip TT labs with relevant resources. They also need to create a library sector with print learning materials, stand-alone software, networked software, journals, case studies, and worldwide research project deliverables, in order to keep the Ts and the staff up-to-dated with new developments.

Moreover, TT initiatives should dedicate equal number of training hours for both technological and pedagogical aspects. It is important for Ts to develop a deep understanding of the actual effects of ICTs in the learning process. In order to familiarize Ts with the use of ICTs in education, TT programmes could also integrate ICTs for course delivery. Telematics and computer-conferencing systems can help to this end, as they can guarantee synchronous and asynchronous learning as well as autonomous and group work. Ts will then be able to evaluate these systems from the learner perspective.

Finally, we believe that every new TT initiatives should be tailored to its target group's needs. Collecting and implementing ideas and findings from similar projects is also legitimate but it needs careful selection and monitoring, based on the current situation. Though TT courses have some parallel attributes, there are also culture-, country-, infrastructure-, subject-, and trainee- specific variables that explicitly affect and determine the outcomes of such initiatives. We strongly advocate trainee needs analysis and careful budget management.

CONCLUSION

The aim of this study was to investigate the degree of success of the one-year foreign language instructors' training programme on ICTs in education at the University of Macedonia, according to the trainees' point of view. The results were gathered by means of a questionnaire handed to them at the end of the course. We assumed the subjects' motivation from the fact that they expressed interest for participation in the programme. In total, the results showed that the course fulfilled its main objective, which was the successful training of in-service instructors from the secondary education sector in order to train their colleagues. The subjects declared that they felt competent to instruct other teachers on how to use and integrate ICTs in the classroom, and how to design and evaluate learning materials. However, they also criticized some aspects of the course and suggested future changes, which can be taken into consideration for the next group of trainees. Therefore, we aspire to optimize the instructors' training course not only by keeping up-to-date with current international initiatives and studies but also by actively focusing and adapting our programme on the specific needs of our target groups of trainees.

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NEXOS - A Language Portal for Cultural Learning and Collaboration

Josef Hellebrandt, Santa Clara University, US
David Armstrong, Santa Clara University, US

Foreign language teachers have been lacking an open web platform in support of learning and collaboration. This interactive session introduces participants to NEXOS, a web language portal for teachers and learners of Spanish. It will be facilitated by a Spanish professor and an instructional resource expert, who will familiarize the audience with the main features of NEXOS as well as its pedagogical and technological aspects.

The main goal of NEXOS is to promote learning exchanges among university students, teachers, and community members in the US and abroad through shared cultural information and resources. Traditionally, schools, colleges and universities have been offering Spanish teaching and learning in a top-down fashion to the student or to the community. Only recently have Spanish teachers begun to re-evaluate the focus of teaching and to explore colloborative learning formats using technology. The key features of NEXOS--a database-driven platform and multiple communication and collaboration channels--will dramatically enhance technology-enhanced collaborations. It is designed for the sharing of a variety of resources among users and contributors around the globe, specifically for the education community.

The NEXOS portal supports three types of resources within its data banks: images, audio/video and general resources. The latter consists of links to information that can be found in the community and on the web, as well as information posted by NEXOS members on a variety of categories and types including: Events, Organizations, Teacher / Student Resources and much more. In addition, it allows for Real Video and web-based graphics. Members of NEXOS can communicate with other members of this portal via its Webboard or through topic-specific mailing lists.

Both design and usage of NEXOS support numerous learning outcomes, which aim at:
1. enhancing student learning about cultural products, perspectives and traditions
2. engaging campus and off-campus groups in mutual collaborations
3. promoting learning and professional collaborations among students and teachers
4. increasing access to technology
5. establishing electronic communication as a viable form for university and community collaborations.

The project will be made available to the membership of The American Association of Teachers of Spanish and Portuguese in November for evaluation including a request for possible modifications.

Electronic Writing and Workplace Literacy

Heather Hemming
School of Education
Acadia University
Canada
heather.hemming@acadiau.ca

Sonya Symons
Department of Psychology
Acadia University
Canada
sonya.symons@acadiau.ca

Lisa Langille
School of Education
Acadia University
Canada
014639l@acadiau.ca

Abstract: Askov and Gordon (1999) recognize the need to write effectively in an electronic context as important to literacy programs. The goal of situated learning is to create a context that is meaningful and relevant. When an instructional approach is developed based on principles of situated learning, instructors acknowledge the fact that adult learners bring already existing knowledge and skills to workplace literacy programs. Askov and Gordon (1999) suggest that the integration of work-related materials and instruction in basic skills builds on workers' background of experience and knowledge while developing their abilities to use communication and computational skills more effectively in the workplace. This paper discusses the importance of integrating electronic writing into workplace literacy programs, describes an approach to instruction based on reciprocal teaching, situated learning and strategy instruction, outlines the data analysis process used to assess the impact of the instruction, and discusses the findings.

Introduction

The definition of workplace literacy is shifting to encompass much more than the traditional interaction with text, as the idea of text itself is continually transforming with the onslaught of new technologies; there is now an essential focus on written communication within the boundaries of workplace literacy. Heath and Mangiola (1991) suggest that literacy is a mix of content, process and context by differentiating between 'literacy skills' and 'literate behaviours'. Literacy skills they define as "mechanistic abilities that focus on separating out and manipulating discrete elements of text" (p.40), while literacy *behaviours* refer to being able to "communicate … analy[se] and interpret … through extended text …. [They are] ways of going about learning that treat language as both the medium and the object" (p.40). This distinction is central to this study; by concentrating on improving electronic writing our goal was to focus instruction on literate behaviors and literate skills that may be necessary in the workplace.

Writing in electronic spaces has changed most workplaces. For example, the impact of e-mail has recently overwhelmed the workplace. A poll conducted by Kopp (1998) estimates that ninety percent of large companies, sixty-four percent of mid-sized companies, and forty-two percent of small firms currently use e-mail systems. The same poll found that more than forty million employees correspond via e-mail, and the number is expected to increase by about twenty percent each year. In addition to the significant presence of e-mail in today's workplaces, there has been an escalation in the use of electronic discussion in many environments (Bonk, Appelman & Hay, 1996; Hemming, 1999; Kuehn, 1994; MacKinnon & Hemming, 1998). Electronic discussions provide adult learners with opportunities to reflect, pose questions, and examine problems (Brett, Woodruff & Nason, 1997). Given the growing need to be able to communicate effectively, exposing adult learners to computers is not sufficient preparation for the workplace. Communicating through the use of computers must be distinguished from simply using computers. Workplace literacy programs must be founded on research that focuses on understanding methods of teaching individuals to use literacy skills effectively within a technological context and to support the development of literate behaviors for interaction with electronic texts. In this research project we developed and examined an instructional approach designed to teach adults strategies for writing effectively in an electronic context. The instructional approach was developed based on a reciprocal teaching framework and the goal was to situate the learning within a meaningful work-related context through electronic discussions.

Reciprocal teaching has been used extensively in previous studies designed to examine the effectiveness of teaching cognitive strategies (Collins, Brown & Newman, 1990; Lysynchuk, Pressley & Vye, 1990; Palinscar & Brown, 1984). Results in many studies suggest that reciprocal teaching has potential to be an effective instructional approach to teaching workplace literacy skills (Rosenshine, Meister & Chapman, 1996; Spivey, 1995). Reciprocal teaching involves providing instruction over several sessions beginning with the instructor modeling strategic approaches to tasks. Gradually, from session to session, the instructor shifts more and more of the responsibility to the learners for using strategies. The gradual transferal of responsibility allows learners to ask questions, clarify the approach, and receive feedback before being required to complete the task independently. Reciprocal teaching supports an ongoing dialogue between student and instructor; various instructional strategies including teacher-led discussion, explanation, and modeling of strategy use may be effective ways of scaffolding participant attempts to employ the strategy.

Askov and Gordon (1999) suggest that because situated learning involves contextual instruction, based on real-world knowledge and experiences, it encourages transfer of knowledge and skills from the classroom to the job. To enhance the relevance of the writing strategies to the participants involved in this study, hypothetical case studies were created to reflect real-life situations and provided the context for the electronic writing. The cases were based on real-life issues that often surface within many workplace situations. Also, workplace settings found in local communities were used within the cases to enhance the relevancy of the material. The context of the cases enabled participants to explore important issues that often arise in workplace settings, bring and build on their prior knowledge and experiences, and increase awareness of various perspectives, which may encourage a re-examination of their viewpoints and beliefs with regard to many workplace situations and therefore enhance their ability to transfer their new way of thinking and problem-solving skills to future places of work and other areas of life.

Electronic discussion groups as a medium for writing has the potential to promote a collaborative writing environment. Further, Askov and Gordon (1999) suggest that computer-assisted instruction is one approach that educators may take to customize instruction to suit the needs of adult learners. To be prepared for the demands of electronic communication there must be opportunities to engage in writing within this context. Electronic discussions may provide an environment for more reflective responses as they enable participants to work at their own pace. Electronic discussions offer flexibility given their asynchronous capability; this makes the learning medium one that may be provided at a time when the adult learner is available and able to participate. Further, this environment allows learners to use their prior knowledge, reflect, and revise their writing within the context of an electronic learning community.

The Study

This study focused on the development of an instructional approach and the subsequent assessment of the approach used for teaching writing strategies important in electronic communication based on a reciprocal teaching model of instruction. Twenty-two participants, ages 18-48, at the Annapolis Valley Work Centre (AVWC) participated in the study. AVWC is an organization, which provides support to adults who have difficulty finding and/or maintaining employment due to various obstacles including academic, emotional, or behavioural barriers. Regardless of their unique challenges, all participants who were involved with the study experienced varying levels of computer experience as well as difficulty with literacy skills.

Each participant completed a computer usage survey prior to receiving instruction as a method of gaining information regarding participant previous experience with computers and participant attitudes toward computers. In addition, to gather baseline descriptive data each participant was asked to complete a written sample based on the content of a selected case study, without the use of a computer. A baseline score was assigned to the written samples using a modified version of the TOWL. Basic computer instruction was provided to the participants using the IBM Thinkpads that they would continue to use throughout the study. When the participants felt comfortable using the laptop computers, they completed an introductory session prior to instruction, which involved making an entry into the electronic discussion group based on a case study. The instruction was based on a reciprocal model of instruction and consisted of eleven forty-minute sessions that focused on three specific writing strategies used when making electronic discussion entries. The instruction was also designed to situate the teaching and learning in context relevant to workplace preparation.

Throughout the instructional phase of the study, three sessions were designated to each of the three writing strategies: explaining/expressing a viewpoint, asking pertinent questions, and writing effective responses. Participants received instruction in heterogeneous groups during their regular class schedules at the AVWC. The first session consisted of an introduction to the strategy where the strategy was modeled; the second session (application A) involved participants working through the strategy with some guidance; during the third session (application B), participants used the strategy independently. Worksheets and study guides were provided to participants during each session, which were used as guidelines for making entries into the electronic discussion groups. Participants were also required to complete two additional sessions, which involved working through a case study using all three of the writing strategies. During the first of those sessions, participants received guidance and support from the research assistant while participants used all three strategies independently during the second session.

After the instructional phase was completed, all data collected throughout the study was archived for analysis. In addition to the computer usage surveys and written samples completed prior to instruction, the worksheets used during instructional phase and participant electronic discussion group entries were documented for later analysis. Additionally, detailed qualitative data was gathered throughout the entire phase of instruction.

Findings

To gain better understanding of participants' experience with computers prior to instruction, the computer usage surveys were examined. 15 of the 22 (68%) participants had used e-mail while 9 (41%) had used chat groups prior to this study. Only 3 (14%) of the participants categorized themselves as heavy computer users (many hours per day), another 3 felt they were light computer users (approximately once per week), and 3 of the 22 considered themselves to be infrequent users (rarely use the computer). These findings reveal that there was diversity among participants with regard to computer use. It is also interesting to note that although fifty-nine percent of the participants had used a computer within seven days prior to participating in the study, sixty-two percent of those participants had used a computer for playing games while only thirty-eight percent used a computer for word processing and forty-six percent for writing an e-mail message. These findings suggest that the participants enrolled in the workplace literacy program at AVWC do not frequently use computers for electronic writing when compared with using computers for entertainment purposes such as playing games. Further, only fifty percent of the participants used a computer for any purposes within the context of their workplace literacy program within one week prior to the study.

The overall goal of the instruction was to improve the quality of electronic writing with more specific goals of having the participants use the strategies taught while writing. To assess the change in writing quality after instruction, we compared the electronic discussion entries created during an introductory session to entries made during the final independent session. These data are summarized in Table 1. The number of words that participants used before and after instruction did not differ, $\underline{t}(20) = 1.77$, $\underline{p} = .092$. However, participants used an increased number of sentences after instruction than they did prior to instruction ($t(20) = 3.24$, $p = .004$). This suggests that writing processes were changing; it appeared as though participants started to make more thoughtful, planned decisions about their writing. Further, when comparing these two groups of entries it was also found ninety-five percent of participant entries showed an increased amount of explanation provided to support viewpoints generated. This data suggests improvements to participants' written communication; they were carefully explaining the viewpoints with regard to the cases rather than simply stating isolated opinions that were not relevant to the cases. The overall quality of participants' writing was compared using a modification of the TOWL. Results suggest significantly higher scores following instruction, t (20) = 2.43, p = .024. We also compared the explanatory quality of the arguments made by the participants on a 5-point scale. This reliable scale indicated that the participants' arguments were better after instruction than before, t (19) = 12.58, p = .001.

Measure		Pre-instruction	Post-instruction
Number of words in writing sample	M SD	79 (39)	68 (22)
Number of sentences in writing sample	M SD	3.5 (1.9)	4.9 (1.4)
Writing Quality (maximum 29)	M SD	19.2 (4.4)	22.3 (4.0)
Quality of Argument (maximum 5)	M SD	1.5 (0.9)	4.7 (1.0)

Table 1: Descriptive statistics of pre- and post-instruction writing measures

Specific to the goal of using the strategies in the electronic postings, we assessed participant worksheet/study guides to see whether there was evidence of strategy use. Ninety-five percent of participant entries revealed some evidence of using worksheets and study guides, which were important components of the strategy learning throughout the instructional phase.

Throughout this study, there was evidence of change in attitudes toward writing. At the beginning of the study, thirty-six percent of the participants specifically identified writing as a significant barrier for them with regard to finding and maintaining employment. During the pre-instructional session, which required participants to write in response to a case study without using a computer, eighteen percent of participant written responses did not accurately reflect thoughts verbally expressed within the group discussion. Many written responses were very brief, used basic words, contained unconventional spelling and letter formation.

There were additional changes in the participants' literate behaviours throughout the duration of the project. Participants began to think about their writing, as well as the conventions of writing particularly spelling, punctuation, and capitalization. For example, one participant stated that she now read her work "over and over again" to make sure that "it makes sense" before she published it. Further, participants began to use each other for resources in the process of writing. Also, when reading the entries of others, participants would often make editorial comments. As a result of this feedback, one participant gained increased awareness of the importance of spacing between words.

Conclusions

Computer exposure is not sufficient to prepare adult learners for the workplace. Communicating through the use of computers must be distinguished from simply using computers. Electronic discussion groups (EDGs) have the potential to promote a collaborative learning environment that enables learners of various abilities to exchange ideas and thoughts, extend their learning, and ultimately grow as a community of learners. Thus, electronic discussion groups may provide an appropriate learning atmosphere that allows for the diversity of adult learners enrolled in workplace literacy programs. If workers are to be prepared for the demands of electronic communication, instructional approaches must reflect the authentic process of communicating electronically to promote growth in the areas of literate behaviours and skills. Adult learners require an instructional approach that will address their diverse needs and will guide them to independent use of the various strategies learned so they can then be transferred to future situations.

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CoBaLTT! Content-Based Language Teaching through Technology

Marlene Johnshoy
Center for Advanced Research on Language Acquisition
University of Minnesota
United States
johns484@tc.umn.edu

Abstract: The CoBaLTT project includes two primary components: the delivery of a professional development program for K-16 world language teachers that will enable them to create content-based lessons and UNITS that incorporate technology in order to improve students' language proficiency; and the construction of a Web Resource Center for language teachers that will provide instructional modules based on the face-to-face instruction in the professional development component and additional practical resource "rooms."

The purpose of the **CoBaLTT** project is to provide professional development and practical resources for K-16 world language teachers in content-based instruction supported by appropriate uses of technology. The CoBaLTT project has two primary components: a Professional Development Program and a Web Resource Center.

Professional Development Program

The purpose of the CoBaLTT professional development program is to provide intensive professional development for world language teachers on the use of technology in the second language classroom to support and enhance content-based language instruction. Participating teachers gather authentic materials and create content-based lessons or units that motivate students to develop higher levels of proficiency and cultural awareness, thus enabling them to meet challenging standards.

Each year, a cohort of world language teachers is selected to participate in a year-long program that includes a week-long summer workshop and three two-day workshops during the academic year. The program focuses on:

- content-based curriculum development and teaching strategies,
- best uses of technology for teaching and learning,
- creation of authentic tasks that meet national foreign language standards, and
- assessment of student language proficiency and content knowledge through performance-based assessment.

The program begins with a one-week intensive summer workshop held at the University of Minnesota. The CoBaLTT summer workshop sets the stage for the program by helping teachers understand the theoretical principles that link standards with content-based language instruction and curriculum development. Participants also become familiar with selecting and using technology to enhance content-based language instruction.

We are currently in the third year of the professional development program. The 25 K-16 teachers in the current CoBaLTT program have completed the week-long institute in the summer of 2001. Support and additional learning sessions will be held three more times during the 2001-2002 academic year. Between sessions, participants are involved with developing lesson plans to be added to the website, offering feedback and suggestions to peers, and trying out new ideas with their students.

Web Resource Center

The CoBaLTT Web Resource Center serves both as an integral part of the CoBaLTT Professional Development Program and as a stand-alone learning resource for language teachers. The Web Resource Center has two main areas:

- instructional modules for language teacher professional development in key subject areas important to the CoBaLTT program
- practical resource rooms for teachers related to the topics in the instructional modules

The instructional modules support the face-to-face instruction, but will also serve as independent learning modules for those teachers who are not able to attend the face-to-face instruction with a cohort. It is intended that these instructional modules will eventually form the core of a credit-bearing independent learning course.

The instructional modules will include the following:

- National standards
- Content-based curriculum development
- Content-based teaching strategies
- Technology-enhanced instruction
- Performance assessment (connected to the Virtual Assessment Center)

The practical resource "rooms" will contain a large collection of practical resources for language teachers. These resources will support and expand both the face-to-face instruction and the online modules:

- lesson plan room has (many first and second .year cohort lessons/units now viewable)
- discussion rooms (Year 3 cohort is using a bulletin board to discuss readings)
- rubric room (connected to the Virtual Assessment Center)
- technology room

Please visit the CoBaLTT website modules and resources. Any comments or suggestions would be appreciated.
http://carla.acad.umn.edu/cobaltt/

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Using Technology to Present Mathematics Lesson Plans That Integrate Children's Literature

Virginia Keen, Bowling Green State University, US

It is not uncommon for preservice early childhood/elementary school teachers to acknowledge having some level of mathematics anxiety. In an effort to establish a comfortable learning environment in which to both deal with mathematics content and learn good mathematics pedagogy, I assign the creation of mathematics lesson plans which integrate children's literature. By approaching the teaching of mathematics through the more attractive realm of the reading of stories to children, preservice teachers gain a sense of security in the planning of a mathematics lesson.

Students are required to present their plans to their peers in the mathematics methods classroom using some means of technology. The technology options range from chalk and chalkboard to a digitized whiteboard system, including a networked computer providing access to all University-keyed software. The students choose the level of technology they wish to use, just as they select the literature and mathematics content for their lessons.

Several students have chosen to put the ideas and knowledge gained through their program preparation in classroom technology to excellent use as they have developed presentations that capitalize on the power of presentation software like PowerPoint® and HyperStudio®. In addition, some have incorporated opportunities to use the digitized whiteboard (SMART® Board) to make their presentations more interactive. In this SITE presentation, I report on the experiences I have had with student products and, if possible, have a preservice teacher co-present, sharing the product they created as a part of this assignment.

The objectives of this session include:

1. Sharing a vehicle for getting students to use their learning from classroom technology course work in subsequent courses,
2. Providing an opportunity for colleagues to see examples of student work, using technology to show how students integrate children's literature in mathematics instruction, and
3. Initiating a preservice teacher into the professional world of conference presentation.

The intended audience is teacher educators, not restricted to those in classroom technology. The software of concern includes PowerPoint®, HyperStudio®, Inspiration®, SMART® Notebook, and AppleWorks® graphics.

Preservice Teachers' Use of WebQuest to Construct Literacy Events

Kimberly Kimbell-Lopez, Ed.D.
Department of Curriculum, Instruction, and Leadership
Louisiana Tech University
United States
Kklopez@latech.edu

Abstract: Preservice teachers taking a Reading Methods course as part of their elementary program requirements were asked to complete a WebQuest on a topic of their choice. The students were shown how to create the WebQuest through use of Netscape Communicator, which contains the web page editor Netscape Composer. As part of the process, the preservice teachers incorporated elements of reading as well as other elements of the language arts.

Introduction

It has become increasingly apparent that teachers must enter the classroom with knowledge and expertise in the use of technology resources. In the *Report to the President on the Use of Technology to Strengthen K-12 Education in the United States* (March, 1997), the President's Committee of Advisors on Science and Technology stated that:

> As schools continue to acquire more and better hardware and software, the benefit to students increasingly will depend on the skill with which some three million teachers are able to use these new tools. In order to make effective use of educational technology, teachers will have to master a variety of powerful tools, redesign their lesson plans around technology-enhanced resources, solve the logistical problem of how to teach a class full of students with a smaller number of computers, and take on a complex new role in the technologically transformed classroom.

A major point made by this report is that teachers currently do not receive enough support in the way of administrative, technological, or pedagogical resources. In addition, graduates of teacher preparation programs are not adequately prepared to use information technologies in their teaching. Subsequently, most teachersare left largely on their own as they attempt to integrate technology into their curriculum.

The National Center for Educational Statistics (Cattagni and Farris, 2001) reported that in fall 2000, 77 percent of classrooms were connected to the Internet. Developments concerning connectivity are especially critical when considering information reported by The United States Department of Education Office of Education in its Progress Report on Educational Technology. This report (November, 2000) stated that the proportion of teachers using the Internet in teaching continues to climb along with school connectivity from 65% in 1998 to 85% in 2000. With this increase in access to the Internet, there is a need for teachers to have explored potential uses of this resource within teaching and learning activities used in the classroom.

The International Reading Association's position statement on *Integrating Literacy and Technology in the Curriculum* (December, 2001) emphasizes that students must become proficient in the new literacies of information and communication technology in order to be fully literate in today's world. The role that teacher preparation institutions play becomes increasingly important, since the preservice teachers that are trained must be able to support these students in the development of new literacies. Teacher educators must integrate effective instructional models that use the Internet and other technologies into preparation programs in literacy education (IRA, 2001).

The Study

A major purpose of this study was to investigate possible ways to model the infusion of technology within classroom instruction using the WebQuest project developed by Bernie Dodge and Tom March out of San Diego State University (Dodge, 1997). Questions that were explored included: (a) What technical problems do preservice teachers encounter when using technology resources, and (b) How do preservice teachers incorporate reading and language arts curriculum elements when using the technology resources to develop an Internet-based Inquiry project (i.e. WebQuest)?

Participants

Participants in this study were twenty-three female preservice teachers enrolled in a Reading Methods class. This class was a course that must be completed prior to the student teaching component of their degree requirements. Students are usually around a junior level status when enrolled in the reading methods course. The university calendar is arranged in Quarters with classes taken in ten-week cycles, and this particular class met two times a week for one hour and fifty minutes each class for a total time of three hours and forty minutes. During weeks four through nine, students met on one of those class days at an elementary school to participate in the field experience component of the course.

Data Sources

Qualitative data collected for this project included the final WebQuest product completed by the students, a questionnaire, and email correspondence. Required elements for the final WebQuest product included pages that addressed the *Introduction*, *Task*, *Process*, *Evaluation*, and *Conclusion* (Dodge, 1997). In addition, the preservice teachers were asked to complete a three item questionnaire that addressed the following areas: (a) What was the hardest part about doing the WebQuest, (b) What helped the most during the process of creating the WebQuest, (c) Do you think the WebQuest is a good project to do with your students? Why or Why not? The preservice teachers were also asked to write a response to complete two open-ended questions: (a) I wish…, (b) If I could do it all over again, I would….

Introduction to the Project

Through their involvement in the course, preservice teachers were introduced to the concept of a "WebQuest" as a way to construct meaningful literacy events for teaching and learning activities in the elementary classroom. This model was developed by Bernie Dodge and Tom March at San Diego State University in 1995, and it is defined as:

> …an inquiry-oriented activity in which most or all of the information used by learners is drawn from the Web. WebQuests are designed to use learners' time well, to focus on using information rather than looking for it, and to support learners' thinking at the levels of analysis, synthesis and evaluation. (Dodge, 2001c)

In order for students to have an adequate amount of time to create and develop the WebQuest, the project was introduced at the beginning of the quarter. Students explored *WebQuest Building Blocks* (Dodge, 2001), and a *WebQuest about WebQuests* (Dodge, Byles, and Brooks, 2001) to learn more about what is involved in the project.

Technical Aspects of the Project

Students entered the class with varying degrees of expertise and experience regarding use of technology. Many had not used any type of web page editor at all much less used such software to develop instructional materials for use in the classroom. In order for the software to be made available to all students, it was recommended that they use Netscape Communicator 4.7x. Since this is a free software program they could download to their home computer, which made it more readily accessible when working on the project. This software was also available in all of the computer labs on campus therefore accessing the software to work on the WebQuest project should not have been an issue.

Support Outside of Regular Classroom Instruction

In addition to class time where the project was discussed, a three-hour support session outside of regular class time was provided by the instructor for those students wishing to receive instruction regarding how to use the web page editor. Students also sought support through office visits with the instructor or through email correspondence.

Providing a Template as Support

Students were provided a working template on diskette that included already created "base" pages for: (a) *WebQuest Home*, (b) *Introduction*, (c) *Task*, (d) *Process*, (e) *Conclusion*, and (f) *Evaluation*. Each page also had a navigation bar with links between the pages. The purpose in providing the template was to help students concentrate on the curriculum component of the project versus becoming mired down in technical problems. Students had to still input selected graphics and links, so they did get experience in working with these technical aspects of the project.

Selection of Topics

The topic selection for the WebQuest was based on an area of interest or grade level range in which the preservice teachers were interested. Students were directed to the web site of Bernie Dodge, which provided a *Matrix of Examples* (Dodge, 2001a) of different WebQuests that were organized by contents and grade levels. This web site had been found to be a good resource in helping students narrow the instructional focus for their own WebQuest project.

Incorporating Reading/Language Arts

During the course of the quarter, discussion topics and activities in the Reading Methods course cover such skill areas as word recognition and identification, vocabulary, and comprehension. When developing the WebQuest project, students incorporate various aspects of these skill areas in to the learning activities. Since students were also enrolled in the Language Arts Methods course while enrolled in the Reading Methods course, they were encouraged to embed aspects of the language arts within the WebQuest project (i.e. speaking, listening, reading, writing, viewing, and visually representing).

Results

The preservice teachers had the option of developing the project individually or they could work with one to two partners. Five students chose to do the project alone, six other students chose to work in groups of two (three groups of two), and twelve students opted to work in groups of three (four groups of three). Students were free to select the topic and grade level for their Webquest. Grade levels that were targeted in these twelve projects included the following:

Table 1
Distribution of grade levels for WebQuest Projects

Grade Levels				
Unidentified	3rd	4th	5th	6th
1	1	4	3	2

The topics selected by students for their projects were geared toward content area reading primarily in the area of science (10 of 12 projects). Topics selected included broad areas such as *Zoo Animals*, *Discovering Plants and Animals*, *Endangered Species* and *Introduction to the Solar System.* Some projects narrowed the focus to address topics that included *Creepy Crawly Spiders*, *The Bald and the Beautiful* highlighting the North American Bald Eagle, *Pumpkin Time*, *Only You can Build the Zoo* focusing on African animals and their habitats, or a specific city as in *Landfill Overload* or *Clean up your City*. Two projects had a social studies emphasis that targeted *Orville and Wilbur Wright* and *A New National Monument*.

Responses from Questionnaire

Two major themes that emerged from the analysis of the questionnaire included concerns with the technical aspects of the software and appreciation of support services. A minor theme noted included students wishing they had prior knowledge about how to create web pages.

Technical Aspects of the Software

Comments from students when responding to the questionnaire mainly dealt with technical considerations. Many considered the hardest part of the project was finding appropriate links and graphics to build into the pages of their project. Since Netscape Composer is a "bare bones" web page editor, it does not allow much room to manipulate such features as font size, placement of graphics, or to incorporate audio/video elements within the pages of the WebQuest. As a result, many of the problems encountered with the project were more technical in nature versus problems related to how to organize the teaching and learning activities incorporated within the actual project. Specific comments included notes about problems encountered in keeping the font style and size consistent, getting the links to work properly, anchoring the graphics in a particular place on the page, or disappearing graphics. The biggest issue noted by students was the idea of learning how to use Netscape Composer while also learning how to incorporate effective elements of lesson design with the Webquest project.

Support services

Accessing support services was another theme that emerged from analysis of the questionnaire. The three hour support session provided outside of regular class instruction and the use of the template with navigation bar were found to be helpful to the majority of students. In addition, students commented on how helpful it was to use each other as a resource in areas that were technical as well as curriculum oriented.

Previous Experience with Web Page Design

Some students included comments in the questionnaire that indicated a wish to have had previous experience with web page design before actually developing their own WebQuest. Prior to taking teacher education methods coursework, students are required to take a general technology course that covers such areas as word processing, presentation, draw/paint, database, spreadsheet, and telecommunications. The depth that these areas are explored is usually dependent on the instructor of record. For example, those instructors having expertise and experience with web page design have required the development of basic web pages. Students who did not have instructors who considered this to be important, therefore would not have this previous experience before taking the Reading Methods course.

Analysis of Final Product

Analysis of the final WebQuest projects centered on the areas of reading that were targeted such as word recognition/identification, vocabulary, and comprehension. Each project was also analyzed to determine the types of activities that were included in reference to the language arts (i.e. reading, writing, listening, speaking, viewing, and visually representing.

Reading Skill Areas

The twelve projects created by the preservice teachers incorporated a variety of activities that included an emphasis on vocabulary and comprehension skill areas. In all of the projects, the vocabulary focus related to the content areaa topic or theme of the WebQuest. For example, the project on *Landfill Overload* included attention to the science vocabulary terms landfill, reduce, reuse, recycle, and solid waste. The word study activities that were included focused on the meaning of particular words and the relationships that existed through the common theme that was being studied.

Through the process section of the WebQuest, the preservice teachers scaffolded learning activities so that the elementary students the project was designed for would be successful in completing the required comprehension elements of each WebQuest. For example, activities focusing on comprehension would build on a basic literal level of information (i.e. What is the Statue of Liberty? Where is it located?), gradually expand to a broader synthesis of information (i.e. Why is the Statue of Liberty considered a National Monument?), to finally include an evaluative component (i.e. What should be the next National Monument for the United States? Why?). As part of these activities, the preservice teachers would activate prior knowledge, guide elementary students to determine what is important in a web page from which they seek information, ask questions about what they would be reading, create visuals and other images as part of the activities, synthesize information drawn from multiple sources, and summarize the most important elements about the topic.

Language Arts Elements

The most represented elements of the language arts were reading, writing, speaking, viewing, and visually representing. Although students incorporated activities that requested students to turn around and present information to the class (i.e. speaking), there were no activities that focused on the listening component that would also be necessary for those students who are receiving the information from their peers. For example, students might be required to present the information to the rest of the class, but the audience listening to the presentation was not required to make notes or record this information as they listened to the presentation.

By far the most represented element of the language arts was writing. Activities that focused on this element included the writing of stories, persuasive essays, report writing, how-to guides, journal writing, email correspondence, and the development of books. The element of visually representing was another category of the language arts that was well represented. Elementary students who would complete these activities would be encouraged to create posters, complete charts or concept maps, develop diagram, and construct 3-D models.

Final Thoughts

The development of the WebQuest as a potential use of Internet resources required a certain level of knowledge and expertise using a web page editor software program. Preservice teachers who had less experience with such software felt that they were at more of a disadvantage than those who had previous experience in the development of basic web pages. The comments made by those students related to technical problems that were encountered. They also tended to be more easily frustrated and panic-stricken when such problems were encountered (i.e. font style, size, inserting images, linking to web pages, etc.).

Those students who were technologically proficient were much more confident during the planning and development phase of the entire project. Comments made by these students reflected a level of confidence that enabled them to concentrate on the construction of meaningful literacy events. These preservice teachers were comfortable in their ability to incorporate elements of reading and language arts to plan effective teaching and learning activities for elementary students. The overall consensus from the preservice teachers was that that they believed the WebQuest to be a worthwhile project to use when constructing literacy events with elementary students.

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Kimberly Kimbell-Lopez is an Assistant Professor in the Department of Curriculum, Instruction, and Leadership in the College of Education at Louisiana Tech University. Address: P.O. Box 3161, Ruston, LA 71272. Email: kklopez@latech.edu.

BEYOND WORD PROCESSING: INTEGRATING TECHNOLOGY IN ENGLISH 101

Dr. MaryAnn Kolloff
Curriculum and Instruction
Eastern Kentucky University
USA
maryann.kolloff@eku.edu

Dr. Kevin Rahimzaden
English Department
Eastern Kentucky University
USA
Kevin.rahimzaden@eku.edu

Dr. Barbara Hussey
English Department
Eastern Kentucky University
USA
barbara.hussey@eku.edu

Abstract: It is the intent of this paper to share the framework (e.g., pre-writing, writing workshops, peer-editing, etc.) for integrating various technologies into freshman composition, ENG 101. Review of the objectives for ENG 101 and the rationale for integrating various technologies will be discussed. Examples of applications of the technologies with emphasis on the appropriateness of the technology for the writing process (curriculum) will be addressed. Reflection by one of the professors of the effectiveness the technology tools is provided as well as barriers to successful integration of some of the technology tools.

Overview of the Preparing Tomorrow's Teachers to Use Technology (PT3) Grant Objectives

The Preparing Tomorrow's Teachers to Use Technology (PT3) implementation grant at Eastern Kentucky University is a unique, collaborative effort between the College of Education, College of Arts and Sciences, and P-12 partners with a focus on transforming the education of future teachers through the infusion of technology throughout the general education and the teacher education program. Implementing the grant is a campus-wide priority through which content areas, pedagogy, and instructional technologies are fully integrated. One of the major goals of the grant includes creating "clusters" of both Education and Arts and Sciences faculty, as well as pre- and in-service teachers, to work together to integrate content, pedagogy and technology through the redesign of technology-rich general education and educational foundations courses for future teachers.

Preparing technologically skilled pre-service teachers begins in the their freshman year during their English general education course, ENG 101. Two English professors, one Education professor, one P-12 teacher, and a sophomore student formed an English cluster. During the first year of the project, the cluster rewrote the syllabus for the course. Objectives of the university's freshman writing courses were revisited along with discussions of appropriate technology tools. Implementation of the revised syllabus occurred in the second year.

It is the purpose of this paper to share the instructional philosophy and strategies for teaching composition, and how the selection of the technologies for the course was guided by these instructional principles. A major criterion for applying technology tools in the course was to promote the learning of the writing process. A guiding question that influenced these decisions was "what can we, as professors of English, do better and differently in class as a result of using of technology?"

Instructional Philosophy and Strategies

The guiding philosophy of the PT3 English 101 composition course was based on the social constructivist model of learning. This model promotes the use of "collective knowledge and skills" within a course so that individual knowledge and skills can be supported. The focus is on building communities of learners within a failure-safe learning environment. This environment involves taking risks by sharing pieces of writing. Providing a supportive environment for taking these risks encourages learning about writing.

The instructional strategy forming the basis of the ENG 101 course was to facilitate the recurring processes in writing by monitor the planning, writing, and revision stages within the process. The English professors assumed the roles of monitors in the writing process. This role entails reflecting, coaching, and evaluating the performance of students (McNabb & Smith, 1998). As monitor, the individual professor becomes a collaborator while focusing on the written piece. At all times, the professors, of the cluster, maintained the positions of the expert and evaluator. With the professor as a collaborator, the richness of the classroom context is taken into account and a community of learners is built. The focus is on centered on implementing different classroom activities as a result of using technology resources. The teacher enhances the classroom with in-depth, and critical thinking conversations focusing on the process of writing. The teacher focuses on the metacognitive strategies for assessment allowing for the self-monitoring of progress. Assessment probes include open-ended questions, exploratory cues, and dialog. As a community of learners, mature writers share their knowledge and skill in the writing process and immature writers are provided with appropriate contextual strategies that engage them successfully in the process of writing. In class, conversations centering on writing allows mature and immature writers to revise links in their mental schema concerning the topic and delete, add or edit their paragraphs within the paper.

Objectives, Technology Selection and Application

The objectives of the English Department and The National Council for Teachers of English (NCTE) guided the rationale for selecting and applying various technologies into the course.

Academic Writing

The English department's main objective for the course is to increase the focus on academic writing. Students are required to write critical responses to short readings rather than writing for narration, description, or definition. The specific objective reads as follows. "Learn about the variety of outside sources, including print and electronic resources, available for developing and supporting one's own ideas in writing, and use of outside resources in at least one essay." (This does not mean student are required to write a formal research paper).

NCTE's objectives state that pre-service teachers "use major sources of books, periodicals, reports, videotapes, electronic and non-electronic databases to understand the relationship between reading and writing", and "examines, evaluates, and selects resources, such as print materials, video recordings, software, websites which support different viewpoints" these objectives supports the departments position on academic writing in Freshman composition courses.

With these objectives, it became evident that the course would increase its emphasis on researching and documenting information. The objectives are closely relate to the concept of information literacy; that is, locating, accessing, and citing references as well as evaluating information available from textual resources and web-sites. The technology that was the best fit with this objective was online search tools; i.e., the University's electronic databases, on-line catalog, and web-sites. The class shared articles and visual information found during the search process in order to support ideas and thoughts concerning specific topics. The concept of identifying and using keywords was emphasized.

Peer Sharing and Evaluation of Writing

A second objective set forth by the University's English Department read as follows. "Read and respond critically to materials relevant to writing, including student writing, writing intended to guide the composition process, and writing which serves as a model or stimulus for the students' own work."

The selection of technology, guided by this objective, was to employ software for courseware authoring such as Blackboard or Web-CT. The rationale for including a courseware authoring system was based on the premise that discussion forums provide equality among students and democratizes classroom discussions (Eckman, 1996). Students often feel less restrained in posting a writing piece, reading the posted writing prior to class, and in preparing comments on each other's works prior to class time. The shift is from the use of technology to preparing for classroom activities. Students come to class prepared to discuss the writing piece. It is at this point that the teachers become the monitor of the writing process.

Classroom technologies: peer sharing and evaluation of writing

Keeping in mind the objective of reading and responding critically to student writing, a classroom equipped with a Smart Board and video projector became a necessity. These technology tools became imperative in that the success of any technology implementation depends largely on class activities, which is determined by teachers. The Smart Board and video projector allowed the professors to carry out the crucial role of monitoring student writing. Within small groups, students decided which piece of writing would be used as a model for class activities.

Prewriting Activities

NCTE's objective states pre-service teachers, "use writing, visual images, and speaking for a variety of purposes and audiences" guided the selection of the visual thinking tool, Inspiration, for brainstorming activities. The software was selected for its attributes of using graphic organizers and outlines. After a demonstration of the software, students used either the graphic organizer or outline to display their schema for the topic. The selection of the graphic organizer or outline aspect was based on students' personal learning preferences. While students worked on the software, the professors were able to clarify any problems with the assignment, coach students while engaging in a performance task, and provide strategic prompts for the students. Use of keywords for concepts, ideas and thoughts and providing links among the ideas were emphasized during instruction. The "notes" feature of the software was used to embellish and elaborate upon a keyword or concept.

Collaborative Writing

Applying NCTE's objective, " produces different forms of written discourse", provided the direction for including a written piece created collaboratively among small groups of students. Technology tools available in the courseware authoring software appropriate for implementing this assignment included discussion forums and use of e-mail. Individuals were responsible for posting single paragraphs to the small group discussion forums based on one thesis statement. The group had to agree on a thesis statement, and, then each individual posted a separate paragraph supporting the thesis. The group was responsible for making organizational decisions concerning the collaborative paper and then suggesting transition statements. Small groups used e-for this purpose. One individual was responsible for preparing the final piece, and then e-mailing the paper to the members and professor.

Use of Visual Images to Support Writing

Two other NCTE objectives state that students "will demonstrate the influence of language and visual images on thinking and writing", and " recognize the influence of media on culture and on people's actions and communication". These objectives suggested that the analysis of visual images in print materials was appropriate for ENG 101. Throughout the semester students analyzed visual and text images as they wrote their pieces of writing. On the final paper students were required to support their thesis on youth culture and denim by incorporating one or more appropriate visual images.

Finally, University's English department objective that students "engage in inquiry – such as class discussion, critical reading, speaking with others, observing, and using technology – appropriate for writing tasks", and NCTE's objectives that the student "displays an understanding of the role of technology in communication" and "demonstrates how reading, writing, speaking, listening, viewing, and thinking are interrelated" provided the direction for the final project of the course. Students were to present a Power Point Presentation based on their thesis paper concerning youth culture and denim. This medium was selected based on its attributes of changing the manner in which writing was directed, and its communication purposes. Students were required to use effective presentation guidelines that included using keywords, phrases, concepts in bulleted format so that the ideas could be elaborated and embellished during their presentation.

Reflection: The Process of Integrating the Technology

I, Kevin Rahimzaden, began the first semester of PT3 course implementation as perhaps the English service unit's most stubborn skeptic. While much of my skepticism had to do with my own anxieties over teaching and using technology in the classroom, part was also due to the fact that during the year-long planning process for the course, I found it difficult to see how, exactly, the various technologies we included in the course benefited either the learning or teaching process in Freshman Composition. I feared, in fact, the worst: that students would walk away from the semester having learned more about the mechanics of posting to an electronic discussion board than they would about how to construct a careful piece of college-level rhetoric.

Still, some advantages of our PT3 design seemed clear. It was easy to see, for instance, that the course's BlackBoard site would allow students to distribute drafts and share revision suggestions with unusual ease. This aspect of the course would be especially useful at Eastern Kentucky University, where we have a large number of commuting students who find it difficult to meet with their classmates in the evenings or on weekends. The BlackBoard site also seemed well suited to posting updated ancillary materials such as the course schedule and assignment questions so that students could have easy access to them. Powerpoint presentations have become so pervasive in academia and business that students would be well served learning how to do them. Email and the various communication functions of BlackBoard would clearly facilitate communication between myself and my students. Library databases would be an essential component of learning how to conduct research. Although I could not see the advantage of Inspiration, an idea-organizing software, over, say, a blank sheet of paper and a sharp pencil, I was willing to give it the benefit of the doubt, if only because my cluster colleague from the College of Education, MaryAnn Kolloff, was so enthusiastic about this software's possibilities. Nevertheless, in the end it remained unclear to me how any of these technologies would have a real impact on the writing *process*, or, for that matter, on our secondary goal of pre-service teacher training.

Now that our inaugural semester has ended, my central fear, that students would be more absorbed in the technological aspects of the course than they would in learning how to write, has proved goundless. My freshmen were on the whole unfazed by the technologies we used. While I expected such a reaction from those who arrived at the beginning of the semester already comfortable with email and discussion boards and the Internet, I was surprised that even those students who had to learn along the way didn't demonstrate much by way of interest, either positive or negative, even in something as flashy as Powerpoint. Nor did these students seem especially anxious about their initial lack of technological ability, despite the fact that they were so obviously behind the slight majority of students in this area. They simply learned what I asked them to learn as a matter of course, because their instructor expected this of them.

Whatever technological enthusiasm the PT3 aspect of the course generated among my students was focused on the Inspiration software. Despite my thoroughgoing skepticism while we were planning the course, this electronic brainstorming tool ended up a clear improvement over the handwritten charts and outlines I usually demand, at least if the student evaluations turned in at the end of the semester are any guide. Class member after class member indicated that Inspiration really did help them generate and sort out their preliminary essay ideas. And while I cannot say that I saw any noticeable leap in the quality of student writing--or quantity for that matter, for text generation remained an oddly stubborn problem all semester long--I will note one important thing: our hour-long Inspiration sessions forced the class to analyze assignments carefully. Composition students typically "under-read" their assignment questions, especially as they brainstorm and create early drafts. Because one cannot get anything out of Inspiration without first putting quite a bit in, students were quick to learn that they must be speedy and systematic in "figuring out" the what the assignment requires if they are to have a document to turn in as part of their grade by the end of the period. For this reason, Inspiration seems to create a fairly good conceptual and organizational foundation for subsequent drafts. In the past, in-class brainstorming sessions have mostly functioned as an excuse for students to shut down intellectually for an hour or so; Inspiration, it seems to me, prevents this from occurring, and so may mark an advance in the composition learning process.

Nevertheless, despite a pleasant surprise here and a disappointment there (the classroom's Smartboard, for instance, was not at all useful) I think that my central assumption going into the semester proved largely correct: Though the PT3 technologies we used smoothed out the operation of the course a bit, especially by way of student-to-student and instructor-to-student communication, and by way of better idea-generating sessions through the use of Inspiration, they did not have a meaningful impact on teaching and learning processes in the composition classroom.

Conclusion

When evaluating the effectiveness of the various technologies in the freshmen composition course, based upon the observations and reflections of the course professors, it is clear that students' attitudes towards the technologies were favorable. Also, the professors indicated that using a visual thinking tool such as Inspiration provided many benefits to using class time effectively in the writing process. Other implementations of technology provided students with access to course information and file sharing. On the other hand, Dr. Rahimzaden's initial assumption and resulting conclusion that the technologies "did not have a meaningful impact on teaching and learning process" needs further investigation. Other variables may influence the students' performance in the area of text generation. These variables include students' previous writing abilities, perceiving assignments as authentic and meaningful, desire to become a better writers, willingness to take risks in sharing writing during discussion of written work, and investigating professors' monitoring strategies during class time. These variables guide the basic question that continues to direct the PT3 clusters' discussions: "What can we, as professors of English, do better and differently in class as a result of using the technology?"

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Integrating Technology into Reading Instruction: A New Course Development and Implementation

Leping Liu, Ph.D.
Assistant Professor of Instructional Technology
Towson University, U.S.A.
Email: lliu@towson.edu

Abstract: This paper will present the development and implementation of a new course that prepares reading-major students to use technology to enhance reading instruction. Emphasis is on integrating current computer technologies and software applications into reading curriculum. Course content includes design of reading segments on phonemic awareness, vocabulary development, comprehension, and writing, using presentation, graphics, and multimedia authoring software. Issues, problems we had when developing and teaching this course, the progresses students made, the effects of this course will be discussed.

Introduction

Through our experiences of technology integration projects, we have come to realize that an important part of effectively integrating information technology into classroom is to systematically train the pre-service and in-service teachers in a regular fashion, equipping them with the necessary theoretical foundation and technical skills of the integration. The idea is that we need to have certain courses to prepare them for this. In our general education programs, we are offering certain computer literacy teaching basic computing skills; but very few of the course contents systematically deal with theory or technique of technology integration. Although the courses in the instructional technology (ISTC) programs are well developed to integrate technology into learning and teaching from different perspectives, they are mostly for our ISTC major students, and inappropriate for other students who do not have a background of using technology for various reasons: for example, (1) to take one ISTC course, they may need several prerequisites, (2) the course could not be counted into their original program, or (3) even though they finally get into the course, it may not focus on the particular subject areas they are/will be teaching. After all, it is quite clear to us that courses of technology integration focusing on certain areas might be a good solution. This paper will introduce the design and implementation of such a course—Integration Technology into Reading Instruction.

Purposes of the Course

Overall, this course was designed to help teachers develop technology-based reading instruction. Emphasis was on integrating current computer technologies and software applications into reading curriculum design. Course content included designing reading segments on phonemic awareness, vocabulary development, comprehension, and writing, using presentation, graphics, and multimedia authoring software. It would prepare students to use technology as a tool to enrich reading instruction at all levels.

Specifically, after taking this course, students would be able to use technology as an assisted tool to develop reading instruction on related topics. They would: (1) Develop understanding of various technologies, including basic computing, presentation software, and authoring tools. (2) Use Web resources in reading instruction design, including information search, evaluation, and documentation. (3) Evaluate and use selected reading software packages. (4) Be familiar with the general principles and processes of system design/courseware design. (5) Design appropriate reading instruction with the above mentioned technologies and software on four reading topics (Phonemic Awareness, Vocabulary Development, Comprehension, and Writing).

The Structure of the Course

Course was structured in three dimensions: (1) Lecture, including theories, concepts, instructional designs, and demonstration of the designs, (2) Cooperative learning, including class/group discussion, group activities and team projects, (3) Lab work, including a series of lab modules from which students learned the basic computing skills, the use and teach of educational software, and multimedia courseware designs.

Course Work

The course work focused on five major projects that were paralleled through the entire semester. The first project was a research project in which students were supposed to search the current trends and issues in the area of using technology in reading instruction, develop research interests on certain topic, and write a research paper. The research questions formulated from this research project should relate to their integration design projects. The second project, parallel with the first one, was an information search project, from which students would learn skills of Web search and online database search, develop information evaluation criteria to determine the quality of the information that they could use for their research and the courseware. An information resource Web site also was developed on the related topics as a whole group project. The third one was to develop a technology portfolio including 12 pieces of basic computing work with the concentration on how they could be used to enhance learning and teaching. The portfolio consisted of the work on word processing (including the uses of table and mail merge), digital graphing, communication skills, spreadsheet and database applications, multimedia presentation, and simple Web page design. The portfolio should have an electronic copy and a hard copy, and On-line copy as option. In the fourth project, students were supposed to develop four short lessons using different reading software. They need to (1) determine the topic of learning or teaching; (2) select and evaluate the software; (3) develop a lesson plan to arrange the procedures of the lesson, when and how to use the software, task, activities, or materials necessary for the lesson, and evaluation methods; and (4) present the lessons to the class and be evaluated by the class. The last project was to design a unit of multimedia courseware using authoring tools on selected topics. Students were supposed to go through all the processes of courseware development form the stage of planning, through analyzing, designing, implementing, evaluating, and revising. The authoring tool used for the reading major students was HyperStudio. Overall, the five projects, together, developed a framework of integrating technology into reading instruction.

Teaching the Course

The author has taught this course twice and found out: (1) we should employ different instructional strategies to teach those majoring in reading than the instructional technology majors. (2) The component of research in this technology-reading course is especially important for students to understand "integration of technology". (3) Coursework such as computer-based instruction program design that focuses on the reading instruction has great potential to be used in classrooms to enhance reading achievement. Some students had already used their self-developed program to their classrooms and obtained very good responses. (4) The assessment strategies and instrument used in this course differ from that used in instructional technology courses, which makes a useful input into another course (Assessment in Instructional Technology). (5) Student-products from this course, such as on-line portfolio, multimedia courseware, and Web resources, can be used to show their technology strength when they go out for a teaching-job interview. Some of the students had already found good positions or been promoted in schools because of their strength of using technology.

Some issues that need to be considered when teaching this course are: (1) the students need extra lab-time to work on their project, and some individuals even need extra help. Therefore, the schedule of computer lab and the availability of the instructor are important issues. (2) The access to necessary educational software is another issue. In this course, students need to learn, evaluate a variety of reading software, and use the software to design a series of short lessons. We only have limited copies of the software and they were installed in our classroom, which was not always available because of all other course schedules. (3). The instructor needs to prepare the lab instruction materials in the way that is appropriate for computer-beginners. The solutions and how everything worked out will be presented on site (because of the length limitation of a short paper).

Preparing Teachers to Use Technology, MI Theory and TESOL Standards

Ines Marquez-Chisholm, Arizona State University West, US
Carol Beckett, Arizona State University West, US

With the increasing cultural and linguistic diversity in classrooms most teachers have or will have students who are in need of English language skill development. In addition to the cultural and linguistic diversity in today's classrooms, teachers must also address the diversity of cognitive strengths that students bring to the learning environment.

In order to ensure that students receive optimal educational opportunities, teacher educators must prepare preservice and inservice teachers with strategies that will accommodate these cultural, linguistic, and cognitive differences. Teacher educators can provide professional development opportunities for teachers to experience learning activities that support the diverse needs of their students. Merging Multiple Intelligences (MI) Theory with language objectives found in the *ESL Standards for Pre-K-12 Students* (TESOL, 1997) provides teachers with instructional strategies that accommodate a range of cultural, linguistic, and cognitive skills. Applying these strategies through the use of technology provides equitable educational opportunities for all students while developing their technology competency.

This interactive session offers participants the opportunity to experience a hands-on computer integrated learning activity that combines MI Theory and TESOL standards.

The activity is a multi-disciplinary lesson including language arts, social studies, and mathematics. The activity provides for verbal/linguistic, logical mathematical, visual/spatial, and intrapersonal intelligences. TESOL standards addressed are Goal 1, Standard 3, "To use English to communicate in social settings: Students will use learning strategies to extend their communicative competence (p.39)." The activity includes gathering information on the Internet, cut and pasting graphics, word processing, and presentation software. Handouts will include information for downloading the TESOL standards from web, on-line references for MI Theory, and additional adaptations for the classroom.

The Sky IS Falling:
Language Arts Methods, Technology, and a Cleveland School Facilities Crisis

Kristien Marquez-Zenkov, PhD
Cleveland State University
United States
k.zenkov@csuohio.edu

James Harmon, MEd
Lincoln-West High School
United States
j.harmon@prometheus.ed.csuohio.edu

Abstract: This paper describes a literacy education professor's and a middle school technology specialist's pedagogical responses to a Cleveland school facilities crisis. The decrepit conditions of Cleveland's schools offered an opportunity to engage language arts teacher candidates in a authentic, multi-disciplinary, performance-based research, writing, design, and presentation language arts methods curricula that integrated tools of technology. The authors suggest implications for language arts, technology, and democratic education.

Introduction

On October 6, 2000, the roof of the gym at Cleveland's East High School collapsed onto the basketball courts below, injuring no students or staff, but sending a loud message to the Cleveland Municipal School District and the city of Cleveland. In the ensuing months, the then-Mayor of Cleveland, Michael White, and the Mayor-appointed Chief Executive Officer (CEO) of the District, Barbara Byrd-Bennett, formed a temporary citizen's council (the Facilities Assessment Commission) which appealed for broad public input at several forums held around the city. These roundtables offered a chance for residents to vent their frustrations, express their fears, and contribute their ideas about the state—both physical and academic—of the city's schools.

The city and its district clearly no longer had a choice about addressing the facility needs of its schools: significant investments would need to be made immediately, merely for the physical safety of the students and staff. While the Commission was necessarily concerned with the state of the physical plant of each of the District's 122 buildings, the larger symbolic significance of the conditions of a district's schools was then and still remains an underlying issue. What are the implications of such a decrepit physical state for the state of the academics and the morale of students and teachers? Can these conditions be indicators of the expectations that a community has for its youth? Might the physical and aesthetic environment of a school building serve as a starting point for a language arts curriculum that is highly relevant, project-oriented, and appropriately technology-infused?

These were the questions that this article's authors—a literacy education professor and an educational technology specialist—asked as they planned the teacher education curricula on which they would collaborate during the 2000-2001 academic year. This article describes these educators' pedagogical responses to this facilities crisis and details a language arts methods curricula that is uniquely multi-disciplinary, technology rich and performance-based, energized by an immediate and authentic citizen concern, but still honors the traditional writing, reading, and presentation components of a language arts methods course. This course provided authentic opportunities for the teacher educator, technology specialist, and future classroom teachers to utilize tools of technology that are not usually considered relevant to or viable in a language arts setting. These tools provided unique, tangible, cross-curricular strategies for making the "recreation of our classrooms" the focus of a language arts experiences.

Perspectives and standards

This language arts methods course began with a collective role-playing activity that is part of the vernacular of "process drama" (O'Neill, 1995), through which all teacher candidates engaged with numerous constituent perspectives. Who were the members of the city district's hastily called Facilities Assessment Commission (FAC)? The commission's members and the attendees at the various public forums included a broad cross-section of the Cleveland's schools constituents—business leaders, foundation representatives, grandparents, community service agency workers, pastors, union activists, teachers, students, parents, engineers, artists, etc. The language arts teacher candidates adopted these and myriad other points of view, using these perspectives to consider a range of standards by which to judge language arts curricula, their own teaching practices, their achievement in our course, and the design and function of schools in general.

Using the process drama method of role-playing developed by Dorothy Heathcote (Heathcote and Bolton, 1995), these teacher candidates frequently took on these constituent perspectives collectively; rather than each student adopting an individual point-of-view, the entire class considered the ongoing school building events from a single perspective. At the beginning of most of the 15 evening class sessions the teacher candidates were provided a news article, Facilities Assessment Commission draft report, photograph of a current Cleveland school building, or another artifact to quickly and concretely focus their attention and provide an impetus for the selection of a constituent perspective. These artifacts became the lenses through which students imagined and described the events that resulted in these reports, etc.

In addition to the important process of allowing students to understand the range of perspectives on a school, the primary use of this early role-playing was in the development of a class set of standards and objectives for all classrooms. For first course writing assignment students adopted these roles in order to conduct and transcribe interviews with friends and family about their experiences in schools, translating these into their own "Standards Recounts" about what the expectations of school had been over previous generations. For this initial assignment, it was important that the class consider the broadest definition of "standards," as the instructors hoped to build a bank of potential expectations and outcomes for classrooms and schools before narrowing the class focus to a set of standards to which the students and instructors could commit professionally.

These standards served several purposes throughout the course. First, they were used as set of guidelines that established some ground rules for engagement amongst the students and instructors of this course. Secondly, they were meant to provide these future teachers with an example of a standard-setting process that they might use in their future classrooms. Thirdly, they required these teacher candidates to research and discuss the proliferating "standards" (especially technology standards, such as the NETS for teachers touted by the International Society for Technology in Education [ISTE]) with which K-12 teachers are supposed to be conversant and to which they are being held accountable. Finally, these standards were used as a set of outcomes against which students in this course assessed themselves and by which they were assessed by the university instructor through a semester-long portfolio development project.

Students started this standard-setting process by looking at the College of Education model that drives the curriculum in the teacher education programs at Cleveland State University. They then described the lists of classroom rules and expectations that they had encountered in their various field experiences, practica, and student teaching, as well as the rules and guidelines they might have for students in their future classrooms. To these lists they added any expectations that the students believed community constituents might have for the schools, based on the role-playing activities in which they'd engaged. They shared this list of more than 30 potential guidelines with each other via web-based email accounts.

With a bank of almost three dozen potential standards for language arts classrooms, one might expect that the instructors would have wanted to begin the winnowing process, paring this almost overwhelming list down to a manageable number. While they felt a strong pedagogical urge to do this, they decided instead to have the students sit with and even add to this catalog through the use of some visual explorations. Rather than begin a decision-making process, students built on this list of standards through the visual brainstorming by completing a "Photo Essay" assignment where they shot pictures (both 35mm and digital) of the city schools in which they were currently completing a practica.

As well, the class visited the Cleveland Public Library's digital photo archives to study the history of school architecture in the city, and toured the recently renovated seventy year old middle school where the technology specialist worked to document the aesthetic and design features of the building and classrooms. Students again used both digital and 35 mm cameras to document the features of the middle school, while for their own photo essays students shot color 35 mm film. At the photo archives they used an optical scanner to view and print photos of school and community buildings stored off-site, and compared these archived photos with their up-to-date images of the same school structures.

These analog and digital photographs provided the final, compelling, design-based (Taylor, Vlastos, and Marshall, 1991) component of this standards generation and discussion process. While students' previous school experiences and the various lists of standards from professional organizations afforded a substantial overview of relevant curricular and community guidelines, the students' use of visual tools with which they had less experience provided a unique perspective on how these standards are fleshed out in the very designs and structures of our classrooms (Uline, 1997). Consequently, their ideas for the standards that should guide their teaching expanded to include guidelines that considered these environmental elements. To support their understanding of the connection between the visual evidence to which they were being exposed and the standards for schools and curricula that this evidence represented, the instructors provided them with a T-chart that allowed them to graph these connections.

When the language arts methods class visited and toured the technology specialist's school, they were able to use one of the school's computer labs to submit these broader perspectives on standards to a discussion board on the course Website. They could then view each others' ideas immediately and begin to consider the full range of these ideas as they prepared to select their final list of course standards or outcomes. Additionally, because of this asynchronous environment, students could engage in each other's ideas in settings outside of class, where the traditional pressures of classroom discussion did not factor. It is the opinion of the authors that the discussion board format allowed students to carefully formulate new threads and operate at a level higher than what was commonly experienced in class.

Over the course of the semester the class used the final class list of standards to support and assess all course projects. The roles considered in building this final list of standards provided the class with the rich perspectives that educators should regard when they construct their language arts curricula. While technology is explicitly mentioned in one of the language arts curricula standards, it is the authors' opinion that technology is implicit in all of the standards. While this process required class time during each of the first four weeks of the course, it allowed for a deep, multi-disciplinary, and authentic consideration of the idea of teaching standards and the development of a set of standards to which each student was personally and professionally committed. It provided the students with numerous opportunities for discussion, debate, reading, and writing in both traditional and electronic modes—the basic skills of language arts—and required that they engage in the very activities they might use in their own middle grades classrooms in the future.

As well, this standards development process relied upon an integration of technology that supported and extended the reading, writing, brainstorming, and professional discussion emphases of this process. Because students were asked to use these tools in order to generate ideas and to build a store of potential classroom guidelines, their reluctance to use these new tools was mediated. The instructors' modeling of integration also demonstrated the importance of bringing technology in when it was appropriate and had an explicit impact on the content off students' learning. Finally, and perhaps too obviously, this process placed the question of classroom design and aesthetics at the center of any curricular, pedagogical, technological or behavioral consideration. It communicated to these future teachers that the design factors are interwoven with—though most often silent in—the everyday choices of language arts educators.

Conclusion

One of the realities of teaching and teacher education work is that educators are typically so bombarded with discrete tasks that they rarely have the chance to gain a broader perspective on these tasks. What is the relationship of these tasks to each other? How do they fit with the field in which educators are working? How do they relate to the overarching curriculum concepts a particular class is supposed to address? Often, educators at all levels plan for a class, devise most of a semester's outline for a course, and then delve into these daily and weekly responsibilities, only to surface for air at the end of a semester. Or a career.

The focus of this integration of design-based projects and technology into a language arts methods curriculum was a deliberate attempt to challenge this myopic tendency. Teacher candidates often hear about the importance of their educational philosophies, only to have any time or capacity for contemplating the larger purposes of their professional work squeezed out of them in the first years of K-12 public school experience. This essay suggests that if our society wants educators to continue to contemplate the grander implications of their teaching practices, then it must provide them concrete—as in the bricks and mortar of our school buildings—ways of exploring the relationship between their daily lessons and school's broader purposes.

This essay opened with questions about the effects of a school's decrepit physical condition on the state of the academics and the morale of its students and teachers, and about the extent to which these conditions might be indicators of the expectations that a community has for its youth. The answer is to these questions is obvious and requires no elaborate research study to prove: students and educators will default to what they see; their expectations and ideals are rooted in what they experience daily. If kids learn in crumbling, forgotten schools, the first lesson they will learn is that the value of their educational endeavor is an afterthought in the minds of their community.

Much like students in schools, teacher candidates will resort to what they see and experience in their model instructors. In this case, they witnessed instructors who engaged them with not only a technologically enriched, standards-based curriculum, but also with sense of "eventness" and social justice. As the evidence of this course demonstrates, the physical and aesthetic environment of a school building can serve as a starting point for a language arts curriculum that is highly relevant, project-oriented, and technology- infused. This article suggests explicit strategies and projects that classroom teachers, teacher educators, and curriculum specialists and theorists might use to make the study and design of educational environments cross-curricular, democratic education projects. This project has the potential to alter significantly current language arts teacher education and language arts curricula, as well as history curricula and the state of our city schools nationwide. One unique implication of this project was its use of "parallel practices": in order for teachers to understand the importance of their language arts lessons, they must engage in and be legitimately affected by the projects they require of their students. Design-based activities lend themselves to this sort of "practice what you preach" ideal.

Of course, a teacher or teacher educator must be very comfortable or proficient with her or his content, before using tools of design or technology with this content. But the content of language arts—and other subject areas, as well—can be supported and extended by these tools of design and technology. All of these activities began with "doing" rather than "learning": students engaged in these projects largely without recognizing that they were simultaneously engaged in learning about teaching.

The authors suggest that an explicit focus on the authentic project of considering and altering the design and aesthetics of educational environments might both enliven students' language arts education and provide immediate opportunities for democratic engagement. The public artists who are language arts and English teachers might help the rest of us—artists of the public, all—find our way as we engage with our school lessons, our immediate communities, and our broadest political contexts. They might begin by calling upon their students to recreate the very classrooms in which they are learning.

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Mapping the Boundaries of Literacy and Literacy Education in Cyberspace: Four Preliminary Markers

Barbara O'Byrne
Marshall University Graduate College
Bobyrne@marshall.edu

Noel Bowling
Marshall University Graduate College
Nbowling@marshall.edu

Patrick Iannone
Marshall University Graduate College
Piannone@marshall.edu

Tom Caron
Marshall University Graduate College
Tcaron@marshall.edu

Abstract: This paper identifies and analyzes four markers significant in assessing the impact of Web-based delivery on the teaching and learning of literacy. The paper describes how Web-based instruction is questioning assumptions about course delivery models and is re-casting boundaries between human interaction and texts. It adds to the discourse on the ways in which Web-based instruction supports critical thinking and reflective writing, as well as learner engagement.

Introduction

Three years ago, the Reading Education program at Marshall University Graduate College experimented with Web-based delivery as a means of serving the needs of students in our distance education program. We now find ourselves in the midst of a sea change. What began as a venture to cut down on traveling time for students and faculty triggered an interrogation of course delivery models, and of the influence of technology on conceptions of literacy and of literacy education. Four markers have emerged as significant in this re-charting of the terrain of literacy and of literacy education in the wake of cyberspace:

1. A need to marry web-based delivery with a face-to-face delivery model
2. The shifting relationships of literacy processes in Web-based teaching and learning
3. Web-based learning presents unique opportunities for student engagement
4. Web-based learning communities can actualize the reading-writing connection

Marrying web-based delivery with a face-to-face delivery model

Mission and structure propel the change to Web-based instruction

Prior to the introduction of Web-based course delivery, the Reading Education program enjoyed a positive reputation for being both rigorous and student-friendly. Why mess with something that was working? As program director, this was my initial take on Web-CT. Although our program was working well, the out-reach mission was limited to two sites in southern West Virginia. Forays beyond these sites resulted in small classes, and occasionally interrupted programs. The program was restricted to fewer than 75 students per semester, some of whom dropped-out completely or meandered through their course of study in ways that threatened program cohesiveness. What was needed was a means to extend the program to underserved areas of the state. The three courses that were the hardest to schedule, due to being housed in other programs, were the first revised into Web-CT deliveries. This, along the with recruitment of students into regional cohorts, allowed the Reading Education Program to expand to 11 sites and serve from 200-300 students each term. During the past year, we have averaged over 400 students per term.

Scheduling considerations

Before Web-CT, my major scheduling concern was to make sure the program faculty had sufficient number of students in their courses and that a balance of students per course was reached. This has changed. My concern now is to hold down the numbers to where they are manageable. We have found that Web-CT is much more labor intensive than first thought. Students expect and need quick feedback regarding their assignments and inquiries. This means that the instructors craft hundreds of responses during the semester, in addition to grading assignments. Through trial and error, we have learned that a class that exceeds 20 students will need additional instructional support.

Marrying Web-based delivery with face-to face-delivery

My first reaction to Web-CT was that it was a complex copy of the instructional modules that were attempted in the mid-to-late '70's. After some disappointing experiences, I abandoned their use. Module responses were based upon the analysis of program defined information sources such as a textbook and journal articles. Collaboration supporting the student's analysis was sparse, even from the instructor. It was expected of the student to form answers to several questions related to the readings. In comparison, Web-CT courses both address 'propositional knowledge' (knowing what) and 'procedural knowledge' (knowing how). Web-CT can stretch learning beyond producing a final product by enabling the learner to access feedback at numerous points in the learning experience. The feedback may come through collaboration, coaching, and questioning, and it can come from the instructor, network of classmates, Internet resources, and, most importantly, reflection. Although further analysis and review are underway in regards to the quality of all Web-CT course delivery, our four field-based reading courses are not being considered at this time for Web-CT delivery. Careful instructor supervision is required for two of the courses (Polanyi, 1958) and instructional resources that depict student-teacher interactions are required for the other two. Web-CT technology will be more useful in these courses once a more comprehensive video clip library is formed, but it will likely be used in conjunction with individual, group, and whole class face-to-face delivery formats.

Considering the shifting relationships of literacy processes in relation to Web-based teaching and learning experiences

Web-based courses share this much in common with traditionally delivered courses. Students need to know what to read, what to do with the readings, and how to proceed with the task. New electronic forms of reading and writing (e.g., e-mail), however, "point to fundamental changes in the way we communicate and disseminate information, the way we approach the task of reading and writing, and the way we think about helping people become literate"(Reinking, 1995, p., 17). A unique challenge faced by those who teach Web-based courses, then, relates to supporting students' efforts to use new electronic forms of reading and writing to learn. The challenge: Instructors must reconsider how literacy process such as reading and writing should be used to help students relate information from course learning materials (e.g., readings) to course learning experiences (i.e., assignments) when working within Web-based learning contexts.

Recasting the boundaries between human interaction and written text

Historically, within traditional delivery contexts (e.g., the classroom), teachers and students have relied primarily on speaking and listening to facilitate human interaction, while the reading of written text has been used to facilitate interpretation and reflection (Bruner, 1972). Students often rely on the processes of speaking and listening to understand the instructor's expectations in relation to course assignments. For example, students may use verbal illustrations provided by the instructor or ask questions to clarify their understandings in relation to assignment criteria. In contrast, students often use the process of reading to comprehend and interpret relevant ideas presented in the readings, using the text later as a reference point for reflecting upon connections to course assignments.

When a Web-based delivery system is used, the traditional/historical boundaries between human interaction and written texts are recast. Through electronic environments such bulletin boards, chat rooms, listservs, and e-mail, "human interaction now takes place in a text -based form" (Warschauer, 1999), reducing student reliance upon the processes of speaking and listening to understand instructor expectations. In addition, the use of Web-based documents, hypertext links and multimedia effects (e.g., graphic images, sound, and streaming video) changes how students approach the reading process. The reading process becomes less fixed and linear (Reinking, 1995), and more extensive (Birkerts, 1994) in nature, as students use hypertext links and use multimedia effects to comprehend and interpret course learning materials.

The instructor's role in defining processes and procedures

While it is clear that the nature and emphasis on literacy processes that contribute to student learning shifts within Web-based contexts, it is less clear how those who design and deliver instruction through Web-based courses should use this information to help students learn. One alternative that considers the shifting relationships and nature of these literacy processes with respect to teaching and learning emphasizes the use of process-based procedures and criteria. Initially, Web-based instructors should provide students with several sources of information to consider beyond the course syllabus in relation to course assignments. A description of each assignment should be provided, specifying what the student should do to complete the assignment successfully. Web-based instructors should also specify criteria for each assignment, suggesting the cognitive acts students should engage in to demonstrate their understanding of course content (e.g., summarizing information from course reading materials and/or critically evaluating information from course reading materials). The assignment criteria serve as a means of communicating the benchmarks or goals that the student should achieve. In addition, procedures for completing each of the assignments should be specified. These procedures will help students understand how to achieve the criteria for each assignment. Together, these sources of information will help students grasp how the process of learning information from course materials intersects with the process of completing course learning experiences.

Weaving a web for learning: student engagement

The old call for "time on task" has been with us for decades as one of the few measures that relate closely to real learning. Yet too often classroom attention to this can lead to superficial and unimportant learning. Our attempts to identify "competencies" such as the IRA standards helps somewhat as we develop educational environments and activities based on targeted learning goals. Still this too can result in piecemeal and isolated skill-based learning which is too narrow and limited to support the development of thoughtful and reflective literacy professionals prepared to make important decisions about students, classrooms, and reading programs. How can we create the student engagement necessary to support the learning needed (Schön 1983)? Mindful of this need, our reading program has experimented with Web-based delivery of courses. As we develop Web-CT delivery, we gain greater opportunities for some forms of student engagement in meaningful learning as we also lose other opportunities.

Gains are represented by new and extended opportunities for students to interact. Through reading, writing, and thinking in email exchanges and bulletin board sharing students find themselves interacting more than they did in traditional classroom settings. Through instructor guidance and feedback these forms of engagement are directed towards meaningful and important learning experiences. The necessity for writing to replace "classroom discussion" in Web-CT courses, for example, leads naturally to a greater opportunity for students to engage in writing activities. Although our reading students sometimes balk at a writing requirement, over time they come to recognize the merits of this added focus on writing and thinking. These benefits seem to arise from needs that are inherent in Web-CT's format, needs that lead naturally to greater place for writing, and the cognitive demands this entails, as well as extensive exchanges between student and teacher.

In contrast, the reduction of "face to face meetings" in Web-CT courses leads to the loss of some important serendipitous opportunities for learning. Many forms of demonstrations and classroom engagements cannot be easily duplicated in a Web-CT learning environment. What kinds of experiential learning from these interactions are lost by web delivery? Can optimizing time during a small percentage of "live" meetings replace this loss, or are we faced with changing how we represent learning and learning goals for our students in the future as we move more substantially to web delivery? These issues need addressing.

Actualizing the reading-writing connection in Web-based learning communities

Research on reading and writing has confirmed that they follow parallel and interconnected paths (Brozo & Simpson, 1995) and, that their regular integration sharpens participants' awareness of the social and communicative nature of literacy (Shanahan, 1990). Practical constraints often lead to a separation of the two in face-to-face classes in which the instructor's primary role is to deliver content. Students often report reading without comprehending texts or neglecting regular, weekly reading. Many writing assignments are used to show learning rather than "to discover or create new knowledge" (Foote, p. 211, 1999). The rethinking of literacy processes, essential in Web-based delivery, provides an opportunity to integrate reading and writing in ways that extend the literacy development of graduate students.

Moving reading and writing to the center of the course

The bulletin board is an asynchronous, interactive communication system that allows course participants to respond to postings of one another. When used in conjunction with carefully crafted learning activities, it can promote student engagement with core readings. Journal activities linked to the bulletin board were central to the conception of CIRG 621 Issues and Problems in Reading Education, a Web-based Reading course at Marshall University Graduate College. Participants composed weekly journals that related to central issues in weekly readings and responded to the journals of other participants. Completion of eleven sets of journal activities per semester has been over 99 % throughout the six sessions of the course. Participants reported spending an average of 1.5 hours on the reading, 1 hour composing the journal, and 30 minutes responding to the journals of other participants. When provided with a viable structure, participants connected reading and writing and quickly sharpened critical reading skills. A preliminary analysis of the journals and responses by an outside observer confirmed that journals became more rigorous, more grounded in the text, and more integrated with professional experience. Bulletin board discussions encouraged active learners who read less on 'automatic pilot' (El-Hindi, 1997).

Moving participants to the center of knowledge-making: the on-line learning community

A unique feature of the journaling activity is that, in essence, participants collaborated in the task of making meaning with weekly readings. Unlike the discourse of traditional classes dominated by the voices of a few, the discourse of the bulletin board identified the voice of every participant. Over time, the bulletin board discussions established a 'learning community' whose goal was to construct meaning with the weekly readings (Wells & Wells-Chang, 1992). The responses of other participants heightened awareness of personal learning processes (El-Hindi, 1997). Instead of private responses journals written on 'automatic pilot' that often surface in traditional classes, the bulletin board postings reflected the positive influence of being responsible for communicating one's ideas to others and for responding to the ideas of course participants.

An independent observer assigned to read the journals noticed a pattern of changes in the bulletin board postings. Journals became longer, more specifically grounded in the ideas of the weekly readings, and more critically reflective. They referred to specific ideas and insights of participants; they drew heavily from personal, professional experience to construct meaning from texts and to respond to the ideas of other participants; they constructed action plans; they 'questioned ideas' (El Hindi & Leu, 1998). The bulletin board postings validated the expertise of the community members as literacy specialists whose identity had shifted from seekers of knowledge to makers of knowledge.

De-centering the instructor

The bulletin board activities in CIRG 621 that encouraged participants to integrate reading, writing, and communicating pointed out a fundamental fact of web-based course geometry. Student tasks and interactions move to the center of the course. Instructor tasks and interactions operate more behind the scenes. Web-based instruction makes the instructor responsible for creating the on-line learning environment and this entails careful alignment of anticipated outcomes and learning experiences.

Conclusions

Web-based instruction recasts the boundaries between human interaction and written texts, and this in turn, establishes new roles and challenges for instructors of Web-based courses. Web-based delivery makes possible the integration of reading and writing activities in a social context that is advocated by current literacy research. However, the positive engagement of students in reading and writing activities cannot substitute for learning that is better achieved in face-to-face settings. The communication tools of cyberspace and the simulation possibilities of virtual reality cannot replicate the all of the ways of knowing involved in becoming a literacy specialist. Rather than choosing between Web-based and face-to-face delivery models, instructors may operate with blended class formats that respect the domains of knowledge that are balanced differently in each course. This balance will influence the manner and degree to which web-based instruction can be integrated with face-to-face delivery. It is our hope that these four markers will serve as lightships in charting the contours of literacy and literacy education in the labile medium of cyberspace.

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Using Technology to Address Demographic Change and to Integrate Meaningful Assessment in a Writing Program.

Rosemary K. O'Donoghue, Director, Writing and Reading Program,
Western New England College, United States, rodonogh@wnec.edu

Abstract By using technology to teach the basic concepts of composition instruction, and by utilizing technology to produce assessment requirements, a college or school system can effect change in a writing program without traumatizing students, faculty, or administrators.

Today, there are two critical issues that college Writing Programs face: 1) how to address demographic change in students and faculty and 2) how to integrate meaningful assessment measures with traditional pedagogy. If as administrators and teachers we relate these issues to technology, we can revitalize composition instruction without sacrificing essential content.

Schools are experiencing demographic change in their student bodies and their faculties, not the least of which is technological expertise. Administrators are requiring increasingly more program assessment. Faculty across the curriculum are demanding that students be able to write academic papers. Furthermore, because there is not a uniform standard of excellence, the "good paper" is a nebulous thing. Complicating these issues is the fact that composition studies have become a discipline, a significant evolution in the past 20 years, and, as is the case in most disciplines, because the field has developed many threads, writing programs often must overcome resistance to change and/or inertia. That most schools have faculty from a range of backgrounds and technological experience only serves to further complicate these issues. However, once having identified the basic goals of a writing program, if we make it easy to use technological innovation beyond the use of a computer as a glorified typewriter, students can have a program tailored to their needs; faculty can stress a common core and can learn to incorporate technology painlessly; and administrators can compile the required program assessment.

In the Classroom

Incoming freshmen typically arrive with inconsistent writing skills. They have varying degrees of proficiency in conducting and documenting research, constructing cogent arguments, and applying rhetorical and grammatical standards. Faculty often have developed "pet" ways of dealing with these heterogeneous classes; some are measurably effective; others are less so. We have found that by making technology a major part of each course, we can provide a common core of instruction. Furthermore, by distributing the common core to the faculty at large, we can help them to develop expectations for the caliber of academic writing their students will produce.

Among the methods that have worked for us in the classroom are:

Meeting each class in a computerized classroom once a week.
Constructing a common core of instruction
Developing core lessons that can be used in a computerized classroom
Creating PowerPoint lessons that can be individualized by faculty
Using a LAN to create faculty directories for in-class work
Establishing an Internet connection and using it for in-class work
Crafting a Departmental Web page that has many resources
Providing meaningful CAI for a writing class (handbook, full dictionary, links to web sites, etc.
Establishing grammar, EFL, and reading drills and pointing students to them on an individualized basis, as needed.
Using WORD features (for instance highlight changes, compare documents, track changes.)

Assessment

Administrative units are requiring more detailed assessment of students, courses, and programs. To assess courses and programs properly, we should identify specific, assessable goals; stipulate what constitutes success in reaching those goals; evaluate whether or not the goals were reached; and feed the results back into the program. The assessment of students in a course or program should be related to those goals.

We have found it meaningful to:

Compile data about academic indicators and student background and provide faculty with individual class profiles in the aggregate.
Develop grading rubrics or standards for grades that are tied to the goals of the course and to the degree of accomplishment as related to the common core.
Provide faculty with comparisons of indicators and mid year and final grades
Develop portfolios for each student and assess them according to the goals of the course.
Distribute results of assessment to the faculty at large.

Conclusions

By thus relying on technology to implement a common core, we can assure that students receive standardized instruction, and we have not infringed on the traditional professorial right to an individual teaching style. By developing rubrics that are determined by the common core of instruction and assessing portfolios according to those rubrics, we can provide meaningful assessment of the course. By telling faculty across the curriculum what the results of the assessment are, we can provide them with meaningful expectations of the academic writing they will receive. The students enjoy using technology. The faculty are not frustrated by their varying degrees of technological expertise. The administration has assessment that is pertinent.

The 3D Term Paper: Putting Virtual Reality into the Writing Process

Carl L. Reynolds, Professor
College of Education
University of Wyoming
Laramie, WY 82071
Aged@uwyo.edu

Christine D. Reynolds
Language Arts Instructor
Rock River School
Rock River, WY 82083
Creynolds@sage.ac1.k12.wy.us

Abstract: In order to meet a need for an enhanced approach to writing term papers using MLA format, the secondary ELA teacher in an isolated rural school in southeastern Wyoming integrated web-based technology into the process. Students acquired communication skills that are traditionally a part of standard ELA instruction, as well as meeting district standards and benchmarks, while incorporating advanced technology to complete the project in a highly motivating manner. The assignment motivated students to think for themselves, to solve problems, and to read, interpret and apply complex operations in what previously had been a common, mundane, "boring" assignment. The students had fun, the teacher had fun, and ELA standards and benchmarks were mastered.

Introduction:

In order to stimulate new interest in the old, English-Language Arts standby, the term paper, the instructor searched for ways to utilize advanced technology to enhance the students' annual term paper efforts. The students were asked to incorporate appropriate web site URLs in the body of their work. Not only were they asked to use the web as a source for information to document their research on selected topics, but the URLs also became a part of the paper itself. In addition, students were asked to embed multimedia sites, such as movie clips, sound clips, action cam sites, and virtual tours to enhance their message and to create a third dimension to their work.

Background:

Prior to integrating technology in the writing process, students would dutifully complete the annual term paper assignment, using standard, hard copy material found in the library. They copied out of the encyclopedias, magazines, and periodicals, in spite of repeated warnings of the evils of plagiarism. In addition, because of the size of the school library in a K-12 school in rural Wyoming, much of the hard copy resources available were sorely out-of-date. Or, they would enlist the assistance of mom, dad, a friend or the Internet, to create the paper for them. In the past, money had been spent to purchase the term paper assignment. Something had to be done to encourage the students to want to complete the assignment themselves, as their best work, and to create a document of which they could be justly proud. By creating a new "third" dimension to the assignment, students were motivated to take pride and ownership in the project. It became fun to write a term paper.

Implementation :

The instructor utilized time-tested writing process instructional procedures, as well as integrating web-based technologies to augment the students' annual term paper writing experience. In collaboration with university personnel in the College of Education, the teacher and university faculty member demonstrated the use of Internet sites and selected citations to prove the validity of the paper's thesis. Traditional research methods were taught to students who ranged in age from 12-18, in grades 7-12. The teacher demonstrated the use of the MLA format, a traditional research tool, for all students to ensure quality results. The teacher demonstrated, through the use of paragraphs with imbedded URL's, the impact of multimedia in providing additional emphasis and impact to prove the thesis of the paper. Demonstrations were conducted, through analysis and the application of critical judgement of several sites, the rationale for selecting a particular site. Finally, the students were instructed in ways to establish the reliability and validity of the chosen sites. As a final step to the project, the students projected their work (in addition to handing in a hard copy for archival purposes), using Microsoft Word and the school's computer display projector, and they gave a speech about the results of their research.

The combined project was archived as a part of their "body of evidence" to prove competency in the ELA state standards of Reading, Writing, Listening, Speaking, and Integration.

Conclusion:

Because of a need to enhance, through technology and multimedia, the required but often mundane assignment of the annual term paper, students were given the chance to create a 3D term paper. The project featured URL's embedded within the paper, that were hyperlinks to sites that featured movie clips, sound clips, action cam sites, and virtual tours to enhance their message and to create a third dimension to their work. The multi-dimensional project stimulated increased creativity and interest in the term project, which usually caused groans from the students. Instead, comments during class from students included such comments as, "Come see what I just found!"

Follow-up interviews with students indicated clearly that students were more motivated, collaborated with each other more, and shared in each other's work much more than when the traditional term paper writing project was conducted. Comments such as "I don't care much about writing, but this project was more like putting a show together", and "I enjoyed seeing what other kids came up with" were common. By adding the "third dimension" students were taught, Traditional English standards were accomplished, as well as integrating advanced technology skills in the English curriculum. Most of all the project became "fun" for students and the teacher alike, while at the same time accomplishing the ELA standards and benchmarks mandated by the state and local district.

Lessons Learned: Twelve Years of Actively Integrating Technology into the Teacher Education Program

Susan Ramp Ridout, sridout@ius.edu
Carl deGraaf, cdegraaf @ius.edu
Jane E. Riehl, jriehl, jriehl @ius.edu
Indiana University Southeast, New Albany, IN, USA

Background

Twelve years ago, an overwhelming feeling of remiss fell upon the two teachers of the Language Arts/Reading Methods Block at Indiana University Southeast in New Albany, Indiana. Why? We kept hearing about the power of technology in the classroom and the backwardness of any teacher preparation program that ignored this idea. From whom did we hear this? From national publications and "future experts." But even closer to home, we heard it from a colleague in our own School of Education.

After facing up to the fact that our forward -thinking colleague was right, we decided to try to change our current modus operandi to make room for technology within our methods courses. But, there was one major problem. Neither of the two methods teachers knew much about technology for our own personal uses, let alone had enough confidence to require students to teach lessons using technology while we supervised. So, we did the only thing we knew how to do, we asked our colleague who was so interested in seeing an infusion of technology into methods courses, if he would help us.

During the first years of this project, our students had very little computer savvy coming into their Language Arts/Reading block. Some had been in a 1-hour computer course, but really did not know the software they would be using with children. Therefore, our colleague trained the university students by holding workshops to learn the software we would be using at Galena Elementary School, the site of our practicum. Now our students come to the Language Arts/Reading Methods block having had a 3-hour college course in educational computing, and are fairly comfortable using technology themselves.

While the technological ride continues to evolve, after twelve years we have learned several valuable lessons. Here are a few of them:

Lessons Learned

One: The university is not in charge of all decision-making. At first, we at the campus selected the software, delivered the workshops to our students, and shared our limited expertise in an authoritative way. But, as time has marched on, not only have the Language Arts/Reading teachers become more comfortable with technology, the teachers at Galena have, too. Now, the school has requested the software packages we use. Together, we plan our projects, attend conferences, and give presentations.

Two: Programs housing technology must be in a constant state of evaluation/change. While it would be easier to stick with software packages and the present "way of doing things," the program has needed to be in a constant state of change. For example: we have gone from desk top computers in a lab, to lap tops in various locations in the school, back to desktops, but this time **not** in a lab, but in the actual classrooms. Numerous times we have changed software packages, e-mail transport systems, and the way children respond to e-mail. This notion of constant change has not been easy for the two methods teachers who like to feel more organized and prepared than advances in technology will allow. Indeed, hard work is the constant companion of technological innovation in schools, and there is little time to "coast and enjoy the ride."

Three: All participants are the teachers of technology. It no longer is one teacher at Indiana University Southeast and one teacher at Galena who hold the keys to incorporating technology. Now, the IU Southeast students share their knowledge with the children, with Galena teachers, and with the IU Southeast faculty members. Likewise the teachers at Galena and the methods faculty share technology tips and help students and children problem-solve. And, often most helpful, the children at Galena continue to instruct all of the adults involved in this project.

Four: The availability of hardware determines how fluid the infusion of technology is. A few years ago when we first heard that the computer lab at Galena Elementary School was being dismantled, we almost cried! What? How were we going to actively incorporated technology into the program without a lab? And...what about glitches? Who would help with the glitches? (All of the adults might have to know a bit more because the most technology-proficient Galena teacher and IU Southeast faculty member could not be everywhere at once.) As it turned out, this change was exactly what we all needed. It forced us all to become more diligent in our efforts to become proficient with technology and it enabled our students to really use technology in a fluid manner. Having the hardware readily available in the classrooms has allowed children to look up questions, write on the word processor, or create hyper cards when they are ready, not necessarily during the 30 minutes they were previously assigned to the computer lab.

Five: The Internet truly enhances the power of literacy lessons. We are watching our students teach literature-based lessons that include skimming, scanning, and note taking skills and strategies being taught as the children gather research from Internet sites. The children enjoy engaging in purposeful reading activities on the Internet, all the while improving their understanding of the logical organization of web sites. This, in turn, is helping them with their reading comprehension skills.

Closing

The lessons we have learned during this twelve-year experience have been perhaps the most rewarding of our professional careers. We have truly felt like a total community of learners, and eagerly look forward to the next few years to see what new lessons we will be fortunate enough to discover.

The Lektor system for the creation and reading of electronic books

José L. Rodriguez Illera
Universitat of Barcelona
jlrodrig@ariadna.d5.ub.es

'E-books ' have had a prominent position in the media over the last years, always tied to the possibility of partially substituting the reading in paper for the electronic reading. This topic has several possible approaches, in this presentation we will basically cover the possibilities and demonstration of a new system for the edition and reading of electronic books based on pedagogical approaches.

The current situation of electronic books.

The electronic books started as a new technological possibility, derived from the improvement provided by user's graphic interfaces, as well as of the new portable reading devices, always adding the advantages of the digital edition in the treatment of the text. However, it cannot be said that there is a standard system, as it is the case for the operative system in conventional computers. Although there are several types of programs that generate electronic books, there is only a few widespread. (but incompatible to each other):

Acrobat Ebook Reader (and its variants)
Microsoft Reader
Diverse propietary formats of the different portable devices.

One of the few standards proposed for the ebooks, the denominated Open Source, promotes that the text of the electronic books be in a variant of XML, although such a format is not compatible with Acrobat. Microsoft Reader has its own format and it can be used in platforms with Windows and Windows CE operating systems. The different devices (Rocket, Pocket, etc) use their own operating systems or Windows CE, incompatible with each other.

This situation is normal in an emergent market sector, thus the suppliers of electronic books opt for converting the originals into one or several of the alreay existing systems, offering two or three formats for the same title so that the readers choose the one suitable for their reading system. The use of electronic books, in the sense of 'ebooks ', is at the moment almost limited to novels, historical and literary works, although the use of electronic documents is widespread for any content type.

The electronic books have some important disadvantages. The main one is the scarce screen resolution. This is a problem that will be solved with screens offering more resolution, but this will not be immediate. Microsoft has created an improved antialising system, ClearType, that allows a better visualization of small size tipes fonts. Acrobat has also created its own system that uses a similar system to colour antialising and that shows very good results. Both systems will be incorporated in the operating systems, and improve the reading on screen.

The Lektor system

Lektor is a new system to create and read electronic books that started dedicated especially to the educational and training sector, and now covers the most general electronic edition. It emphasizes the reader's possibilities like a fundamental issue in the reading process, at the same time that makes it simple to the teachers the creation of electronic texts with instructive aims.

Its current position, shortly described, is as follows:

- It uses a basic and universal creation standard: files in format text (.txt), as well as Html with limitations.
- The creation of books is very easy: it is enough with specifying a text file, adding the data about the author, title, etc. and the program carries out the rest automatically.
- The books can be read in conventional computers (desktop, laptops) and in different operating systems: Windows 95,98,2000, Me, NT, Macintosh 8.5 and 9.x, and Linux and Macintosh X in the next version.
- The interface is multilingual, and the user can choose the language and change it in any moment. In version 1, Lektor supports the following languages: Catalan, English, Spanish, French and Portuguese.
- It offers advanced capacities of search: quick search of words and sentences, as well as complete indexing with chart of frequencies and contextual occurrences of each word.
- Lektor has a group of tools that the reader can use to work with the text: specific notepad for each book, possibility to mark the text with colors, hightlight reading pages, and write down commentaries.
- The author can decide to re-export the contents of books created with Lektor, so that the text is always recoverable.
- It allows inserting graphics or commented diagrams.
- Impression in text and graphic modes.
- The electronic books remain in the user's library, in their local hard disk. New books can be downloaded with any navigator and incorporated to the library.

Besides these general features, Lektor offers a series of facilities for the use of ebooks in schools and educational institutions, by means of a module, denominated Scola, that allows the teacher or the author to associate to the book questions of understanding and tasks related to the reading. Scola allows the student to write a comment on the reading document, as well as to send the professor its own questions or suggestions by means of a module that incorporates electronic mail.

Developing EFL collaborative and communicative writing skills on the Web: An evaluation strategy proposal

Janete Sander Costa , Universidade Federal do Rio Grande do Sul/CNPq, jtscosta@uol.com.br

Silvana Zardo Pacheco, Faculdades Integradas do Instituto Ritter dos Reis, silvana@portoweb.com.br

Dra. Cleci Maraschin, Universidade Federal do Rio Grande do Sul, clecimar@adufrgs.ufrgs.br

Porto Alegre, Brazil

Abstract: This paper reports a study, which aims at evaluating the development of written communicative competence of a group of college students in a Language Course in Brazil, majoring in English as a Foreign Language, during three academic semesters. Students have been utilizing EquiText, a collaborative writing tool on the Web, as a vehicle to improve their linguistic competence in text productions. This tool provides future teachers the opportunity to build a textual interaction on the Web as an alternative means for the face-to-face current practices. Texts written collectively provide the material for this evaluative analysis, which ultimately investigates whether the participants' communicative strategies represent significant indicators of their learning progress in this peer text construction.

Introduction

Digital technologies have been used in the education of future teachers of English as a Foreign Language (TEFL), opening new teaching fronts to Computer Assisted Language Learning (CALL), especially in the linguistic competence learning field. The Brazilian Ministry of Education and Culture (MEC) as well as private educational institutions encourage research in applied technology for collaborative work. Collaborative writing systems available on the Web have been created, such as Col-laboració, REDUCE, EquiText, WikiWiki Web, BSCW, which certainly can be utilized in TEFL programs to enhance learning language skills in response to growing demands for new digital resources as alternative means to teaching/learning conventional materials.

EquiText®[1], a Groupware tool that uses the Web as a word processor model, developed by a multidisciplinary team at the Post Graduate Program in Computer Science and Education at the Federal University of Rio Grande do Sul, according to socio-constructionists concepts, including Vygotsky's "zone of proximal development" (Rizzi et al., 2000a), allows any peer interactive written task in any language including EFL. Its layout favors the writing and rewriting of texts asynchronously by several remotely located people, allowing a constant text edition - during a limited time granted by the task mediator to the participants - in a friendly and accessible manner, displaying an immediate screen visualization of actions. EquiText educational applications have been carried out in Brazilian academic programs and findings presented in local, national and international events[2]. As a CSCL resource, it promotes collaborative learning supported by the Web tools, and open space for production and sharing of knowledge, also among EFL learners.(Chapelle 2001).

A pilot project utilizing EquiText to improve linguistic competence in future teachers of EFL has been developed at the Faculdades Integradas do Instituto Ritter dos Reis, Porto Alegre, Brazil, for three consecutive academic semesters. It aimed at analyzing mainly the process of writing in future teachers of EFL according to the communicative competence construct mentioned in Canale & Swain (1980) and Canale (1983), now in its preliminary evaluative stage. Written communicative competence of a group of 10 EFL voluntary students has been evaluated mostly from their interactions in the co-construction of the text entitled *Short Story* (second text), a negotiated and reflected result from their first experience with EquiText during the writing in collaboration of the *Collaborative Writing* text, specially created for their free use and learning of the tool. For analytical purposes just their interactions taken place in the second text - *Short Story* - will be considered. See Costa et al. (2001a,b) for further detail.

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[1] INPI: 0004139-2, in 11/22/2001. Websites: http://equitext.pgie.ufrgs.br and http://www.equitext.com

[2] Firstly presented at SITE/2000, San Diego, January; SITE/2001, Orlando, March, followed by ITTE, Swansea, UK, July 2001. Also presented in Cuba, 2000, and in Brazil in various events around the country.

The Study

The communication model used here for analyzing collaborative writing in Equitext and its possibilities of improving language skills, according to Canale & Swain (1980) and Canale (1983) concepts of communicative competence are based in three main communicative competences for the teaching of ESL: the grammatical, which registers the domain of the linguistic code, through the vocabulary, pronunciation rules, word formation and sentence structures (essential for students to reach higher proficiency level); the discursive and the sociolinguistic competence, which encompasses the capacity to combine ideas to reach cohesion in the form and coherence in the thought, and to use the grammatical forms adequately in several contexts, expressing the communicative functions in descriptions, in narratives, to persuade, to thank, to invite, etc.; and the strategic, especially used either in the proper process of communication or to express flaws in the knowledge of the code to negotiate meaning, recognized in paraphrases, aid requests from peers, etc. (Schlatter et al., 1998). It is emphasized that the written communication under analysis in Equitext is based on interpersonal interactions, in a sociocultural context, with inherent unpredictability, creativity, purpose, final result and authenticity of the language used. In this particular group, writing and rewriting by the 10 volunteer students in Equitext took place both synchronously (students met in the same Lab room and could interact face to face) as asynchronously (students contributed to the text in other moments, elsewhere). The students were attending various disciplines of EFL in a Language Course, and had different levels of language proficiency. They all worked for this project knowing that there were no evaluation implications involved.

During our study, we could easily find two of the communicative competences described in Canale & Swain: the grammatical and the socio-linguistic (here in conjunction with the discursive communicative competence) in its paragraph layout. The strategic competence, essential to compensate flaws in the communication, turned up less frequently in the *Short Story* than in the *Collaborative Writing* text, as a result of the students' discovering the free writing exercise and still counting with peer and teachers-mediators support, according to Costa et al. (2001a), as they negotiate the topic for the second text, *Short Story*, mentioned in Costa et al. (2001b). In fact, the tool itself makes the strategic competence possible because all contributions there are open to interference of any other participant: the strategic request for help is implicit throughout the task. Communication happens in spite of the limits imposed by the virtual environment, as human beings are flexible and adjustable. The final result or text production works as an integral part of the complex discursive process, where the written language used by the participants, independently of their linguistic competence level, is preceded by reflection and correction, is (re)organized logically in paragraphs, proper of the EquiText layout. Speakers/writers act more or less coordinately while elaborating the collective text, creating a new multi-territorial and multi-authorial space. The resulting cognitive processes can improve the students' fluidity in the use of their linguistic knowledge (Swain, 1998).

The set of paragraphs submitted during the text construction was a more or less communicative text. However, this evaluative study of the students' collaborations - based on the communicative competence approach - concentrates in the paragraphs stored in the "History" function and not in the final text production. Actually, the "History" function displays individual participations, corroborating to the whole text, i.e., a space that exposes to the user all the contributions made in the text in chronological order. For each contribution the accomplished action is indicated (inclusion, alteration, exclusion), its author, date and time the action was executed. The final product is collective, but it is in the function "History" that all the procedural register is stored, all individual contributions are displayed, revealing rich and peculiar meta-linguistic (Swain 1998), and meta-cognitive processes (Ridley 1997).

The students volunteering in this project were all taking different levels of EFL courses, were considered intermediate to low advanced proficient in EFL, according to the ACTFL Proficiency Guidelines (Hadley 1993, p.13). Their openness to learning with each other in a different means - without the evaluation ghost haunting their souls - perhaps made it simpler at first. Actually, *Collaborative Writing* text interactions were their first collaborative writing experience in text construction on the Web and that was possibly the reason why they seemed to be at ease in sharing ideas for co-constructing *Short Story*, their selected topic for the second text. EquiText became then an interesting and democratic environment, an opportunity for them to learn English and eventually teach, collaboratively. It motivated most of them to overcome difficulties, to take risks, to recognize their own mistakes and those of others and to correct them eventually, turning this activity into a dynamic and productive learning experience. This peer text construction generated solidarity and mutual responsibility (Ushioda, 1996) improving their EFL linguistic abilities, especially reading and writing.

Short Story collaborations (from November/2000 to July/2001mostly) represent the material for our preliminary evaluative analysis. An arbitrary evaluation scale has been created to measure all the collaborations stored in the "History" function of *Short Story* text, in a scale of 0 to 10, varying from maximum (10), medium (7) and minimum (4), for all paragraph contributions: Insertion before or after, Alteration, and Exclusion, according to the EquiText functions shown in its menu of collaborations. Participations are computed according to the degree of relevance to the text development, according to the grammatical, sociolinguistic – discursive, and strategic communicative competence model. The grammatical and lexical inadequacies shall be considered if they modify the text course somehow, hindering its clarity, and receiving, in result, the corresponding degree.

Findings

This preliminary analysis of the data collected through the function "History" leads naturally to the idea that Equitext as a communications tool offers good resources in aiding to the reading and writing process in a text written in collaboration task. Illustrations 1 and 2, below, show the percentile of the participations by student as well as the three types of collaboration accomplished by those 10 students in the *Short Story*.

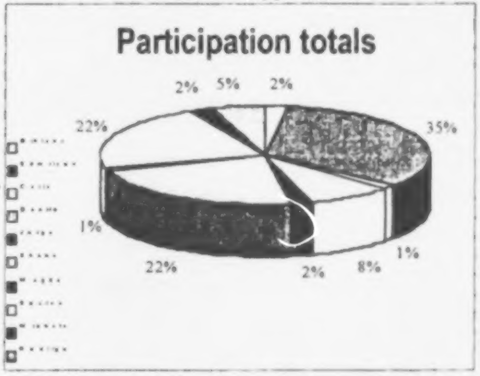

Figure 1: Total of participations per student and their respective percentile in the text construction.

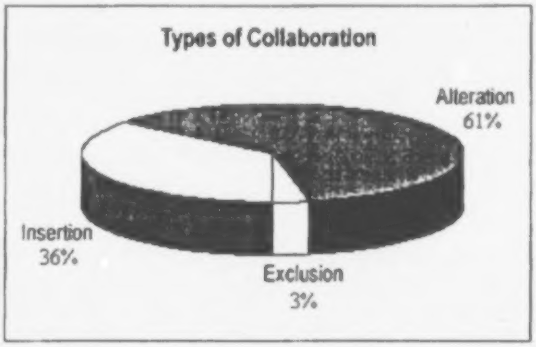

Figure 2: The three collaborations allowed by EquiText and their percentile in the *Short Story*.

Insertions of new paragraphs to the Short Story text were in smaller number than Alterations to the ideas already submitted. Students seemed to be either more involved with turning the text clearer or simply correcting grammar episodes. The Exclusion of paragraphs, with the intention of turning the sequence more fluent, coherent or logically connected, was very small, however significant. Female students accomplished more alterations than men, an interesting finding for a gender analysis. (See Figures 1, and 2). However, a contribution by Carla, for instance, that didn't modify the text in course and to which punctuation was not attributed (neither 7 nor 4), even having the contribution been registered in the function "History", a type of database of the text in process. Contributions like Carla's were not computed for they did not present significant value, neither to the textual movement, nor to the proposed analysis. We tried to maintain the analysis under the perspective of the quality and of the relevance of the contributions to the narrative, and considering the communicative competence, grammatical, sociolinguistic – discursive, and strategic, which actually revealed somehow the students linguistic improvement.

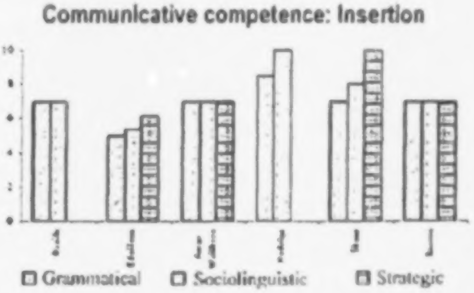

Figure 3: Demonstrative Graph of the three communicative competences in the Insertion function by student.

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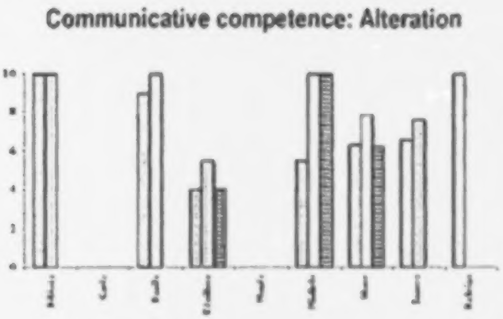

Figure 4: Demonstrative Graph of the communicative competence in the Alteration function by student.

Figures 3 and 4 above present two graphs built from data raised out of the *Short Story* "History" storage functions: the Insertions, Alterations and Exclusion listed in the collaborations menu came from the 10 students *Short Story* production, arbitrarily valued as 10, 7 and 4, though qualitatively attributed. They show the total of participations and their authorship, as well as the nature of their collaborations. Also, they bring referring data to the nature of the insertion and the corresponding communicative competence, as well as their degree of relevance to the textual weaving. Therefore, they reveal the importance of the participation to the process of the text construction. In addition, results show that Alterations (Fig. 3) and Insertions (Fig. 4) largely surpass Exclusions and that grammatical and sociolinguistic – discursive competence were close in intensity, either in their frequency as in the text alteration. The strategic competence due to its interactional and more dialogic nature was apparently less present in the *Short Story* than in the first text *Collaborative Writing*, where students had to negotiate for topic and learn to handle the tool, having therefore to ask for help – a clear case of a strategic communicative competence. On the other hand, EquiText itself potentializes this kind of competence in virtue of its design: it could be implicit in the participants' minds and actions while being receptive to any alteration in their paragraphs. At this very moment, each paragraph author also uses insertion strategies from the others in their own texts. There's a permanent linguistic feedback on the Web and those participants later reported that their experience in Equitext while writing texts in EFL collaboratively contributed considerably to their easiness with the language and with the learning processes there involved, an important gain in their education: "we think that collaborative writing is very important to English students because we can change ideas and work together." (Danilo/Jô, in 11/22/01).

Conclusions

The unprecedented diffusion of the Internet resources, the urge for friendlier and easier educational software to aid to current classroom didactics, in addition to the ever growing challenges that (future) teachers of EFL are facing today in their educational formation, necessarily forces us to a reevaluation of the paradigms towards the teaching of foreign languages, especially English, in Brazil in view of its being the current lingua franca. Sustained basically by the theoretical foundations of Canale & Swain's communicative competence model we feel confident to suggest that the communicative competences found in the text construction of the 10 EFL students analyzed in this pilot project have somehow developed if not improved considerably while writing collaboratively in Equitext during the three academic semesters studied. We agree with Hirvela (1999) that writing collaboratively [in Equitext] will not solve all the problems, nor will it work for all the students, in the same way as any other teaching approach. However, producing a text collaboratively may create significant opportunities for the practice of other linguistic abilities: participants of a group that carry out a task [e.g. in Equitext] negotiate meaning while constructing their text. As a result, they develop group attitudes, which sustain more affective and consequently more effective language learning strategies. Positive peer interactions mediated by a constructive teacher can create high levels of motivation and promote more constructive learning. And this has been verified throughout our students' collaborative text construction, in both *Collaborative Writing* and *Short Story* texts. Thus, the interactions through the Web studied in Equitext produce a group articulation with meta-cognitive peculiarities that retroact and enhance the analyzed communicative competences.

Finally, we believe that other EFL teaching strategies in conjunction with the digital technology available on the Web may generally improve Brazilian learning levels. Thus, Brazilian students' communicative competence in EFL can improve by EquiText environment layout as it facilitates the construction of communicative strategies in collaboration with other peers in order to produce shared knowledge while the text writing movements takes place. Moreover, the construction of a collective that enhances EFL writing skills among (future) teachers in Brazil is possible and provides their users with other more autonomous, reflective and co-responsible means of teaching. EquiText proved a helpful group knowledge construction tool, with considerable benefit to the education of Brazilian teachers.

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Write to Learn with Journal Zone

Peter Skillen, Educational Consultant, peter@peterskillen.org

Abstract: Journal Zone is an online 'journal' that supports reflective learning within a social context. It is a classroom tool that integrates three common practices of exemplary teaching – journal writing, collaboration, and cognitive scaffolding. These encourage students to think more deeply, not only about the task at hand, but also about their own thinking and learning processes. Journal Zone is designed to support and encourage the development of both expertise in learners and of 'collaborative knowledge building' communities (Salomon et al, 1991; Bereiter et al, 1992; Scardamalia et al, 1994). How can novice learners become more like expert learners? What role do journal writing, collaboration, and scaffolding play in the development of learning?

Novice versus Expert Learners

'Intentional' or 'mindful' learners are learning to become expert at *becoming expert* (Scardamalia et al, 1983). They are learning not only subject matter and skills, but are acquiring valuable metacognitive knowledge as well. Current pedagogical models acknowledge that 'learning to learn' is central to education (Perkins, D.N., 1995). Journal Zone is designed to help novice learners acquire many expert strategies and behaviors through their purposeful engagement with peers and with the support of the scaffolding features.

Journal Writing

A Place to Think

The very presence of a journal acts as a tool that predisposes people to think – to plan, monitor, and reflect. This helps overcome the difficulties of not even thinking about performing these tasks. Sometimes it is not that the student doesn't know how to plan, it just does not come to mind to do so. The journal, therefore, reminds students to think and gives them the opportunity.

Thinking About Thinking

Journal writing allows for the externalization of knowledge through language. Language plays an important role in making knowledge explicit by objectifying experience. So as students engage in writing about their knowledge they are indeed exploring, stating and questioning what they know (Britton, J., 1970).

Understanding Subject Matter Through Writing

Writing has been widely accepted by educators and researchers as a significant means of learning subject matter more effectively. Countryman (1992) says, "Knowing mathematics is doing mathematics. We need to create situations where students can be active, creative, and responsive to the physical world. I believe that to learn mathematics, students must construct it for themselves. They can only do that by exploring, justifying, representing, discussing, using, describing, investigating, predicting - in short by being active in the world. Writing is an ideal activity for such processes."

Journal writing, as a form of writing and 'thinking out loud,' seems to assist in initiating, supporting and encouraging intentional learning. What role might collaboration, cognitive prompts and computers have in designing an effective journal writing environment?

Collaboration

Central to knowledge construction is the recognition that learning is a social process. Social interactions allow for concepts, vocabulary and processes to be made explicit. Learning has been said to be "less as the socially-facilitated acquisition of knowledge and skill and more as a matter of participation in a social process of knowledge construction" (Greeno, J.G., 1997).

Journal writing, usually a personal event, may also be more public or collaborative. This collaborative form of journal writing leads to unique experiences that have qualitatively different results than individual journal writing. Students not only reflect on their own thoughts and processes, but also exchange information about both the subject content and the processes and strategies used by others. This leads to more comprehensive knowledge building and results in both better reports and increased metacognitive skills.

Journal and Elaboration Prompts

Both journal writing and collaboration offer opportunities for students to think deeply about their tasks. Specifically, students may engage in a great number of thoughts related to planning, monitoring and reflecting. But, they also may not. Prompts, questions or sentence starters may provide the necessary scaffolding for this to occur.

Journal starters encourage the change of normally covert procedures into ones that are overt. They help students to consider one's own higher level strategies and they promote the active decontextualization of knowledge. They may allow the user to decenter from personal thoughts and think about other considerations. They facilitate an internal dialog when no other partner exists to 'bounce ideas off'.

Summary

Journal Zone is an online tool for reflective collaboration. Journal writing, collaboration, and scaffolding support and encourage the development of students' expertise in learning.

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Literacy Junction: Exploring Adolescent Identity and Social Agency on the Web

Hiller A. Spires
Department of Curriculum & Instruction
North Carolina State University
United States
Hiller_spires@ncsu.edu

Pru Cuper
Department of Curriculum & Instruction
North Carolina State University
United States
Pruinnc@aol.com

Abstract: This paper describes *Literacy Junction*, an interactive web site for middle school teachers and students. Using an interdisciplinary approach to learning, *Literacy Junction* offers three unique features: technology-enhanced experiences with outstanding young adult literature, a virtual middle school environment replete with student-created cybercharacters and cybermodels, opportunities for critical analysis of contemporary social issues. Our ongoing research suggests the motivational value of an interactive, literary cybercommunity to support high reader/text engagement. Through their membership in this unique online community, students are challenged to develop a sense of their own social agency.

Literacy Junction, (http://www.ncsu.edu/literacyjunction) an interactive web site for middle school students and their teachers, takes a unique approach to connecting young adult literature to young adult audiences. Recent research suggests that adolescents are spending more time reading on the web and less time reading traditional print-based texts. Rather than attempting to reverse this natural adolescent learning trend, we are capitalizing on it by providing technology-enhanced learning opportunities to accompany young adult literature. *Literacy Junction* offers features that both peak the interest of adolescents and simultaneously augment the need for rigorous and engaging reading experiences in middle school. In order to accommodate the needs of both teachers and students, *Literacy Junction* includes the following features:

- Teacher-generated lessons tied to the NC Standard Course of Study
- Technology tutorials for teachers and students
- Publication of student-generated work
- Community of cyberpeers who model academic products
- Student-created cybercharacters
- Critical analysis of contemporary social issues

By offering the opportunity for both face-to-face and virtual meetings, this networked professional community provides the mentoring and continued support that teachers need to initiate and sustain new teaching practices. Additionally, *Literacy Junction* offers unique opportunities for students to creatively express themselves as they grapple with contemporary social issues that are prompted from young adult literature.

As we designed *Literacy Junction*, we kept one basic premise regarding adolescents in mind — "for middle schoolers, school is primarily a place for making friends . . . and figuring out just who you are. Somewhere after all of that, it's also a place for learning" (Beers, 1998). The three conceptual tiers underlying *Literacy Junction* take full advantage of this well-established understanding of what engages and motivates adolescents. First, there is Cyber Heights Middle School (CHMS), *Literacy Junction's* virtual learning center. CHMS cybercharacters typify the idiosyncrasies of real world adolescents and teachers. These "virtual" characters serve as our cybermodels, demonstrating academic approaches to the literature-related activities offered at *Literacy Junction*. After getting to know the resident cybercharacters, our "actual" (or *real world*) student visitors are then invited to create their own cybercharacters to attend CHMS. These student-created characters, who form our second tier, immediately become part of the cybercommunity and are invited to participate in online learning opportunities through the genius of the students who created them. A third and final tier of the site is comprised of our "fictional" CHMS characters, who include the many protagonists from the books featured on *Literacy Junction*.

After getting acquainted with and creating cybercharacters, *Literacy Junction's* student visitors "go to class" at CHMS in what might be best described as the *Literacy Junction Impact Zone* (Fig. 1). In this theoretical zone, actual, fictional, and virtual worlds converge as students grapple with contemporary social issues signaled from young adult literature. Through their own perspectives, as well as the unlimited perspectives of the cybercharacters they create, students negotiate their evolving identities and embrace their emerging roles as socially responsible citizens. Within the *Literacy Junction Impact Zone*, students experience unique learning opportunities that potentially include: text immersion and critical web consumerism; intellectual rigor and creative expression; perspective-taking and identity negotiation; personal efficacy and social responsibility.

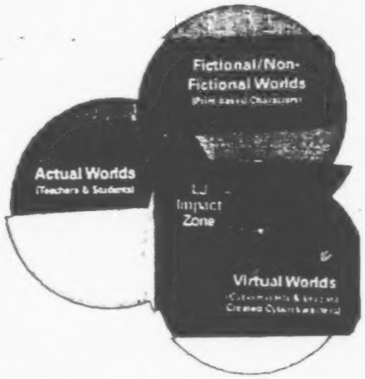

Figure 1. Literacy Junction Impact Zone

Over time, we expect *Literacy Junction* to help teachers integrate technology, to increase students' capacities to use technology as a learning tool, and to enhance students' academic and personal growth as they develop a sense of their own social agency. By using young adult literature as an elemental and engaging platform, Literacy Junction provides an appealing technology-enhanced environment for adolescent cognitive and social development.

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Assessing the Process and Efficacy of Moving Literacy Education Classes Online

Matt Thomas, Ph.D.
Assistant Professor of Literacy Education
Department of Curriculum & Instruction
Central Missouri State University
United States
mthomas@cmsu1.cmsu.edu

Abstract: This paper reports on successful efforts to bring a teacher education course in content area literacy into an online-only environment. It delineates the research-based planning of the course development, course efficacy relative to other forms of delivery, and some of the implementation challenges. The course planning was based on an emerging collection of best-practices in online instruction coupled with the embedding of new online versions of best-practices in traditional content area literacy instruction. Course efficacy is evaluated by comparing quantitative data and anecdotal information from the online course with the same course taught in hybrid and traditional formats. Simple conclusions are drawn in order to advance current understandings of the process and efficacy of moving literacy education classes online.

Introduction

In summer, 2001, the researcher was awarded an online course development grant for $9,000. The purpose of the grant was to move a teacher education course, taught previously by the researcher in both traditional and hybrid formats, into a completely on-line course. This was done by utilizing BlackBoard course delivery software, subscribed to by the researcher's university. The course title was "Teaching Reading in the Secondary School" and is taken for undergraduate or graduate credit. The main content of the course is targeted toward helping pre-service and in-service teachers acquire understandings of student literacy development and teaching methods for best helping their students to learn from their many content area reading, writing, and thinking assignments.

Research-Based Course Development

The backbone of the course structure was a series of thirteen Learning Modules built, by the researcher, around the course text, a content area literacy textbook by Manzo, Manzo, and Estes (2001). Each Learning Module was a Microsoft Word document that the students downloaded and on which they completed the work assigned within the Learning Module. The Learning Modules were designed around a synthesis of best-practices research regarding both traditional literacy pedagogy and online course delivery (c.f. Manzo, Manzo, & Estes, 2001; Thomas & Grigsby, 2001; Dwyer, Sunal, Geisen, Sunal, & Trundle, 2001; Thomas & Hofmeister, in press). Each Learning Module contained the following distinctives: an agenda and task list; a lecture essay to introduce the material; a chapter of the text to be read; a set of Microsoft PowerPoint notes over the chapter; an application activity utilizing journal writing and online discussion board interactions or small group collaborations; three levels of "reading the lines" (reading the lines, between the lines, and beyond the lines, or activities that required reading comprehension, inferencing, and higher-order literacy); transmission, transaction, and transformational models of instruction/learning; three different types of structured interactions (student/text, student/student, and student/teacher); a carry-out thought or quotation; and a checklist to ensure all of the Learning Module tasks and activities were completed. Additionally, in the chapters of the text a selection of content area reading strategies were presented. In subsequent Learning Modules then, key teaching strategies, modified for an online/Learning Module environment were employed as the main strategies used within the Learning Modules themselves. Content area reading/literacy methods or strategies embedded in the Learning Modules included: Listen-Read-Discuss (Manzo & Casale, 1985); Three-Phase Graphic Organizer (Manzo,

Manzo, & Estes, 2001); reiterative reading (Crafton, 1983); KWL-Plus (Carr & Ogle, 1987); Comprehension Monitoring System (Smith & Dauer, 1984); and elements of the interactive teaching cycle (Manzo, Manzo, & Estes, 2001). Finally, in addition to completing the tasks associated with each Learning Module, the students wrote a comprehensive modified Directed Reading-Thinking Activity (Stauffer, 1969) using online text for the assigned reading, wrote a detailed review of one chapter of the text, and compiled a comprehensive course notebook.

Efficacy of Online Course, Implementation Challenges, and Conclusions

Since the summer of 2001, approximately 75 students have completed the online course. Quantitatively, according to test scores, assignment grades, course grades, and course evaluations, the online course compares equitably to the traditional and hybrid format offerings of the same course taught by the researcher. Anecdotally, based on reflections in their course notebooks, discussion board interactions, and e-mail conversations, students learn a good deal, read their texts more carefully, think critically about the course topics, and find the course to be valuable. However, while some students seem pleased with the flexibility afforded by the asynchronous course delivery, others express that they miss the face-to-face interactions of a traditional course. The primary practical implementation challenges ficed by the researcher have included: the time-consuming nature of Learning Module creation and monitoring and participating in many discussion board threads; helping students with needed technology skills; and managing a very great increase in the number of e-mails from students. Future course upgrade goals include adding video streaming, developing more small group collaboration activities, and developing a web-based environment for housing student work for future use by themselves and by colleagues.

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Knowledge Building Technology and Literacy Learning in Canada's North

Elizabeth Tumblin
Department of Education
Prince Edward Island
Canada
ejtumblin@gov.pe.ca

Heather Hemming
School of Education
Acadia University
Canada
heather.hemming@acadiau.ca

Abstract: With the arrival of technology's presence within classrooms around the world, the responsibilities of the teacher quickly become redefined. Technology itself cannot automatically provide learners with an enhanced education; thus, teachers are encouraged to critically examine how technology is used in their classrooms. It is essential for teachers to actively question issues surrounding technology's ability to support constructivist teaching and learning approaches. This paper will offer a discussion around the successful implementation of an electronic learning environment, supported by CSILE/Knowledge Forum®, in a Northern Canadian classroom and educators' views on the impact on literacy learning.

Introduction

Using computer based technology to support literacy learning has been embraced enthusiastically by some, outwardly rejected by others and examined cautiously by many. What remains a concern is how to ensure that the computer is used in a pedagogically sound way to support learners as they use language in functional ways to construct meaning. One of the challenges for educators is making computer learning experiences culturally relevant while supporting literacy development. This paper examines educators' perspectives on the challenges and possibilities for literacy development created when CSILE/ Knowledge Forum ® (Scardamalia, Bereiter, McLean, Swallow and Woodruff, 1987) software was used by educators in Iqaluit, an isolated, Northern Canadian community of approximately 6000 people where 85 % of the students are Inuit.

Theoretically, the learning process embedded in the CSILE/ Knowledge Forum ® learning environment should support the creation of a learning environment which parallels that advocated by leading literacy educators. For example the software is created in a manner that learners read and explore content which is self-selected, use existing background knowledge as a base for learning, are in control of their learning, use language in meaningful ways to build knowledge and solve problems. The role of the teacher is one of facilitator. The infrastructure of the software makes explicit some thinking strategies. Participants explore specific areas of interest under the umbrella topics introduced, choose one of several scaffolds to frame their discourse, such as the process of devising a problem, developing theories, posing additional questions, planning, researching new information from a variety of sources, representing new learning through text and graphics, devising a better theory, etc. or through focused discussion topics. Topics are tailored to meet specific local curricula and interests/needs of the students as each site starts with an empty database on their server. In Iqaluit, topics have ranged from Marine Environment to Indigenous People of the World, from Weather and Space to Northern History, Geography and Resources, with special interest areas such as Suicide and Racism explored in between. Users contribute to the database on client computers to construct knowledge as a community, allowing for continual modification, building on each other's ideas, constructing knowledge, whether individually or in groups. Using the technology of Knowledge Forum® to build knowledge that is culturally relevant while promoting a world-view has the potential of being motivating for young Inuit children. Such software could enable students to start with what they know, and from where they are in their language development in their first and second languages, thereby enabling a comfort level with learning and technology that is not readily available in most commercialized resources for Northern youth.

The Study

This research project focused on analysing perspectives of educators regarding the relationship between the knowledge building technology of Knowledge Forum® and literacy development for Inuit students. Data was collected through interviews, observation and examination of the data base.

The choice of a qualitative framework was adopted primarily due to the emphasis on social context. Since qualitative research is "rich in description of people, places and conversations" (Bogdan & Biklen, 1992, p.2) means that the context formed an integral part of the research.

Five major informants were selected using purposive sampling: 1) a bilingual Inuk first grade teacher whose students are taught totally in Inuktitut, 2) a consultant who was responsible for bringing the software to Baffin, 3) a veteran northern teacher, 4) a bilingual Inuk third/fourth grade teacher, and 5) a fourth grade English First Language teacher.

Findings

According to all the informants, all the questioning, theorizing, researching, dialoguing integral to the used of Knowledge Forum technology encouraged students and teachers to engage in literacy learning which was meaning focussed. In the classroom these processes were not something practiced but were a natural part of the literacy learning. Further, the creation of various forms of texts which requiring thoughtful question posing, reflection on the need to communicate with an audience, clarifying an ideas and editing were all viewed as authentic literacy events. The fact that the software was viewed to be driven by process, and that content focus was developed by participants, was thought to create a literacy learning framework that supports cultural relevancy. As the informants identified, rather than the teacher controlling the evolution of content exploration students had an opportunity to have control over identifying content that had personal relevance. Further, given the flexible nature of the software students were able to engage in knowledge building communities at a variety of developmental levels. Consequently, the diverse range of literacy levels within classes were thought to be accommodated.

Knowledge Forum® technology offers an electronic medium for literacy learning which educators involved in this study suggest can create a meaningful context for literacy learning. In classrooms, teachers are challenged to create literacy learning curricula which are meaning-centred, emphasize process, allow student control, support a variety of learning levels, and embrace cultural relevancy. In northern communities where English is frequently not the first language the challenge of creating a curriculum, which is relevant and builds on the existing language base of the students was viewed as challenging. The experiences of the informants in this study suggest that using knowledge-building technology in Iqaluit, a Northern Canadian community provided a curricular structure which in their views supported meaningful literacy learning and pedagogically sound teaching.

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A GREAT INSPIRATION

Kathy L. Adams
Educational Leadership Department
Wright State University
United States of America
Kathy.adams@wright.edu

Marguerite Veres
Educational Leadership Department
Wright State University
United States of America
marguerite.veres@wright.edu

Abstract. There are thousands of software applications available to educators, but one application in particular is an essential tool for teaching and learning. It is a graphic organizer program called *Inspiration*. *Inspiration* is a program that can be used by teachers and students to organize ideas graphically or textually. Advanced features of the application allow for linking both to the Internet and other documents thus demonstrating the relationship of ideas and concepts.

In these days of national standards there is a tremendous need for on-going training among pre-service and practicing teachers in the use of technology. Students are entering pre-school having utilized technology more than many of the educators that they will encounter. There are thousands of software applications available to educators, but one application in particular is an essential tool for teaching and learning. It is a graphic organizer program called *Inspiration*. *Inspiration* is published by Inspiration *Software, Inc.* and allows for the organization of ideas either graphically or textually. It is user friendly, stimulating, and easily adopted by both students and teachers. Advanced features of the application allow for linking both to the Internet and other documents thus demonstrating the relationship of ideas and concepts.

Research is clear that graphic organizers assist greatly in improving instruction, increasing reading comprehension and improving creative writing. (Culbert et al. 1998; Bowman et al. 1998; Meyer 1995; Quist 1995). In addition, graphic organizers assist with conceptual understanding, higher-level thinking and retrieval of information (Monroe 1997). Most importantly, *Inspiration's* ease of use assures that it does not interfere with the creative process or the sometimes frustrating use of technology.

Inspiration software allows teachers to turn complex thoughts into meaningful displays whether pictorially, in text, or back and forth between the two. Brainstorming, concept mapping, and diagramming in all subject areas are essential to inspire creative thinking. Educators utilizing this program can easily survey a class and then demonstrate the similarities and differences among the concepts. A class of primary students could quickly contribute verbally about a variety of topics and instantly see a graphic representation of their session. The idea of classifying pets, foods, or games could turn into a meaningful beginning for young minds to see relationships within the group. The teacher could then provide links for concepts either to the Internet or other similar documents. This would provide a springboard for writing or reporting within the classroom. Furthermore, this visual graphic helps to retain knowledge. It also helps to connect prior knowledge to new knowledge in a meaningful way, supports different kinds of thinking and can assist with formative assessment. *Inspiration* has a brainstorming rapid-fire feature that allows thoughts to flow quickly. There is no longer a need for messy boards and copying because Inspiration has made the connections and display. The organizer can then be printed out and copies run for all participants. *Inspiration* can also be used by the teacher for his or her own writing. Lastly, the modeling of the creative process for students can be powerful.

The *Inspiration* program can help students with the development of concepts, demonstrating and understanding sequencing or chain of events, cycles, cause and effect, problem solving, comparing and contrasting, analysis, classifying, finding main ideas and part to whole learning. In addition, the program can be very motivating for reluctant writers. Besides the students having a copy of the organizer to study for a test, the actual process the student goes through with *Inspiration* can demonstrate and be used for

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alternate assessment purposes. For example, if the students make visual representations of what they know the teacher can then quickly check for this understanding.

Inspiration can be used by teachers and students alike. It is a fun, easy and motivating program to use. Best of all, it allows for the integration of technology and contributes to learning in many ways.

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Children's Literacy Initiative's Message Time™ CD-ROM

Alicia Wilson, Children's Literacy Initiative, US

Children's Literacy Initiative (CLI) is a non-profit organization dedicated to ensuring that children living in high-poverty areas have the best possible opportunity to become successful at reading. Children's Literacy Initiative's goal is to prevent the need for remediation by helping children who are perceived to be educationally "at risk" achieve at national norms on literacy assessments. CLI's programs address many of the causes of reading difficulties in the early grades, which very often lead to continued school failure, and ultimately to economic disadvantages. CLI has served public school and Head Start teachers nationally, with a focus on the eastern states. Large-scale projects include Baltimore City Public Schools, the Philadelphia School District, Newark Public Schools, and the Camden Board of Education, with other projects in Los Angeles, New York City, Washington D.C., and Pittsburgh. Through years of work in entire school districts and with the community of teachers within individual schools, CLI has established itself as an effective professional development model.

CLI's approach is to provide primary teachers (pre-Kindergarten through 3rd grade) with intensive training in proven literacy instruction practices. CLI coaches, mostly teachers themselves, work with new and veteran teachers in their classrooms assisting them to the level of mastery in these practices. Moreover, essential to CLI's working with teachers in low-income, under-resourced areas, is its commitment to setting up individual classroom libraries, as well as home lending libraries, and provides other literacy supplies such as individual student writing boxes equipped with a myriad of fun and essential writing tools.

As CLI develops and addresses new demands in primary education for the 21st century, its mission is expanding to reach an ever growing population of new teachers who are replacing the thousands heading for retirement. With the hopes to train larger numbers of teachers in effective instructional strategies, CLI has adapted the use of CD-ROM technology to its program. As an alternative to its intensive training component, CLI will be providing shorter training sessions on one of its instructional strategies and supplying teachers with a CD-ROM to give them a thorough demonstration of an effective method in teaching writing skills. By taking advantage of the multimedia format, teachers will be able to view multiple video, audio and graphical samples that will provide them essential supportive illustrations and information.

By using CD-ROM technology, CLI has reformatted one of its central training models, namely, the use of video demonstrations and text support into a more dynamic and interactive medium giving teachers opportunities for multiple viewings and personalized engagements. CLI plans to use this format as a supplemental as well as an alternative training program offered to schools throughout the country and to those not able to purchase the entire CLI training package.

CLI hired twentyonexdesign (http://www.21xdesign.com) to develop a CD-ROM that would demonstrate the step by step procedure for conducting a daily writing lesson called Message Time™. Developed by Dr. Janice Stewart of Caldwell College in New Jersey, Message Time™ is a basic instructional approach which explicitly models the writing process to primary students learning the initial skills in literacy. Message Time™ is not a direct-instruction approach, nor is it a script for teachers to follow. Rather, it is a simple approach to writing which allows early learners to first comprehend that writing is a process of communication. Message Time™ increases children's knowledge of print conventions such as differentiating between words and letters and punctuation. It also acquaints children with written language in a meaningful context and provides opportunities for children to respond at their own level of reading and writing comprehension.

The SITE conference offers CLI an optimal platform to launch a debut of its CD-ROM to the education community and interact with colleagues who have also developed technology-based educational formats. CLI is interested in demonstrating its CD-ROM to educators who can use it as well as to those who can offer critiques and suggestions of its use. During a two hour poster session, CLI will offer demonstrations of it software, displays of images from the CD-ROM and pamphlets about the product and about the CLI program in general. A raffle of free CD-ROMs will also be offered during this time.

The Q-folio in Action: Technology Integration in Inquiry-Based Language Learning

Carl Young, Virginia Tech, US

Abstract:

Presenter will share an approach to re-inventing the pen and paper portfolio and the traditional research project with the Q-folio, a web-based electronic portfolio designed for language pedagogy courses taught at the University of Virginia and Virginia Tech.

The "Q-folio" courseware tool was originally designed for use in portfolio-based writing instruction. The principals employed in that design include: (1) a web-based platform for communication; (2) a "user-centered" approach in which users of the tool are invited to participate in the design of the interface; and (3) "day one productivity," meaning the tool should require a minimum of training before it can be used productively. The Q-folio acted as a robust document management system both for delivering content to the students as well as archiving drafts of their work. The system also allowed them to build multimedia files with full HTML capabilities for presentations. The tool was built in a web-database environment using Cold Fusion, allowing administrators to develop the tool rapidly and make changes easily. Cold Fusion's close adherence to HTML standards and its relatively straightforward commands for manipulating databases were found to be effective for instructors with little knowledge of programming.

In supporting the Heuristic Quest research project in "Language, Literacy, and Culture," the Qfolio provides students the opportunity to develop their own research agenda and to use inquiry to teach themselves and their classmates in an authentic research process. Using hypertext, interlinks across heuristics, and web links, students create a sophisticated road map of inquiry into the nature of language and effective language instruction. They document their process and their findings, which are being archived for future students and eventually for public access. Although customized for this course, the Q-folio is being used in other courses at the University of Virginia as well as Virginia Tech. Ultimately, the tool can be used to support any content area and grade level where teachers want to enhance and integrate the research, writing, language, and conversational practices of their students.

Comments:

The evaluation study informing this presentation was conducted on the electronic portfolio mentioned and examined students' experience of the tool to support both their research processes and products. This study sought to address the need for information regarding: 1) how preparing teachers perceive the technology they are being asked to use; 2) the extent to which electronic portfolios enhanced content learning for these students; 3) how students might collaborate with instructors and technicians on the design of the technology intended to support their work; and 4) how experiences of technology in teacher education affects student plans for integrating technology in subsequent learning environments.

The data (from surveys, interviews, lab and classroom observations) derive from a course focused on language, literacy and culture, wherein the subjects used the specific electronic portfolio tool to further a research question of their own choosing related to language pedagogy in the English classroom. The case study method and analytic induction were used to arrive at the findings regarding students' perception of the tool and associated tasks, the impact upon content learning, the potential for collaboration on instructional design, and the impact upon student technology use. Findings were used to revise the course and refine the tool for this course as well as additional course settings.

I had difficulty in deciding on a presentation category. The presentation would include a talk integrated with a demonstration of the tool and some of the student work archived there. I am open to suggestions for altering the presentation category should this be a concern.

Possible co-presenters may include Margo A. Figgins, Associate Prof. of English Education at the University of Virginia, and Yitna Firdyiwek, Faculty Instructional Technology Advisor at the University of Virginia.

SECTION EDITOR:

Reagan Curtis, Northwestern State University of Louisiana

Technology use in teaching and learning has come to be regarded as essential for the future of educational institutions at all levels. Researchers strive for a better understanding of technology's effects as it continues to gain prominence in education. This year's SITE conference papers contribute to this understanding. The quantity of submissions has more than doubled this year attesting to a deeper recognition of the need for critical evaluation of Instructional Technology (IT). This section includes papers addressing the comparison of online and traditional methods for instruction, technology use in practice, competence with and use of technology, perceptions related to technology, as well as theoretical and methodological issues related to research in IT.

My perception is that research in IT has often begun with the unexamined assumption that technology use is inherently good. As such, I find a need for more research comparing technology to traditional methods. This type of research highlights the idea that various forms of technology should only be used if they are more effective tools. I would like to see more of this type of research in future SITE conferences thereby helping educators to determine both when technology is appropriate and what forms of technology are likely to be most beneficial for meeting their goals. This year's contributions include papers that compare online and traditional or face-to-face methods. Jerry Galloway works with middle school students studying African American cultural heritage and Merry Boggs focuses on high school computer science students while the rest of the authors work at the university level. Yusef Koc, in mathematics, and Barbara Coppola, in teacher education, each focus on how discussions can be influenced by IT, while Sherri Restauri and Rosa Ponce each do broader campus-wide comparisons.

The papers dealing with the effects of technology use in practice without making comparisons to traditional methods describe the effects of a wide variety of technologies, in several educational contexts, and from many different theoretical perspectives. Papers in this category include those by Simon Mochon, David Lane, Donna Russell, Tiffany Koszalka, Marino Alvarez, Kimiko Isono, Tianguang Gao, Yahya Mat Som, Neal W. Topp, Sue-Jen Chen, Margarete Juliana, Max Louwerse, Therese Laferriere, Robert Bracewell, and Isil Kabakci. IT such as spreadsheets and simulations, web-based methods, discussion lists, electronic journals, intelligent tutoring systems, and networked learning communities, are examined among others. These technologies are predominately examined in math and science education, but there is also an interesting piece on music education. Readers of this section should appreciate the emphasis on empirical data combined with a diversity of theoretical backgrounds including socio-cultural and ecological perspectives, constructivist theories, action research, and inquiry-based education.

Papers focused on the level of competence with and use of technology help describe the current level of computer, Internet, and software use by elementary and secondary students, as well as the level of computer literacy and technology use by pre-service and in-service teachers. These include offerings by Myka Raymond, Pamela Petty, Donna Ferguson, Toni Jones, Helen Brown, JoAnne Davies, Kay Gibson, Nan Li, Gerald Knezek, Rhonda Christensen and Yu-mei Wang. Some of these papers include discussion of attitudes and beliefs related to technology, but not as the primary focus.

The papers dealing with perceptions related to technology include research on perceptions, beliefs, and attitudes of a wide variety of stakeholders on a diverse set of topics. This category includes articles by David Dean, Jesse Foster, Amy Staples, Mary Lane-Kelso, Beth Coghlan, Glenda Rakes, Kathy Bohley, Dale Magoun, Debra Sprague, Seung Jin, Kimberly Berg, Rita Dobbs, Melissa Mohammed, Prentice Baptiste, Christian Penny, David Pratt, and Misook Ji. These articles discuss research on perceptions related to the Bill and Melinda Gates Foundation's Teacher Leadership Project, the "Digital Divide" and "Digital Schools", integrating technology into teaching, PT3, using interactive television environments and the Internet, as well as other timely topics. The perceptions of pre-service and preschool through university in-service teachers, kindergarten through university students, and university administrators are focused on to better understand the effects of IT across many educational contexts.

The papers categorized as theoretical and methodological issues related to research in IT include those by Betul Ozkan, Fidel Salinas, Steven Dickey, David Moursund, Tammy McGraw, and Chih-Hsiung Tu. These authors cover wide-ranging issues including statistical applications, ethics, online presence, and future directions for research in IT.

Dr. Reagan Curtis completed his Ph.D. in Education at the University of California at Santa Barbara and is currently an assistant professor in educational psychology at Northwestern State University. He currently teaches courses in human development, research methods, and statistics. His research interests include the development of quantitative knowledge from infancy, cross-cultural mathematical development, online teaching and learning, and teacher education.

Email address: reaganc@alpha.nsula.edu

Two Professors Share Their Thoughts and Feelings with Their Students

Marino C. Alvarez
Center of Excellence in Information Systems, Tennessee State University
United States
malvarez@coe.tsuniv.edu

Michael R. Busby
Center of Excellence in Information Systems, Tennessee State University
United States
busby@coe.tsuniv.edu

Abstract: Lecture dominates the medium that is used to communicate facts and concepts to college students. Often these facts and concepts are either misunderstood or take on meanings not intended by the lecturer. Unfortunately, there are very few avenues that students can pursue to clarify misconceptions other than infrequent question-asking or a visit during office hours. Likewise, professor feedback is delayed until end-of-the-year student evaluations that does not remediate faulty logic and serves little purpose in reclaiming clarity of thought and negotiation of meaning of the curriculum. This paper describes how electronic dialogues can illuminate the degree of student understanding with course content.

Introduction

Exploring Minds is an active electronic venue for professors, teachers, and students to reflect, negotiate, and evaluate the teaching/learning process that enables systemic changes to occur under meaningful and thoughtful circumstances. Ideas are revealed in narrative and visual formats through electronic journals, mapping conceptual arrangement of ideas, and V diagrams so that metacognitive tasks such as self-monitoring, reflective and imaginative thinking, and critical analyses are a crucial part of the learning process. The basic premise that underpins Exploring Minds is that the mind deals with meaning and meaning is the basis for conceptual understanding of facts and ideas. This paper describes the dialogic exchanges that took place between two professors and their undergraduate students during a semester via journal entries in a teachers education methods and a physics class.

Knowledge that is isolated into compartmentalized units of study does little to advance the interest and curiosity of teachers and their students. This type of learning reduces knowledge into capsules that are sorted by topic with the ultimate purpose of retrieval by testing. Nowhere does this type of compartmentalized knowledge occur than in college classrooms where the professor lectures and students dutifully take notes for later retrieval on an examination. Facts become valued over ideas due to expediency and an attitude of getting through the required course at minimal expended thought. Understanding is sacrificed for knowing in this type of classroom setting with little professor/student exchanges taking place outside the walls. The professor relies upon end-of-the-semester student evaluations to determine student perceptions of course content and delivery of information; however, in many cases these comments cause minimal, if any, changes in course preparation, adjustment, or course restructuring.

This paper focuses on electronic interactions between two professors and their students during the course of a semester. For this study, we used the action research paradigm grounded in the reality of classroom culture and under the control of teachers. In this study, the events consisted of electronic exchanges that were initiated by the students who were asked to reflect and enter narratives that expressed their thoughts, feelings, and questions resulting from the class session and their assigned readings. These entries took the form of a mental task similar to a diary entry where students were asked to carry on a dialogue with themselves concerning the happenings during class and assigned readings.

Theoretical Framework

Teaching is an exchange of facts and ideas engaged under meaningful circumstances in an environment that goes beyond simply telling and assigning. These facts and ideas should relate to topics, problems, situations, and contexts of a given discipline that take into consideration the experience and world knowledge of the students. However, our position is that these facts and ideas should not be confined to one subject discipline in which the teacher and students are assigned, but rather serve as the anchor from which other disciplines are incorporated so that relationships among them can be readily ascertained, acknowledged, and assimilated.

Our view is predicated on our belief that monitoring student progress and understanding keeps us better informed about our teaching practice, the value of our course content, and takes into consideration Gragg's (1940) warning that "wisdom can't be told." It is also consistent with Gowin's (1981) theory of educating and Ausubel's (1968) theory of meaningful learning. Our theory guides us when interpreting the findings of our research projects and others so that better communication and understanding of the key concepts occur with the "live" audience who weigh the merits of their learning derived from these discussions, assigned readings, assignments, and their applications.

Faculty and Student Use of Computers in the Classroom

A case study involving faculty at Stanford University indicated that computer use by professors primarily consisted of preparing documents used for instruction (e.g., handouts, email listservs), and when researching for personal writings. However, using this same technology in their daily teaching was negligible (Cuban, 2001).

We should also note that professors who teach using distance learning labs or classrooms are not engaging in faculty use of technology for instruction rather it is a way to dispense information "live" rather than tape-delayed through video (although we acknowledge that this method is sometimes also disseminated through distance learning classrooms.). These uses of technology become methods of conveyance rather than uses of technology to monitor self-learning. Instead we depict a network that provides teacher/student monitoring of classroom practice with journaling, and student use of metacogntive tools of concept mapping and V diagrams.

Computer access does not necessarily equate to computer classroom use, but it does indicate that students having computer access to the Internet does imply engagement for personal use and induces student learning brought about by the societal, informal, curriculum than by the formal, school curriculum. For example, Cuban (2001) found that students' use of computers were peripheral to their primary instructional tasks, and that less than 5 percent of the middle and high school teachers integrated computer technology into their regular curricular and instructional routines. When teachers in their classrooms used computers these computers did little to alter the existing teaching practices already in place (see Cuban, Kirkpatrick, & Peck, 2001).

Perhaps it should be noted that technology systems that have been developed for school use are done so by persons who have little knowledge or experience of what it is like to teach at elementary, middle, secondary, or postsecondary schools. This position also encompasses the social, cultural, organizational, and political factors of the school environment that shape the complexities of what people do in this milieu.

Our Exploring Minds Network was developed at the Center of Excellence for Information Systems, Tennessee State University, from a teacher's perspective with classroom experience at the middle, secondary, and postsecondary levels that includes management, interactive communications, monitoring, and metacognitive tools (Alvarez, 1998). The network includes collaborations with researchers, parents, coordinators, and guests as deemed necessary by its users.

Finding Out What Our Students Know and Understand

Keeping abreast of how our students perceive the course content is a key component of pedagogy. How are we, as professors, to know the extent to which our students are processing new information in meaningful ways that are deemed to be acceptable rather than in ways that may be either misconceived, confusing, or relegated to rote memorization?

In order to promote learning and understanding that go beyond the walls of the classroom and result in reflection, we used electronic exchanges with our student to reveal their feelings and thoughts as well as our own to the course content over a semester period. The processes involved are social, political, and organizational when negotiating the curriculum, adhering to politically driven mandates, while working within the organizational structure of the school.

Dialogic Exchanges

Two full professors and their undergraduate students participated in this action research study. Thirty-six students, freshmen through seniors, enrolled in an introduction to physics class in the College of Arts and Sciences, and twenty-one senior, preservice teachers, enrolled in a secondary methods class, College of Education, participated in this electronic journaling. Students in both classes utilized the Exploring Minds Electronic Network.

Exploring Minds is an interactive electronic network that is password protected and contains provisions for teachers, researchers, and students to communicate about their class work and/or research agendas. This unique network is designed as a venue for professors, teachers, and students (middle, secondary, and postsecondary) to reflect, negotiate, and evaluate the teacher-learning process almost exclusively over the Internet (Alvarez, 1998). Exploring Minds is a self-contained system in component form that encapsulates transactions between students and learning stakeholders over the Internet interactively. Although this network contains many features, for this study, the focus was on the journal component that provided students in the respective classes to enter their thoughts, feelings, and questions following each class session that met twice a week for sixteen weeks. Students also posted reactions to their assigned class readings.[i]

Students were asked to react after each class session in their journal by carrying on a dialogue with one's self. In other words, students were to reflect on the content of the class session and express their thoughts about the facts and ideas that appealed to both their cognitive and emotional state. A rehashing of what transpired during the class session was discouraged and clearly not intended to appear in the journal other than in those instances that a specific notion or feature was referred to in the writing.

Informing Practice

After each class session and before our next meeting each of us read the journal entries that were posted by our students. Our responses to the students were predicated on the type of entry posted. For example, we were interested in the ways our students reflected upon what was being taught both in their affective and cognitive responses as well as how well they understood the facts and concepts of a specific lesson. Three levels of reflection were classified:

1) How important the facts and ideas were perceived by our students;
2) If they reported that the facts and ideas were part of their prior knowledge and/or experience; and,
3) If they applied the facts and ideas of a topic to another relevant situation.

As part of the analysis we also read each posting to determine if any misconceptions related to the lesson or reading assignment were reported in these entries.

Reviewing the responses of our students indicated that a few students maintained a continuous dialogue with us as opposed to the others who primarily maintained a running record with themselves. The majority of the postings were entries that posed either direct questions about the clarity, their understanding or specific questions, or about their interpretations of the material.

Seldom we didn't respond to a students' entry. The primary reason being that the postings were worded in such a way that "asked" either directly or indirectly for a response. Our responses took the form of answering a direct or indirect question/statement, offering encouragement, or asking to share their concerns, revelations, and/or materials with the class. Many of the postings by the students contained embedded questions that were explicitly stated or took the form of comments that were written similar to "thinking out loud." One can question the sincerity of these postings since the students knew we were reading them. However, the overall postings by the class, as a whole, together with their in class discussions indicated that their remarks were consistent with their thoughts and feelings of the course content and their interactions with us.

It was clear that students maintained a dialogue with themselves and also with us that better enabled them to understand and retain important facts and ideas. Simultaneously their electronic entries informed us of their level of understanding of each class session, and also alerted us to be more cognizant of forthcoming lessons and reading assignments so that they could be better learned and understood. Based on the students completed assignments, in class discussion, and their journal records, each of us changed the format of our course and final examination making it more applicative.

Conclusion

Electronic journaling created shared and mediating learning contexts and invited multiple connections across contextualized information. Questions, thoughts, and feelings were exchanged after students had an opportunity to reflect on each class activity and assignment through electronic journals that took place beyond the walls of the classroom. Student reflections were dependent upon how important they perceived the lesson, whether they had experienced the lesson itself in their world experience and/or knowledge of the facts and ideas being studied, and/or their ability to apply newly learned methods to other situations. Their queries informed us of any information that needed clarification or elaboration to which we could respond directly and, if warranted, make the rest of the class aware of an issue, fact, or concept that needed further explanation at our next class meeting.

This study confirmed an earlier one that concluded that it may be that when you ask students to conduct journal entries as a "dialogue with oneself" that the entries are written in such a way that evokes within the person a reflective stance that differs from when one is asked to record what transpired during the class session. This kind of posting results in a "report-like" response that is similar to a notetaking type of entry (Alvarez, 2001). This type of "report-like" entry does little to stimulate thought or evoke feelings since reflection of the class session is minimized and relegated to writing down the information and then repeating it again either from notes or memory into a journal entry.

The Exploring Minds Network facilitated teaching and learning of our course content. It also provided a means whereby meaningful learning of ideas were shared, negotiated, and continued beyond the walls of the classroom. These electronic exchanges helped us and our students negotiate the curriculum in ways that traditional lecture and college teaching does not entertain.

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NOTE:

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[i] For a detailed account of the Exploring Minds Network see Alvarez, Busby, Burks, Sotoohi, and Panzarella in these proceedings.

Faculties' Reflections on Teaching Online

H. Prentice Baptiste, Ed. D.
New Mexico State University, College of Education
baptiste@nmsu.edu

Gulsun Kurubacak, Ed. D.
New Mexico State University, College of Education
kurubagu@nmsu.edu

Natashia Hill, MA.
New Mexico State University, College of Education
hill@nmsu.edu

Abstract: This is a qualitative ongoing case study. The main purpose of this study is to describe and analyze faculties' reflections toward an online course. Through purposive sampling techniques, six faculties in the College of Education at a large Southwest State University were selected as participants. Video-typed interviews have been conducting to explore and evaluate faculties' reflections toward online teaching in its natural environment. This study is exploratory in order to allow insights to emerge from a recursive data analysis process. The variables in the site of the research are highly complex and extensive. The research data are very dependent on context and needed to be collected in its natural environment with no controls and manipulations.

Overview of the Study

This study has been taken a grounded theory approach to allow the researchers to explore and discover the faculties' reflections toward online teaching for two reasons. First, today, different academic institutions offer teacher education graduate courses online. Therefore, online learning and faculties' reflections toward online teaching are relatively new phenomena. There is a lack of theoretical or empirical research base on this topic. Only a few researchers have focused scholarly attention on investigating or working in this field.

Finally, before entering the study, the researchers tend to analyze the research data inductively rather than to prove or disprove hypothesis. The main focus in this study is: 1) to obtain investigate, understand and the insider's views toward teaching online courses on different subject area, and 2) to expound on this study participants' perspectives and interpretations rather than researcher imposed categories.

Research Design

This study is a qualitative case study. The purpose is to investigate the faculties' reflections toward a particular phenomenon of online teaching on different subject area experiences.

Research Site

The site of the research is a large urban university at Southwest in College of Education. It is in the Fall Semester 2001. The College offers many B.A., M.A. and Ph.D. programs online.

This College was chosen to study faculties' reflections toward enhanced online teaching for three major reasons: First, today's, the most of the faculties have been strongly interested in using the web as an instructional tool to make possible communication between regular class sessions. Each week students would post their assignments and any questions, concerns, ideas online. The students could read, receive, post, exchange and/or share information on the discussion topics of each week before and after the class hour. Sometimes students would email the course professor's account directly, when they had particular questions, suggestions and /or comments any time. Second, the most of course curriculums in the College of Education have been included both computer-based learning activities into classroom and web-based learning activities, WebCT have been used for posting the students' massages and papers via electronic mail (email) and electronic bulletin board. Finally, at the future, the most of the faculties in the College of Education are considering to teach their courses totally online in the near future whereas the few of them have been delivering their courses online.

Instrumentation

This study utilized both qualitative and quantitative data to provide detailed information to the researchers for analysis. Therefore, qualitative instruments and qualitative instruments are designed due to collecting and analyzing data on the faculties' reflections toward online teaching on different subject areas. Video-typed interviews have been qualitative instruments whereas the faculty survey instrument has been a quantitative instrument in this study. Each instrument was developed and modified according to investigating the focus of this study.

Another crucial issue in this study is the validity of each research instrument. To provide the validity of these instruments in this study, the researchers have been collaborating the experts, the other faculties and the students from the other courses. These people have been asked to provide opinions regarding the following three issues: 1) readability and clarity of the questions in the faculty survey, 2) length of the instruments, and 3) other general impressions.

Data Collection

The researchers have been colleting data from different sources to investigate faculties' reflections toward teaching online. Although the qualitative case study approach has been used to obtain information on the focus of study, both qualitative and quantitative data have been collected from the research setting. Utilizing qualitative and quantitative data together in this study have been provided a more complementary and different aspects of this complex phenomenon.

Researchers have been following a careful data management process to ensure high-quality and accessible data, documentation of data collected, and associated after the study will be complete. For these reasons, the researchers regularly record and systematically store both qualitative and quantitative data into the researcher computers and videocassettes. They have been recording each collected data on the floppy diskettes and CD-ROMs every day as well as printing out each datum twice and filling them into separate folders. The researchers also regularly send all collected data into their FTP sites via WS_FTP Pro 6.02 ftp client software everyday.

The researchers have been writing short notes on these data from different sources in folders to show where related data in another can found. The researchers also index all data by using number and letters as locaters in each data being collected.

Data Analysis

This research is being operated with a qualitative case study approach. The analysis of the faculties' reflections toward online learning on the different subject areas is ongoing process, which will be started at the end of the Fall Semester-2000, through written the final report. The data analysis process in this study is analytic and recursive to inform further decisions on data being collected. It also is restructured, flexible and open to the discussions with the stakeholders and reviews of related literature.

During the data analysis procedure, the researchers briefly will followed these steps given in a logical order: 1) transcribe each video cassettes, 2) write field notes from the class and all WebCT activities, 3) identify patterns, 4) analyze the content of each class observation and the student survey, 4) work on qualitative data, 5) triangulate all qualitative and quantitative data, and report results in descriptive and narrative form.

Integrating Technology into Preservice Teacher Education: Comparing a Field-Based Model with a Traditional Approach

Krista Glazewski, Kimberly Berg, Thomas Brush
Educational Technology
Arizona State University
United States
kglaze@asu.edu

Abstract: This study comprises one component of a PT3 funded investigation into the effectiveness of combining technology integration techniques with field-based preservice teacher methods courses. One data collection instrument, the Technology Attitudes and Beliefs Survey, is described. Attitude and belief differences between preservice teachers in the field-based model and those enrolled in the traditional, one-credit course are identified and discussed.

Over the past decade, rapid advancements in technology have created expanding possibilities for enhancing instruction. As a result, there remains a growing need for augmenting the instructional technology skills of both practicing and preservice teachers (Hill & Somers, 1996; Northrup & Little, 1996). Meeting those needs, however, has proven to be a struggle for many teachers (Strudler & Wetzel, 1999). Siegel (1995) reported that most K-12 teachers are generally not receiving sufficient time, access, and support to become comfortable with computers, while others have found that although some teachers have positive attitudes toward technology, many do not consider themselves competent to teach with technology (OTA, 1995; Schrum, 1999; Strudler & Wetzel, 1999).

Researchers have advocated integrating technology training throughout the preservice teacher education program (Brush, 1998). However, most teacher preparatory programs offer stand-alone technology courses. Many of those courses have curricula that fail to adequately prepare teachers for technology integration (OTA, 1995). This is especially true in states lacking specific computer competencies for teacher certification. Therefore, many preservice teachers are still entering the classroom with minimum exposure to technology and the techniques for integrating its use into instruction in real world settings (Strudler & Wetzel, 1999).

With the support of a three-year Preparing Tomorrow's Teachers to Use Technology (PT3) grant, one university is attempting to improve the way it prepares preservice teachers for technology integration. Until recently, preservice teachers enrolled in the existing program have been required to complete a one-credit, stand-alone technology course; the curriculum thus remains isolated from the environment in which it is to be applied. The primary goal of the PT3 grant shifts the focus of this experience away from skill development to means for integrating the technology with authentic teaching experiences (Brush, Igoe, Brinkerhoff, Ku, Glazewski & Smith, 2000). To achieve this, the on-campus preservice teacher course is being eliminated in favor of integrating this content into field-based courses covering instructional methods. This field-based model, also known as job-embedded learning (Loucks-Horsley, Hewson, Love, & Stiles, 1997), focuses on providing preservice teachers with authentic training experiences in real classrooms prior to their student teaching experience.

Currently, preservice teachers enrolled in the field-based program are elementary education students who follow a sequential block system in their coursework. The technology component is incorporated in the first two block semesters which cover instructional methods for teaching language arts / social studies and math / science. These courses are taught at local elementary schools where the preservice teachers are placed in K-6 classrooms. Within the technology component, each student attends workshops where he or she observes and participates in models of technology-rich lessons integrated with the given content areas. After the observation workshops, each student designs, implements and evaluates an instructional lesson for one of the content areas that effectively and appropriately utilizes technology.

The purpose of this research project focuses on collecting comparison data regarding their beliefs and attitudes related to technology integration from two groups of preservice teachers: those enrolled in the field-based model and those enrolled in the on-campus course. The data collection process is aimed at addressing the following research question: Are there differences in attitudes and perceptions toward technology integration between preservice teachers in the field-based model and those in the campus-based course?

Method

Participants

Participants were 133 preservice teachers. Of these, 24% (n=33) were completing their computer requirement on the university campus, and 76% (n=100) were participating in the field-based model. Over 90 percent were female. The majority of students (74%) were enrolled in the elementary preservice teacher education program, 11% were enrolled in the secondary education program, and 15% were enrolled in a different education program, such as English as a second language, bilingual, or special education.

Procedures

Survey data collection occurred during fall of 2001. Those preservice teachers enrolled in the field-based model completed the survey during the final class session of the technology component related to their respective methods course. Those preservice teachers enrolled in the traditional, one-credit course completed the survey during their final class session.

Materials

Materials consisted of one survey: the Technology Attitudes and Perceptions Survey. The survey was developed as a means of measuring attitudes toward technology integration as well as the degree to which the preservice teachers hold prevalent misconceptions as identified by the methods and educational technology university faculty. The survey consists of three sections: Background Information, Attitudes Toward Integration, and Environmental Resource Barriers. The Background Information section contains eight items covering such things as future teaching goal, academic year, frequency of computer use, and basic demographic information.

The Attitudes Toward Integration section includes 18 Likert-style items measuring attitudes and beliefs related to technology integration. Example items in this section include "A variety of technologies are important to enhance student learning," and "I feel that my technology course(s) has prepared me to integrate technology into my content area specialization." Participants rate all items on a four-point scale from "Strongly Agree" to "Strongly Disagree."

The final section, Environmental Resource Barriers, contains 16 items asking participants to rate their perceptions of potential technology integration barriers. Example items include "There isn't enough time in class to implement technology-based lessons," and "It is easier to use technology with smaller class sizes."

The overall Cronbach Alpha coefficient of the Technology Attitudes and Perceptions Survey is relatively high (α = 0.81), indicating it is a fairly consistent measure.

Data Analysis

Data analysis consisted of calculating means and standard deviations of scores obtained for each item on the two surveys. A one-way multivariate analysis of variance (MANOVA) was performed to determine if a significant difference in overall reported scores between preservice teachers in the field-based model and those in the campus-based course is evident. A follow up one-way analysis of variance was performed on the survey data in order to identify significant differences between the two groups on individual survey items.

Results

Table 1 displays the means and standard deviations for the five items with which the on-campus preservice teachers most strongly agreed and most strongly disagreed. The numbers represent responses on a four-point Likert scale ranging from one (Strongly Agree) to four (Strongly Disagree).

Table 1: Five items with which on-campus preservice teachers most strongly agreed and most strongly disagreed (n=33).

Statement	M	SD
Strongest Agreement:		
A variety of technologies are important to enhance student learning.	1.42	.56
A lack of knowledge about technology will impede a teacher's ability to integrate technology.	1.52	.76
In order for technology integration to be successful, teachers should have more access to computer labs.	1.64	.49
Technologies used in a lesson should be selected based on the learning goals of the lesson.	1.70	.47
It is easier to use technology with smaller class sizes.	1.79	.70
Strongest Disagreement:		
It is unreasonable to expect teachers today to integrate technology.	3.09	.84
Teaching students to use technology is **not** my job.	3.03	.92
Lower elementary students (K-2) cannot effectively use technology as a learning tool.	3.03	.95
I do **not** need more training on how to integrate technology.	2.76	.97
There isn't enough time in class to implement technology-based lessons.	2.73	.80

Note. Reponses ranged from 1 (Strongly Agree) to 4 (Strongly Disagree).

Field-based preservice teachers' responses are reported in Table 2. Means and standard deviations for the five items with which they most strongly agreed and most strongly disagreed are provided.

Table 2: Five items with which field-based preservice teachers most strongly agreed and most strongly disagreed (n=100).

Statement	M	SD
Strongest Agreement:		
It is easier to use technology with smaller class sizes.	1.55	.63
A lack of knowledge about technology will impede a teacher's ability to integrate technology.	1.57	.69
A variety of technologies are important to enhance student learning.	1.66	.62
In order for technology integration to be successful, teachers should have more access to computer labs.	1.68	.60
Technologies used in a lesson should be selected based on the learning goals of the lesson.	1.78	.69
Strongest Disagreement:		
It is unreasonable to expect teachers today to integrate technology.	3.21	.79
Teaching students to use technology is **not** my job.	3.18	.85
Lower elementary students (K-2) cannot effectively use technology as a learning tool.	2.93	.88
Technical problems can be avoided with proper teacher planning.	2.72	.81
An unsuccessful technology-integrated lesson is usually the result of lack of teacher's technical skills.	2.66	.78

Note. Reponses ranged from 1 (Strongly Agree) to 4 (Strongly Disagree).

A one-way multivariate analysis of variance (MANOVA) performed on the items revealed a significant difference among the two groups, Wilks' $\Lambda=.60$, $F(34,85) = 1.67$, $p=.028$. The multivariate η^2 based on Wilks' Λ was strong, .40. Results of follow-up analyses of variance (ANOVA) tests indicated that participants in the field-based experience were more likely than those in the on-campus course to disagree with the following statements: "I feel that my technology course(s) has prepared me to integrate technology into my content area specialization," $F(1,131)=11.16$, $p=.001$, "Technical problems can be avoided with proper teacher planning," $F(1,131)=7.17$, $p=.008$, and "There isn't enough time in class to implement technology-based lessons," $F(1,131)=4.45$, $p=.037$. Preservice teachers in the field-based models were also more likely to agree with the following statements: "Technology-integrated curriculum projects require more preparation time than projects not incorporating technology," $F(1,131)=5.64$, $p=.019$ and "A teacher with novice technical skills can deliver an effective lesson integrating technology," $F(1,131)=3.99$, $p=.048$. Table 3 includes a summary table for these items.

Table 3: ANOVA summary table.

	On Campus (n=33)		Field Based (n=100)			
Statement	M	SD	M	SD	F-ratio	p
I feel that my technology course(s) has prepared me to integrate technology into my content area specialization.	2.09	.68	2.61	.80	11.16	.001
Technical problems can be avoided with proper teacher planning.	2.27	.91	2.72	.81	7.17	.008
There isn't enough time in class to implement technology-based lessons.	2.73	.80	2.38	.83	4.45	.037
Technology-integrated curriculum projects require more preparation time than projects not incorporating technology.	2.33	.92	1.93	.82	5.64	.019
A teacher with novice technical skills can deliver an effective lesson integrating technology.	2.36	.70	2.07	.74	3.99	.048

Note. Reponses ranged from 1 (Strongly Agree) to 4 (Strongly Disagree).

Discussion

Currently, technology training is a major focus of many preservice teacher education programs. That training is provided through a variety of approaches, most of which are stand-alone technology courses. This research describes the initial comparison results of a PT3 grant designed to move technology training of preservice teachers from the university classroom to a field-based setting in which students observe lesson models integrated within their methods courses, and are expected to plan and implement a technology-integrated lesson.

Overall, results from this survey are encouraging. Both groups perceive that they are responsible for teaching students to use technology, and express agreement that a variety of technologies are important for enhancing student learning. However, both the on-campus and field-based groups also tend to disagree that a successful technology-integrated lesson is possible using one computer. They also perceive that it is easier to deliver a technology-integrated lesson in a computer lab. These generally positive attitudes regarding the importance of technology coupled with the perception that technology is easier to integrate with more computers represent an opportunity for teacher preparation programs to make an impact. Because these teachers are more likely to have 1-4 computers rather than regular access to a lab, instruction should focus on what is possible with the resources they are more likely to possess.

Results also reveal differences between preservice teachers participating in the field-based experience when compared to those enrolled in the on-campus course. Specifically, the field-based preservice teachers feel more unprepared for technology integration than their counterparts in the on-campus courses, while expressing stronger agreement with the statement that a teacher with novice technical skills is able to deliver an effective technology-rich lesson. This suggests that providing preservice teachers with a more authentic experience may result in differing perceptions regarding what a teacher needs in order to integrate technology. Preservice teachers in the field-based model, many of whom consider themselves novices, were required to plan and implement a technology-integrated lesson; therefore they are more likely to agree that it is possible for teachers to integrate technology, even if they do not have advanced skills. However, these preservice teachers also recognize a greater need for more preparation, which may result from experiencing directly what is involved with planning and implementing a technology-based lesson.

In addition, those participants in the field-based model were more apt to recognize that planning for technology-integrated lessons requires more time, and their responses showed stronger agreement that there is not enough time to implement technology-based lessons. This reflects a more accurate perception of the time that is involved in planning and implementing technology-rich lessons. During the initial data-gathering phase of this PT3 grant, methods and educational technology faculty expressed that the preservice teachers who participated in the traditional model of instruction held an unrealistic perception of the time involved in technology integration (Glazewski, Brush, & Ku, 2000). It is encouraging to see that those experiencing the field-based model hold a more accurate perception of time.

The limitations of this study, however, should not be overlooked. The small number of participants enrolled in the on-campus course who completed the survey may not adequately reflect the attitudes and perceptions of this group as a whole. For this reason, further research should attempt to obtain a larger sample. Doing so should increase the power associated with the statistical results, and, thus, account for a larger percentage of variance related to technology attitudes and perceptions.

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The Student Voice: Results of an Attitudinal Survey

Katharine A. Bohley, DBA
Assistant Professor of Business
University of Indianapolis, USA
kbohley@uindy.edu

Elizabeth A. Kiggins
Assistant Professor & Director, Center for Instructional Technologies
University of Indianapolis, USA
kiggins@uindy.edu

George Weimer, Ed.D.
Professor of Teacher Education and Music
University of Indianapolis, USA
weimer@uindy.edu

Abstract: This paper presents specific findings based on a three-year campus-wide student attitude survey of web-delivered learning. Since 1998, the University of Indianapolis has utilized Blackboard to augment and web-deliver courses. The survey collects demographic data and several attitudinal questions scored on a 5-point Likert scale. Additional open-ended questions are included. The survey consists of a web-based form administered anonymously institution-wide in all courses that have integrated the web into teaching and learning. Findings indicate that as time passed, students perceived their computer skills were more sufficient and that their computers were more adequate for the course requirements. Data indicate a negative correlation with the term in which the course was taken chronologically and instructor-student interaction, course pace, learned more, and required more time. Correlations among the data provide information for developing a useful distance learning attitude survey.

Introduction

The University of Indianapolis is an independent, comprehensive university affiliated with the United Methodist Church. Approximately 1,900 undergraduate day division, 900 graduate and 1,200 non-traditional students pursue credit in undergraduate, graduate, and continuing education programs.

The presenters have analyzed data collected from a student survey based on three years of institution-wide web-enhanced, web-based and distance learning courses using Blackboard. The online survey consists of demographic data and several attitudinal questions scored on a five point Likert-type scale (see end of paper). Additionally, open-ended questions are provided to the students. Anonymous responses are used to improve course offerings in the web-learning environment at the university. Implications of the data analysis reveal valuable information for colleges whose faculty and administrators have concerns about changing the traditional university interaction of faculty and students in a classroom.

The university utilizes Blackboard to support three types of web instruction: those using the web to augment instruction (web-enhanced), courses that have significantly reduced seat time (web-based) and courses delivered entirely via the web (distance learning). For the purposes of this paper, data have been aggregated by term. Further data analysis will be presented in the session.

Scope of Research

A total of 1410 students responded to the survey over the three-year period. Table 1 shows the breakdown of the respondents by semester. As indicated in Table 2, the number of male respondents was approximately 30%, and the number of female respondents was approximately 70%. This is representative of the university demographics. As indicated in Table 3, approximately 45% of the respondents were under the age of 20. Moreover, almost 85% of the respondents are under the age of 30. Less than 7.8% of the respondents were over the age of 41.

Term	Number of Respondents
Semester II, 1998-99	104
Semester I, 1999-2000	392
Semester II, 1999-2000	458
Semester I, 2000-2001	291
Semester II, 2000-2001	165
Total	1410

Table 1: Number of Respondents by Term

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	419	29.7	30.2	30.2
Female	970	68.8	69.8	100.0
Missing	21	1.5		
Total	1410	100		

Table 2: Gender

Age	Frequency	Percent	Valid Percent	Cumulative Percent
Under 20	63.5	45.0	45.8	45.8
21-30	536	38.0	38.6	84.4
31-40	108	7.7	7.8	92.2
41-50	80	5.7	5.8	98.0
Over 50	28	2.0	2.0	100.00
Missing	23	1.6		
Total	1410	100.0		

Table 3: Age

When asked if they understood the computer requirements before enrolling in the course, approximately 50% of the students agreed or strongly agreed. Approximately 30% of the respondents did not understand the computer requirements upon enrolling in the course. A large portion of the 30% occurred in the first year of offering the course in the web-based format during which the web-based requirement was not indicated in the schedule and the students were not informed of the format of the course when registering. As indicated in Table-4, understanding computer requirements is positively correlated with the term for the course; hence the students understand computer requirements more now than when the university first employed web-based learning. One reason for the correlation between understanding computer requirements and the term could be due to the following reasons: the web-based format was listed on the schedule after the first year and informal communication amongst students increased.

The next two variables addressed whether students had a sufficient computer and whether they had sufficient computer skills when enrolled in the course. Eighty-nine percent of the students reported to have use of a computer that was sufficient to meet the course requirements; however, almost 7% of the students did not have a computer or it was not sufficient for the course. Not only is the computer sufficiency variable important, it is essential to analyzing whether the students had the computer skills to take a web-based course. Over 90% of the students agree or strongly agree that their computer skills were sufficient for this course. Conversely, only 4% of the students did not feel that their computer skills were sufficient for this type of course. As indicated in Table-4, understanding computer requirements, having sufficient computer skills and having a sufficient computer are positively correlated with the term for the course, thus the longer the university employed courses in this format the more likely the students were to agree or strongly agree that they understood the requirements, their computer was sufficient and they had sufficient computer skills.

Besides computer variables, interaction variables (instructor available, sufficient instructor interaction, and sufficient student interaction) must be addressed. As in all courses, it is imperative to determine the student's perception of the instructor availability. Less than 8% of the students did not feel that the instructor was available to provide assistance. When evaluating the interaction, it is imperative to evaluate the student-to-student interaction and the student-to-faculty interaction. Eighty percent of the students reported the interaction with the instructor was sufficient. On the contrary, 9% of the students did not feel that the interaction with the instructor was sufficient. Sufficient instructor interaction was negatively correlated with the term; hence, students perceived that the instructor interaction was much greater when the web-based courses were first offered. The expectations and the numerous course offerings of courses in this type of format could be the reason for the negative correlation. The majority, 75%, of the students enrolled in this course believed that the student-to-student interaction was sufficient, however 7% of the students did not feel that the interaction with other students was sufficient.

In addition to computer and interaction variables, course variables were analyzed. The course variables analyzed in this paper are appropriate pace, appropriate delivery approach, organized material, learned more, required more time, enroll in more, and recommend this type of course.

Over 77% of the students reported the pace of the course was appropriate; however, 11% of the students did not feel that the pace of the course was appropriate. The course pace was negatively correlated with the term; hence the students reported that the course pace was not as appropriate as it was when the web-based course was fist offered. The change in technology and expectations could be reasons for these results.

Over 70% of the students enrolled in the course reported the delivery approach was appropriate. On the other hand, 10% of the students did not believe that the delivery approach was appropriate. Moreover, the majority of the students, 75%, believed that the course material was well organized. The key questions, "Did you learn more than a traditional course?", "Would you be interested in enrolling in more courses offered via this technology?", and "Would you recommend other courses delivered via the same technology?", were also analyzed. Over 44% of the students reported that they learned more in this course than a traditional course. Moreover, 43% of the students reported they spent more time in this course than a traditional course. However, the number of students reporting that they learned more and the courses required more time have declined over the three years, hence the negative correlation between term and these variables. The expectations and the numerous course offerings of courses in this type of format could be the reason for the negative correlation. The majority, 68% of the students reported they would be interested in taking another course in this type of format. As indicated in Table–4, there is a positive correlation between term and enrolling in more courses; hence, the students are more likely to enroll in web-based format courses now than three years ago. Finally, over 70% of the students reported they would recommend this type of format.

	CR	SC	CS	IA	II	SI	PA	LM	MT	DA	OR	EM	RE
TE	**	**	**	NS	n*	NS	n*	n*	n**	NS	NS	**	NS

NS indicates no significance

n indicates a negative correlation

* indicates a positive correlation at the .05 level

** indicates a positive correlation at the .01 level

Table 4: Correlation with Term

List of Variables:

CR = Understood Computer Requirements
SC = Sufficient Computer
CS = Sufficient Computer Skills
IA = Instructor Available
II = Sufficient Instructor Interaction
SI = Sufficient Student Interaction
PA = Appropriate Pace

LM = Learned More than a Traditional Class
MT = Required More Time than a Traditional Class
DA = Appropriate Delivery Approach
OR = Course Material Organized
EM = Enroll in More
RE = Recommend this type of course
TE = Term, Year of course

The majority of the students agreed or strongly agreed that they understood the computer requirements, their computer and computer skills were sufficient. Moreover, the majority of the students agreed or strongly agreed that interaction was sufficient; however, there is a negative correlation between instructors to student interaction. The majority of students agreed or strongly agreed that the course pace was appropriate, the delivery approach was appropriate, and the course material was organized. However, course pace was negatively correlated with the term. The majority of the students reported that they spent more time and learned more than a traditional class; however, there is a significant decline in students reported this over time. Finally, students would enroll in more courses in this format and they would recommend web-based courses to others

Recommendations:

Data analysis indicates that the survey items contained useful information. The exceptions are the items "On average, how much time did you spend in a week accessing course materials?" and "On average, how much time do you spend per week with a traditional course?" Student responses were vague and of little meaning. More data need to be collected to determine why there is negative correlation with the term and instructor-student interaction, course pace, learned more, and required more time. Otherwise the only survey additions we plan to make in the future will assist in collection of more specific demographic data such as department and school in which the course is offered, student's major, and full-time or part-time student. We also plan to add items asking each instructor what technologies they are using with their courses in addition to Blackboard. These may affect student responses to items relating to technology.

Distance Learning Assessment

Bio/Demo Information:

What is your gender?
☐ Male ☐ Female

What is your age?
☐ Under 20 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ Over 50

Country of residence? (International students, please provide your country): *(fill-in the blank)*

Computer-related Questions:

Which computer did you use most frequently?
☐ Macintosh ☐ Windows 95/NT ☐ Windows 3.1

Which Web browser did you use most often?
☐ Netscape 4.0 or later ☐ older version of Netscape ☐ I don't know
☐ Internet Explorer 4.0 or later ☐ older version of Internet Explorer

How did you most often access course materials?
☐ University computer lab or residence hall ☐ Direct dial-in to university
☐ IndyNet ☐ Other Internet Service Provider (AOL, GTE, etc.)

What is the speed of your modem?
☐ 28.8K ☐ 33.6 K ☐ 56 K A direct connection ☐ I don't know

How much memory is installed on your computer?

☐ Less than 16MB ☐ 16MB ☐ 32MB ☐ 64MB or greater ☐ I don't know

Likert Scale:

1 –Strongly Agree	**2 –Agree**	**3 – Undecided**
4 – Disagree	**5 – Strongly Disagree**	**6 – N/A**

I understood course requirements before I enrolled: 1 2 3 4 5 6
My computer was sufficient to access the course materials: 1 2 3 4 5 6
My computer skills were sufficient for this course: 1 2 3 4 5 6

Technical Issues:

I did not encounter any technical problems when I tried to access course materials: 1 2 3 4 5 6

If any, what types of technical problems did you encounter while trying to access course materials? Please give error messages if you recall them. *(Short answer)*

Course Information:

Course being evaluated: *Student selects course from a drop-down menu*
In which term are you enrolled? *Student selects term from a drop-down menu*

What is the level of the course?
☐ Undergraduate ☐ Graduate ☐ Continuing Education

The course briefing/orientation (if you received one) explaining how to use the software was helpful in making the most of the course: 1 2 3 4 5 6
The instructor was available to provide assistance: 1 2 3 4 5 6
My interaction with the instructor was sufficient: 1 2 3 4 5 6
My interaction with other students was sufficient: 1 2 3 4 5 6
The pace at which the course progressed was appropriate: 1 2 3 4 5 6
I learned more in this course than in a traditional course: 1 2 3 4 5 6
The course required more time than a traditional course: 1 2 3 4 5 6
The delivery method used in this course was appropriate: 1 2 3 4 5 6
Course materials were well organized: 1 2 3 4 5 6
I would be interested in enrolling in more courses offered via this technology: 1 2 3 4 5 6
I would recommend other courses delivered via the same technology: 1 2 3 4 5 6
Was your Internet access to the course adequate? Please explain: *(short answer question)*
What are the strengths of offering a course via this technology? *(short answer question)*
What are the weaknesses of offering a course via this technology? *(short answer question)*
What would you change about how this course was taught? *(short answer question)*
On average, how much time did you spend in a week accessing course materials? *(short answer)*
On average, how much time do you spend per week with a traditional course? *(short answer question)*
Please list any additional comments you may have: *(short answer)*

Optimizing informal learning experiences in the home and school

Helen Brown
Research Project Manager
British Educational Communications and Technology Agency (BECTa)
helen_brown@becta.org.uk

Abstract: This paper describes an array of research projects that explore the use of ICT within the home and other informal settings to enhance motivation, learning outcomes and contribute to the attainment of children in school.

It is important for teachers, researches and policy makers to be more aware of the ways children are using computers in the home. New evidence from longitudinal research projects in the UK suggests that effective integration of ICT within the school environment is constrained by: -

- an underestimate of children's experience and facility with ICT
- a lack of appreciation of the power of collaborative environmental environments made possible by ICT
- a narrow conception of knowledge and its construction
- lack of time and opportunity for teachers to explore the Internet and engage in purposeful but playful activities that contribute to confidence and vision.

This paper reports on the findings of major longitudinal studies commissioned by the UK Government. The impact of informal learning on pupil attainment at school will be discussed in the light of important issues identified as subjects for current and future research.

There is untapped potential in greater home-school linkage and collaboration. The wider learning environment in which children can flourish needs to be understood more fully. In the UK research projects are currently exploring the possibilities of raising pupil attainment through new forms of home school collaboration. Such research recognises the undervalued knowledge and skills of parents, peers, extended family and global www communities.

Recent longitudinal studies have found that the ways children learn to use computers at home are markedly different from the ways they use them at school. Alongside a huge investment of UK Government funding in the National Grid for Learning (NGfL), new technologies are being adopted very rapidly in a majority of homes. Schools are currently coping with children who have an increasingly broad range of computer skills and very high expectations of ICT.

Traditional approaches to schooling may not optimize the exciting possibilities offered by ICT such as the development of higher level conceptualization, better problem solving, more complex collaborative learning in small groups. The British Educational Communications & Technology Agency (Becta) is engaged in several research projects to seek reliable measures for identifying and documenting the impact of home based informal learning activities in relation to attainment in school.

Becta is managing the largest and most comprehensive national study of the impact of ICT on the attainment of pupils from 1999-2002. This study, known as ImpaCT2, involves 60 schools in England and over 2000 pupils. The researchers indicated in their early finding that exposure to networked technologies may impact on learning in ways that are not reflected in formal tests of attainment in Mathematics, Science and Literacy. Nevertheless the skills and attitudes acquired in informal settings may well be essential to developing effective learning strategies.

ImpaCT2 has five specific aims to:

- identify the impact of networked technologies on the school and out of school environment
- determine whether or not this impact affects the educational attainment of pupils aged 8-16 years
- provide information that will assist in the formation of national, local and school policies on the deployment of ICT

To do this the researchers

- devised innovative new methods of assessing pupil attainment and
- devised a framework for measuring the ICT environment.

The ImpaCT2 study makes the assumption that there are new empirical and conceptual challenges involved in attempting to identify a causal relationship between children's use of ICT and improvements in their attainment. The findings show widespread use of ICT across all school age children, with those who use computers at home tending to use them more frequently and confidently at school:

- 80% of UK school pupils now have a computer at home
- primary school children (aged 8-11 years) spent three times longer on ICT at home compared with school and secondary pupils (aged 11-16 years) spent four times longer.
- 52% of primary and 67% of secondary pupils had e-mail addresses
- 14% of primary and 67% of secondary pupils had created their own web page

The research suggests that schools with greater ICT resources may provide more opportunities for children to create web pages, encourage children to have an e-mail address and may have a positive influence in persuading parents to buy a home computer.

Although many children and young people are positive about using computers in the home, many are disillusioned with school ICT. Often they find the restrictions on Internet access frustrating and the speed of individual PCs or networks are less efficient than they experience in the home. Although it is recognised that important forms of learning takes place both in homes and classrooms, teachers and parents and children rarely have the opportunity to share, discuss and use their experiences and skills.

There are some important differences emerging in the ways in which adults and children experience this new technology. When children and young people use the computer for pleasure they learn by playful discovery and experimentation. They ask family, friends and use electronic help frequently such as chat rooms and web sites. Their use of computers at home tends not to include educational software but they do choose to write, design and play games (often in group situations on or offline).

Teachers are increasingly being asked to develop innovative ways of teaching with ICT. In particular they are asked to use the Web to develop new ways of communicating with parents, children and colleagues.
There is a growing concern that teachers have little time to integrate ICT meaningfully into the school curriculum and ironically they feel that pressure of work prevents them for 'surfing' and exploring the www. Their experience of learning via the web is thus very different from that of children who tend to find serendipitous links and spend a lot of time discovering interesting resources and passing on links to friends.

Many schools are utilizing ICT by integrating it into subject teaching, and an increasing number are encouraging pupils to carry out internet-based research out of school. Schools are also using the Internet and e-mail to make global links within class time. There is a growing challenge for teachers who are then asked to mark computer produced homework. They are also facing the consequences of differential access in the home which can make it difficult to know how best to compensate for the digital divide within the school environment

Previous research has strongly indicated the beneficial outcomes of using ICT in education. Factors such as learner engagement, enhanced enjoyment, increased commitment to the task; increased autonomy and self-esteem are frequently mentioned (Cox 1997, Someck 1996, Bonnet et al 1999, Davies & Somekh 1997 and Cole 2000). However there is a complex web of social, cultural and economic factors impacting on educational standards and attainment. This makes it very difficult to isolate or extrapolate the direct effects of ICT on teaching and learning.

The ImpaCT2 study has so far found a strong relationship between access to computers and the Internet at home and socio-economic status. The high cost of UK Internet access and software packages means children in less affluent homes are prevented from using information technology to its fullest potential, while those in wealthier families are able to enhance their learning with a treasure trove of online information at their fingertips.

Both children and teachers took part in this research, which used innovative methods of data collection. Sixty schools took part in the research and in each a *teacher researcher* was given a laptop computer to help them record and communicate data. In each school pupils carried out independent research by keeping weekly logs of ICT usage and interviewing fellow pupils. Pupil questionnaires were used to collect data on ICT activity at home and school, and concept mapping was used to gain insights into children's ideas about how they visualize the current use and future potential of networked computers.

Instructional Design Strategies for Summer Online Courses

Sue-Jen Chen
Department of Specialty Studies, Watson School of Education
University of North Carolina at Wilmington
United States
chensj@uncwil.edu

Abstract: One may think that a summer online course is just a condensed version of a regular semester online course. If the instructor squeezes an 18-week semester of course material into a 6-week time frame, and the students triple their time and efforts studying online, then the outcomes of learning should be the same. In fact, due to the nature of online learning, different instructional strategies should be used for the design and delivery of short- and long-term online courses in order to maintain the quality of learning without reducing the amount of instruction. A combination of objectivist and constructivist instructional methods was used for the design of a short-term summer online course. It yielded positive results.

With the rapid growth of technology and the wide spread concept of life long learning, academic institutions are rushing headlong into the distance education arena and are offering a variety of online courses not only during regular semesters but also during summer sessions. One may think that a summer online course is just a condensed version of a regular online semester course. It works the same way as face-to-face classroom instruction. If the instructor squeezes an 18-week semester of course material into a 6-week time frame and the students triple their time and efforts studying online, the results of learning should be the same. In fact, due to the nature of online activities, usually both teachers and students invest much more time on online learning tasks compared to the same course taught in a traditional classroom. Besides the time factor, long-term and short-term online courses work very differently in many ways; consequently, different instructional strategies should be used for the design and delivery of summer online courses in order to maintain the quality of learning without reducing the amount of instruction.

The positive value of employing constructivist learning theories in the design of online learning environments and activities has been supported by the educational literature (Hannafin, Land, & Oliver, 1999; Palloff & Pratt, 1999, 2001). Recently, with the move of constructivism into education, there is a growing interest among teachers and instructional designers in adopting constructivist philosophy of teaching and learning in the design and delivery of their online courses. However, constructivist-based learning activities require more time and effort from both the instructor and the students. There will be no problem if a constructivist-based online course is offered during the regular semester. Students have sufficient time to work collaboratively with their peer learners to construct knowledge or to solve assigned problems through authentic learning activities. However, it would be a challenge for the instructor to implement the same instructional method in a summer online course given that he/she only has one-third of the regular semester hours to cover the same amount of course material and to achieve the same objectives.

The effects of traditional objectivist instructional design theories derived from behaviorism and cognitive psychology have long been acknowledged and commonly used by educators in various learning environments. The objectivist instructional design models advocate systematic planning of instructional materials and learning activities so that students can follow through the prescribed steps to obtain the desired learning outcomes. This school of theories grants to instructors the control of learning such as environment, materials, students, activities, and time. Efficiency and predictability are some of the strengths of objectivist-based instruction.

If time is the essential factor affecting the success of short summer online courses, instructional designers may consider using a hybrid approach for the design of the summer online course, which combines the strengths of objectivist and constructivist methods of teaching and learning. The intention of this paper is to share my experiences of designing and teaching long- and short-term online courses in the past year.

A short 6-week summer online course was designed based on the constructivist learning environment design model suggested by Jonassen (1999). The course was offered during the summer I session. The result of implementation was far from expected due to insufficient time for communication and collaboration, which are essential for constructivist learning. A decision was made to employ both objectivist and constructivist instructional methods in the revision of the course, which was offered again during the summer II session. The revision included:

Course orientation –

. Instead of asking the students to go through the entire tutorial in order to learn how to use the course management system to take the course, selecting only those tools that would be used in the class.

. Developing a step-by-step job aid.

. Including the job aid in the course resources.

. Integrating a practice of these tools into the course orientation activities and made the practice as an assignment prior to the start of the course. For example, asking the students to post an introduction of themselves to the forum, send an e-mail about their expectations of the course to the instructor, upload their digital picture to the online folder, etc.)

Instructional design of the units – The course contained four units.

. Selecting a unit pertaining to the potential for problem-based learning, but the level of difficulty and complexity of the problem was manageable and accomplishable within a 2-week time frame to be the group project, and using constructivist approach to design this unit.

. Applying objectivist instructional design principles to design the rest of the three units.

. Prescribing detailed instructions on content, class activities, and assignments.

. Providing detailed assignment procedures, rubrics, and criteria for grading.

. "Clarity" was the key for designing the units using the objectivist approach.

Class activities or learning community -

Although the objectivist approach was employed in the design of the majority of the units, most learning activities were designed based on the constructivist learning theories. A big learning community involved the entire class members and four sub-communities consisted of only the members of the groups were formed. Students were advised to work collaboratively not only on the group project but also on the individual projects. The goal of collaboration was for the students to assist each other in obtaining a better quality product. Students were also made aware that their contribution to the teamwork would be graded.

The revised course was well received and highly rated on the students' evaluation at the end of the class. On the exit reflection, most students indicated the following as the most helpful features of the course: clear instructions on how to use the tools to take the course, the assignment criteria and rubrics, quick response from the instructor, and the in-time feedback on draft assignments from the instructor and the classmates. In conclusion, a short summer course, in order to be effective, should employ a combination of objectivist and constructivist instructional design approaches.

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Advancing Teachers Through Stages of Adoption of Technology in the Classroom

Rhonda Christensen
Institute for the Integration of Technology into Teaching and Learning
University of North Texas
United States
rhondac@tenet.edu

Gerald Knezek
Institute for the Integration of Technology into Teaching and Learning
University of North Texas
gknezek@tenet.edu

Abstract: Stages of Adoption of Technology are used in conjunction with other assessment instruments to determine attitude, skill and technology access changes that assist in moving a teacher further along in his/her level of classroom technology integration. Prototypical characteristics are used to formulate strategies for professional development in advancing teachers toward higher stages of adoption. This paper summarizes characteristics at each stage of adoption and address issues faced in promoting transitions from one stage to the next. Example strategies that could foster transitions are also provided.

Introduction

Stages of Adoption (Christensen, 1997) is a self-assessment instrument of a teacher's level of adoption of technology, based on earlier work by Russell (1995). There are six possible stages in which educators rate themselves: Stage 1 - Awareness, Stage 2 - Learning the process, Stage 3 - Understanding and application of the process, Stage 4 - Familiarity and confidence, Stage 5 - Adaptation to other contexts, and Stage 6 - Creative application to new contexts. These six stages form an ordered continuum that has been shown to function as a reasonable interval-level measurement scale (Knezek & Christensen, 1999).

Teacher attitudes can be differentiated according to levels that characterize each stage of adoption. Instruments used for skill and attitude assessment are described in the following section.

Attitude/Skill Measurement Scales

Several information technology attitude instruments were developed and validated by the authors during 1995-98. One of these instruments, plus a second authored by Ropp (1999) with a focus on technology proficiency, form the core of the stage classification data presented in this paper. Each instrument used in this study is briefly described in the following paragraphs. More detailed information is available in the book *Instruments for Assessing Educator Progress in Technology Integration* (Knezek, Christensen, Miyashita, & Ropp, 2000).

The Teachers' Attitudes Toward Computers Questionnaire (TAC) (Christensen & Knezek, 1998) measures seven major indices regarding teacher attitudes. These scales are: 1) Enthusiasm/ Enjoyment, 2) Anxiety, 3) Avoidance/Acceptance, 4) E-mail for Classroom Learning, 5) Negative Impact on Society, 6) Productivity, and 7) Semantic Perception of Computers. Internal consistency reliabilities for these scales typically range from .87 to .95 with K-12 teacher data (Christensen & Knezek, 2001).

The Technology Proficiency Self-Assessment Instrument (TPSA) was included to gather data on teacher competencies (Ropp, 1999). This instrument was selected because it has good reliability and measures skills recommended by the International Society for Technology in Education (ISTE) for all K-12 teachers. Four of

Ropp's measurement scales (with five items each) were included: Email, Integrated Applications (IA), Teaching with Technology (TT), and the World Wide Web (WWW). Respondents rate their skills on a scale of 1 (strongly disagree) to 5 (strongly agree). Reliabilities for these four scales ranged from .78 to .88 for K-12 teacher data gathered from 417 respondents in Texas during 1999.

Study 1: Relationship of Attitudes to Stages of Adoption

In an initial study conducted using the Stages of Adoption instrument in 1998, the average Stage of Adoption value across a sample of 1,135 educators was 4.13, with educator representation falling in each of the six stage categories (see Fig. 1). High correlations were found between stages of adoption and computer anxiety (r = .67, p <. 0005, N = 973), in the direction of higher stages being associated with reduced anxiety. Higher stages of adoption were also strongly associated with increased computer enjoyment r = .60, p <.0005, N = 973). Background information was gathered regarding home access to computers and the Internet. To determine whether use of a computer at home or access to the WWW at home made a difference in a teachers' stage of adoption, t-tests were carried out. Findings were that both home use of a computer and home access to the Internet were very strong discriminators for high or low stages of adoption (Knezek & Christensen, 1999). The nature of the relationship appears to be that home access makes a large contribution to technology integration advancement at the higher stages.

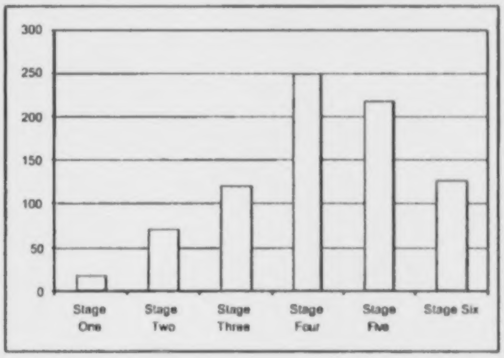

Figure 1. Distribution for stages of adoption of rural Texas educators, 1998.

Stage One Teachers

As shown in Tab. 1 and Fig. 2, teachers who were in Stage One (awareness) rated themselves lowest (among those in the six stages) in computer enjoyment, computer avoidance, Email, productivity and overall perception of computers. They rated themselves as being more anxious toward computers and more negative in their feelings about the impact of computers.

Factor	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
F1 – Enjoyment	2.97	3.15	3.39	3.62	3.85	4.12
F2 – Anxiety	2.59	2.67	3.22	3.58	4.01	4.44
F3 - Avoidance	3.36	3.62	3.79	3.93	4.08	4.28
F4 - Email	3.14	3.08	3.13	3.23	3.30	3.62
F5 – Negative Impact	3.13	3.11	3.40	3.62	3.70	3.96
F6 – Productivity	2.88	2.98	3.10	3.28	3.39	3.62
F7 – Semantic Perception	4.58	4.55	5.02	5.44	5.77	6.13

Table 1. Attitude factors by stage of adoption of technology for 1141 rural Texas teachers, 1998

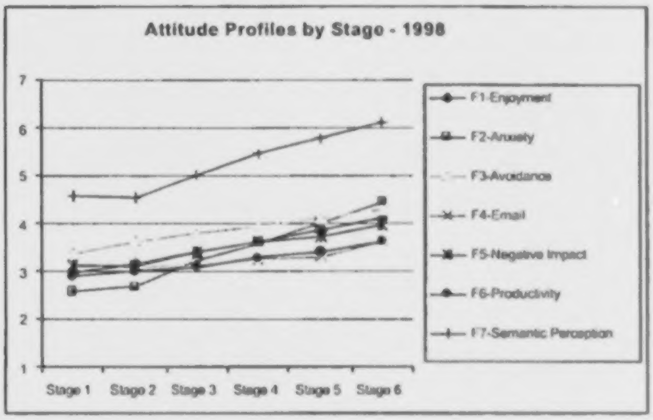

Figure 2. Teacher attitude profiles by stage for rural Texas educators, 1998

Stage Six Teachers

Teachers who reported being in the sixth stage of technology adoption had the highest mean scores among the six stages of adoption category groupings in computer enjoyment, Email, productivity, and semantic perception of computers. This subset of teachers also rated themselves the lowest of all the groups of teachers in anxiety, computer avoidance, and a negative feeling toward the impact of computers.

Study 2: Attitudes by Stage and Home Access

In spring 2000, data were gathered from 344 teachers in a west Texas urban school district near the international border with Mexico. As shown in Fig. 3 attitude profiles by stages were similar to those previously reported for the 1998 rural sample.

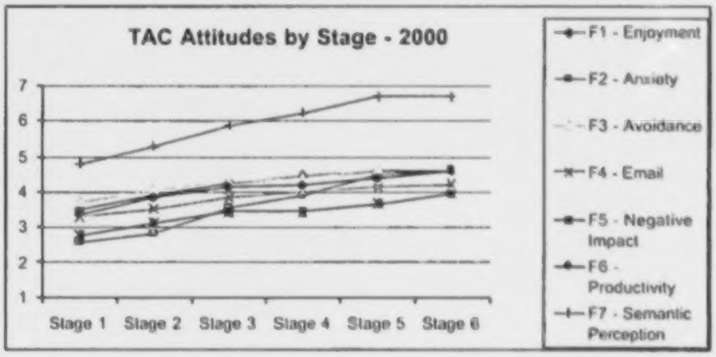

Figure 3. Teacher attitude profiles by stage for urban Texas educators, 2000

Influence of Home Access

In a 2001 study in the same urban district with a sample of 117 teachers, almost 85% reported having access to a computer at home while only 57% reported having access to the Internet at home. Tab. 2 and Fig. 4 show the near linear relationship between stages and computer access at home.

Stage	No Home Comp	Home Comp
Stage 1	0	0
Stage 2	3	6
Stage 3	6	13
Stage 4	3	21
Stage 5	3	25
Stage 6	1	31

Table 2. Stages of technology integration by home computer access, Laredo teachers 2001

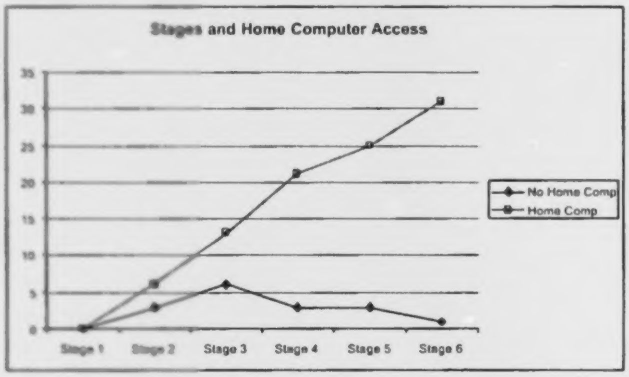

Figure 4. Stages of adoption and home computer access

This same sample of teachers also reported the frequency in which they used computers for student learning activities in their classrooms. As shown in Tab. 3 and Fig. 4 it is the teachers at the highest stages who use computers more frequently with their students for learning activities.

Stage	Never	Occasionally	Weekly	Daily
Stage 1	0	0	0	0
Stage 2	0	3	3	3
Stage 3	2	7	5	5
Stage 4	1	10	4	8
Stage 5	0	9	6	11
Stage 6	1	6	7	18

Table 3. Teacher-reported frequency of computers for student learning activities, Laredo 2001

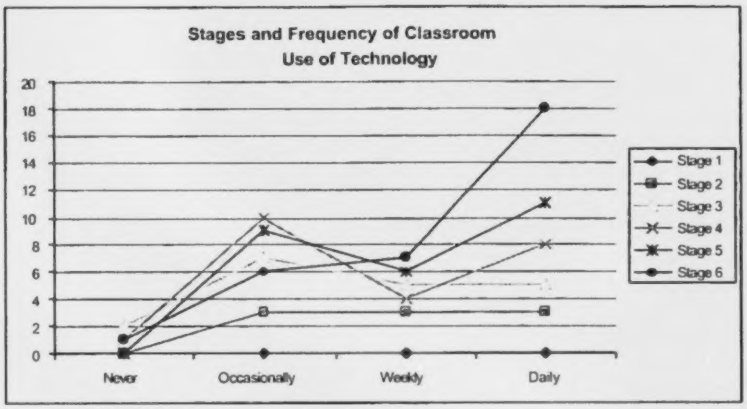

Figure 5. Stages and frequency of classroom use of technology

Discussion

As shown in Fig. 3, many Stage One and Stage Two teachers appear to have high levels of anxiety toward computers (F2). However when teachers reach Stage Three they begin to become less anxious and continue to become less anxious progressively throughout Stages Four, Five, and Six. Teacher education might focus on these Stage One and Stage Two teachers to reduce their anxiety by educating teachers in something that will apply immediately and then move on to classroom integration after they lower their anxiety and gain confidence in using technology.

Profiles of characteristics of educators in various stages of adoption allow the formulation of strategies for promoting advancement to the next higher stage. The concepts of will (attitudes), skill (competencies) and information technology tool access are conjectured to be essential parameters determining whether or not smooth transitions occur from stage to stage. However, simultaneous improvement in all three areas may not be necessary. These findings have ramifications for decision makers seeking to plan the most efficient and productive professional development growth path for technology-using educators.

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Teaching Technology Infusion to In-Service Teachers: A Case Study

Beth Coghlan
Mississippi State University
United States
bnf6@ra.msstate.edu

Stephanie Davidson
Mississippi State University
United States
stephaniedaviso@hotmail.com

Dwight Hare
Mississippi State University
United States
rdh1@ra.msstate.edu

Melissa Nail
Indiana State University
United States
eenail@befac.indstate.edu

Mike Lehman
Mississippi State University
United States
mdl1@ra.msstate.edu

Abstract

As school administrators increasingly see the importance of teachers using technology, there is a demand for technology related professional development for in-service teachers. As an on-going evaluation of a federally funded technology innovation grant, the researchers conducted a case study of a week long summer training session for teachers involved in the grant. The goal of the workshop was to help teachers integrate technology into their own curriculum plans. This study was designed to examine the development of relationships between the teachers and the trainers.

The researchers found characteristics of trainers associated with more teacher involvement and interest in technology use. Trainers who view themselves as learners and understand the difficulties of learning technology skills are more productive with teachers. On the other hand, trainers who present themselves as experts on technology often develop negative working relationships with teachers. This case study provides practical implications for successful professional development.

Introduction

There is an ever-increasing demand for more effective ways to deliver instruction in the classroom. Technology use is an avenue that many education professionals are exploring to address this demand. To promote the enhancement of delivery of instruction in middle school classrooms in four schools in Mississippi's second congressional district, the CREATE for Mississippi project was implemented. A federally funded project, CREATE for Mississippi, is a technology innovation grant originally intended as a five-year grant that is being funded on a yearly basis. The project's main goal is to support the educational technology initiative in the state of Mississippi. CREATE addresses four main areas that have been identified in the literature as barriers of technology infusion instruction. These barriers are lack of time, training, equipment, and support. The barriers of lack of training and support are addressed in the 2001 Summer Training Session of new CREATE core teachers.

In the summer of 2001, the second year of the project, a group of teachers from the Congressional District 2 (CD2) of Mississippi attended a workshop for a week on the campus of Mississippi State University as part of their obligation as core teachers or as educational technologists. The new CREATE core teachers were a group of 16 teachers from the Delta area of Mississippi. These teachers are mostly veteran educators in economically challenged school districts. The summer training session aided the teachers in improving their method of instructional delivery through technology integration. Four teachers and one ET from three of the four schools from CD2 involved in this project participated in the workshop. Only three teachers from one of the schools were at the workshop.

The goal of the workshop, as well as the CREATE for Mississippi project, was to help teachers integrate technology into their own curriculum plans. The training available at this training session was provided through the CREATE staff and teachers and an ET from CD1. The barrier of lack of support is addressed by the presence of the CREATE staff and core participants from CD1 who will serve as mentors during the 2001-2002 school year. The workshop trainers focused on teaching the teachers basic computer skills while assisting them to create lesson plans infused with technology. Throughout the year, each teacher will be expected to create at least three more technology-infused lesson plans to be published on the CREATE website (www.create4ms.org) in conjunction with using technology in their teaching. The goal is that these teachers will become comfortable enough with technology to mentor other teachers in their schools to use technology in their teaching plans as well. The interactions and relationships developed among the teachers from the four core schools and between the new core teachers and training staff will be explored in this paper.

CREATE for Mississippi

CREATE is an acronym for Challenging Regional Educators to Advance Technology in Education. CREATE for Mississippi is a federally funded Technology Innovation Challenge Grant (TIGC) that is presently in operation in three congressional districts in the state of Mississippi. The major thrust of the CREATE project is to provide training and support for participating schools in order to advance their technological capabilities.

Four core subject area teachers were chosen by the school administrator at each school. The four core teachers will receive on going training on technology equipment and software. The core teachers are responsible for mentoring other teachers in the school and for developing lesson plans to be submitted to the CREATE staff. The core teachers are allotted one hour a day to work on technology integration. This one hour is designed for the teacher to find useful websites, write lesson plans, work with the ET, or perform any other task that is related to their growth in technology,

The CREATE project includes a component that addresses technology availability in the school. Through the project the core teachers have access to technology equipment designed to enhance classroom instruction. Teachers are provided with a technology support cart with components such as: (a) computer, (b) wireless keyboard, (c) scanner, (d) digital camera, (e) flex camera, (f) video editing hardware, and (g) digital video camera. The teachers also have access to a fifteen-unit wireless laptop cart in addition to a laptop strictly for teacher use.

Another component of the CREATE project is the support provided to the core teachers. This support is provided through the availability of the Educational Technologist (ET). The ET is responsible for providing teachers with technology training and just- in-time support. The ET serves as a liaison between the teachers and the unfamiliar technological grounds that they may tread. The ET is also responsible for the development of the student technology team.

The student technology team is monitored and trained by the ET. The student technology team is responsible for correcting problems that the teachers may encounter while infusing technology in lesson delivery or planning. The technology team is also available to train teachers and to be trained on new software that is available. The ET provides professional development sessions for the core teachers in the school as well as the non-participating teachers.

2001 Summer Training Session

During the week of June 11-15, 2001, 15 core teacher and 3 ET's from 4 schools in CD2 received technology training at Mississippi State University. The training sessions were conducted by the staff of CREATE for Mississippi as well as teachers and an ET from CD1. The teachers attended sessions on the use of Microsoft PowerPoint, Microsoft Excel, Microsoft Word, digital cameras, scanners, printers, and laptop computers. The sessions were eight hour sessions during the day with additional two hour sessions at night. The teachers were given the opportunity to create permanent products for personal use or for school use during the day sessions. The evening sessions were designed for the development of technology infused lesson plans to be presented on the final day of the week-long session.

Mississippi Delta

The Mississippi Delta is a region of the state that is marked by casinos and cotton fields and set to the rhythm of the blues. This region of the state is known for its rich soil and its flat land. The major source of employment for Deltans is industry and catfish farming. With a very slow economy, many Delta school districts are desperate to improve the quality of the schools in order to improve the quality of life in the Delta. Many Delta school districts face a critical need for teachers. There are two universities located in the heart of the Delta. Both of these universities have teacher education programs that offer teacher certification for graduates. Despite the fact that these universities produce the teachers, the graduates opt to leave the Delta for more attractive economically desirable locations. Technology is not very prevalent in the Mississippi Delta schools. The schools struggle to operate on a yearly basis just to meet the demand for required material for the teachers. . Many Delta schools receive technology assistance through educational grants that offer equipment to school teachers and school districts.

Despite such a bleak appearance, the Mississippi Delta has a creative legacy that includes more than the music of the blues that was born in the Delta. Playwright Tennessee Williams spent his childhood in the Delta and modeled many of his characters and locations after real people and places. The annual Tennessee Williams Festive includes tours of these locations as well as performances of the playwright's work. Thomas Harris, author of *Silence of the Lambs* and *Hannibal*, was also a Delta native. Southern writer Willie Morris grew up in Yazoo City and immortalized his hometown in the book *My Dog Skip*. Morris is buried 13 paces from the grave of the Witch of Yazoo, a site made famous by a film version of his memoir.

Participants

The participants of the summer teacher workshop were teachers and ET's from four schools located in CD2 and the Delta. The sizes of the school districts range from 944 students to 7942 students. According to the state accreditation rating ranging from one (lowest rating) to five (highest rating), the four school districts have an accreditation level of two. The participants were four math teachers, three social studies teachers, four language arts teachers, three science teachers, one gifted teacher who is the science representative for the school, and 3 ET's. The teachers' years of experience as a certified teacher range from none to 30 years.

Years Teaching Experience by Each Core Teacher

	Muddy Waters	Shelby Foote	Manning	Muddy Waters
Math	4	12	13	25
language arts	4	21	18	23
Science	10	18	18.5	24
social studies	30	1	8	not in attendance

The Study

In CREATE's first year of operation there was extensive and continuous communication between the teachers in the core schools and the CREATE staff. During this year, there were many visits made to the schools by the staff, and the teachers made visits to Mississippi State University for training. Because of the long distance e-communication that existed between these two entities, there was some miscommunication along the way the ultimately there were elements of mistrust that arose.

The lack of trust that existed between the staff and the teachers manifested itself in the form of weak relationships between the two. This manifestation hindered the excellence of the project on the part of the teachers and the CREATE staff. The teachers were not comfortable with presenting their problems to the staff or asking for assistance with problems related to their optimum achievement in their participation in the project. The staff was at a loss because they were unsure of how to communicate with the teachers to find out where their weaknesses were and how to help the teachers solve these impending problems.

The researchers were members of the evaluation team during the first year of the project which included schools from the Mississippi Congressional District 1 (CD1). They have discovered that the development of trusting relationships is vital to the growth of the teachers as a result of the project. Since a major component of CREATE for Mississippi is the mentor-model, the researchers examined how the teachers from CD2 felt about the training staff during the one-week workshop.

Findings

When working with teachers, the researchers have found characteristics in the trainers that help create effective relationships between the trainers and teachers. The trainers who understand the situations that teachers face in the classroom are more productive when instructing the teachers how to integrate technology into their curriculums. The trainers who view themselves as learners and understand how difficult learning new technology can be are also more helpful to the teachers. On the other hand, the trainers who are see themselves as experts on technology while viewing the teachers as less intelligent or less capable of learning technology are often viewed negatively by the teachers. These trainers are less effective with the teachers and eventually develop a negative working relationship with these teachers. These trainers have become frustrated with the teachers and eventually stop attempting to help the teachers learn about topic discussed.

The researchers found that the week-long training session was instrumental in helping to start the relationship development process. The teachers seemed hesitant to communicate at first, but as the week progressed, many relationships developed. Teachers from different schools developed relationships with each other, and the teachers developed relationships with the training staff.

The teachers were very open, down-to-earth people with one common goal which was to gain valuable experiences through technology training. The CREATE staff was very receptive and open to the teachers and made themselves readily available to the teacher at all times. Although during the training sessions the teachers sought help from any staff member available, there were two staff members in particular that the teachers relied on heavily on for assistance. These two staff members were Jimmy and Rose. Jimmy and Rose are two the newest members of the training staff. One interesting observation made about Jimmy and Rose is that many times teachers would pass up another staff member to get help from one of the two.

Rose is a young, energetic European American female. Rose has had experience teaching in the public schools as well as experience working with teachers in a grant-related position. Rose is responsible for serving as a liaison between the staff and the teachers in the schools. This position with the staff has offered her invaluable experience in knowing how to communicate with the teachers and developing and maintaining trust. The only problem that arose during the first year of the project with Rose was teachers associating her so closely with the other staff members. When the teachers were dissatisfied with the other staff members, they also felt negatively about Rose although she had nothing to do with the problem. As the year progressed, the teachers began to feel more comfortable with Rose.

Not only did the teachers at the workshop develop a professional relationship with Rose, but they were beginning to establish semi-personal relationships with her as well. Through the week, Rose used very personable language to communicate with the teachers, and she dressed in a very comfortable teacher-like fashion. She could often be observed practically running around the room wearing tennis shoes and her hair pulled back in a ponytail trying to answer the call of everyone who requested her help.

Jimmy is a young, technologically-gifted European American male. Unlike Rose, Jimmy does not have teaching experience. Jimmy has, however, used his savvy technology skills to conduct technology training workshops for several agencies. In addition to Jimmy's training experience, he has been a part of the business world. In this capacity, Jimmy's position was comparable to customer relations. This experience has offered Jimmy the skills needed to be a people centered person. Jimmy has also worked with the project for close to a year in a multifaceted capacity. The bulk of his responsibility was to go to the schools and conduct professional development sessions with the teachers. This experience has been a plus in helping Jimmy to effectively communicate with the teachers and in earning their trust. Jimmy, like Rose, could often be found throughout the week scurrying about offering assistance to the teachers during sessions.

The rest of the staff during this week were effective in their roles but did not establish a connection with the teachers like Jimmy and Rose. The teachers did not seem to respond to those staff members who were more formal in their manner and dress. The complaints from the teachers about these persons were that they were too serious, often boring, and not personable. Teachers complained that these trainers seemed to be unable to relate to them on their level of knowledge of technology and teaching.

On the last day of the session, the researchers used a questionnaire to discover how the teachers felt about the relationships that they built with the staff during the week. Through conversations, the teachers revealed that there were members of the training staff that they preferred not to ask for assistance. In direct contrast to this fact, all of the responses on the questionnaires were positive. On the questionnaires, none of the teachers mentioned being uncomfortable with anyone on the training staff. This may be attributable to the fact that the project manager was in direct contact with the teachers as they were completing the questionnaire. The teachers may not have felt comfortable enough to reveal their true feelings or the feelings that they expressed during casual conversation.

The researchers concluded that there were positive relationships developed between the staff and the teachers during the training session. The researchers believe that the working relationships between the staff and the new teachers for the upcoming years will be more beneficial to everyone involved for the success of the grant. It is the belief of the researchers that the teachers will relate better to staff members who are open and appear to be friendly. This study has shown that positive interaction fosters relationship building. Relationship building, in this case, creates the environment for a productive year for the CREATE project.

Assessing and Predicting ICT Literacy in Education Undergraduates

JoAnne E. Davies
Michael Szabo
T. Craig Montgomerie
Department of Educational Psychology
University of Alberta
Canada
joanne.davies@ualberta.ca
mike.szabo@ualberta.ca
craig.montgomerie@uaberta.ca

Abstract: This study developed computerized testing procedures for selected procedural and declarative knowledge and skills of undergraduate students in an introductory, required instructional technology course. Examination of participant demographic information shows ICT skills seem to be rising as a function of increased exposure to technology in K-12 schools, but it is insufficient for mastery. In addition, a multiple regression model of predicting success based on intellective and non-intellective variables was tested. It was found that the intellective variable computer experience and the non-intellective variables gender and computer self-efficacy predicted ICT skills. The intellective variable general academic ability predicted declarative skills only (not procedural skills). Implications for individualized assessment and instructional programs are presented.

Introduction

In recent years, the view that Information and Communication Technology (ICT) is vital in K-12 education has become widespread. ICT use in schools has increased and various professional bodies have set ICT standards for students and teachers (e.g., ISTE, 1998; Alberta Learning, 2000).

When "embedded within practices and activities that realize its functionality for specific purposes and situations" (Réginald Grégoire inc. et al., 1996), ICT may contribute to various aspects of teaching and learning such as: (1) greater motivation, attention span and concentration, (2) stimulation toward deeper investigation of subjects, (3) cooperation and collaboration, (4) more authentic learning environments through simulations, virtual experiences, and graphic representations, (5) increased teacher interaction and mentoring, (6) more demanding forms of assessment, (7) better teacher access to learning resources, and (8) more collaborative professional development.

Questions abound as to whether teachers have the skills that their students are expected to attain (Milken Exchange on Educational Technology & ISTE, 1999) Schools of education are under pressure to produce teachers who are able to effectively integrate technology into their teaching. However, many teacher education programs do not adequately prepare teachers in ICT, nor assess candidates relative to ICT standards.

The Study

The objectives of this study were to: (1) develop a computerized system which assesses ICT declarative and procedural knowledge and provides a profile to the participant, (2) gather baseline information on the ICT Literacy of undergraduate Education students, and (3) determine whether there are characteristics associated with students with greater ICT expertise.

This study tested 713 undergraduate students at the start of an educational technology course (whose major focus was learning computer technical skills) and found generally weak ICT Literacy, with less than 10% of the students achieving a mastery level (80%). The students took the tests again at the end of the educational technology course and the results indicated a significant increase in the ICT Literacy level of the students. However, still only about half of the students achieved a mastery level on the tests. These results imply that teacher education programs should continue to take measures to increase the computer technical competency of students, as part of preparing pre-service teachers to teach with technology, and that a single computer technical course is not sufficient to raise all students to an adequate level of ICT technical competency.

This study also sought to identify characteristics associated with students who enter education studies with greater ICT expertise. A multiple regression analysis (Ma, 1997) revealed that pre-course ICT Literacy could be positively predicted by: variety of previous computer experience, amount of post-secondary computer-related studies (higher for students with science/technology focus rather than humanities), amount of ICT exposure in K-12 schooling, ownership of a home computer, general academic ability, gender (male), computer self-efficacy, and recency of high school graduation. Both declarative knowledge and procedural knowledge were predicted fairly similarly, with just one major difference. General academic ability was not a significant predictor for procedural skills, while recency of high school graduation was a significant predictor. Since academic ability is normally tested in a manner more similar to the declarative portion of the test (multiple-choice questions) than the procedural portion (practical hands-on tasks), it is not surprising that this variable significantly impacted declarative but not procedural scores. Recency of high school graduation likely impacted procedural skills because more recent graduates have had more opportunity for hands-on practice with computers in school than earlier graduates did.

Automated Assessment of ICT Skills

There was no existing instrument or data available which would have suitably assessed the ICT skill level of the post-secondary students who participated in this study. Commercial automated products such as SAM 2000 (Course Technology, 1999) are available for assessing individual expertise with particular application programs. These products offer an authentic type of assessment, in which the student must demonstrate skill acquisition in a live application environment or in a very realistic simulated environment. However, these products were not suitable for use in this study because they were limited to use on the Windows platform and to one particular version of applications such as Microsoft Word 2000 or Excel 2000 (Microsoft Corporation, 2000b); the computer facilities used in the study included both Macintosh (Apple Computer Inc., 2000) and Windows (Microsoft Corporation, 2000c) computers and various versions of software. There was also very little content in these products that addressed entry-level skills, and they generally did not allow for multiple methods for the student to produce a correct result for a given task.

In addition, various tools for self-assessment of ICT skills are available to pre-service or in-service teachers. Examples are the *California Technology Assessment Profile* (California Department of Education, 2002) and the *Professional Competency Continuum* (Milken Exchange on Educational Technology, 1999). Such tools are based on student self-reports and general checklists. This study required data from an objective, consistent test, in addition to student self-reports (this study collected some self-reported data concerning previous computer experience). For example, this study assessed what a student understands about using spreadsheets, by asking direct questions that require experience with various aspects of using such a tool, including performing particular operations using an actual spreadsheet program. It did not simply ask "Have you used a spreadsheet?" or "How well do you know how to use a spreadsheet?", which is what most self-reports would ask. Students may not be aware of how much they do not know about software tools. The lack of suitable tools for evaluating student ICT skills in this way justified development of new instruments.

Part 1 of the ICT literacy test developed in this study was called the ICT Knowledge Test. This test was a multiple-choice 30-minute test intended to measure declarative knowledge on ICT terminology and concepts. This instrument was presented to the students as a web-based HTML form and responses were collected via the Internet using an Active Server Page (Microsoft Corporation, 2000a) process. This process recorded their responses in a Microsoft Access (Microsoft Corporation, 2000b) database stored on a Windows server and returned a confirmation message to the student's web browser. In addition, responses were compared to the correct answers and the total score was automatically computed and stored in each student's database record.

Part 2 of the ICT literacy test was called the ICT Performance Test. Students completed a number of hands-on computer tasks which required a total of about an hour to complete. Each student was provided with a task list and a set of computer files that they were required to modify. The tasks were a sampling of the practical skills covered in the course and were limited to those requiring commonly available software and operating system functions (e.g., text/word processor, spreadsheet, copying/moving files). When the student completed the test, the modified files were then transferred via the Internet to the server. An automated scoring program immediately analyzed these files and stored the student's results in the database.

The Performance Test was a much more technically complex instrument than the Knowledge Test since it required automating the analysis of files that participants have manipulated on their local computers. There were many different programming methods which were considered prior to developing this instrument - the decision concerning which tools to use were based on criteria such as time constraints for the initial instrument development, minimizing problems in collecting data, and allowing the Performance Test to occur on either the Windows or Macintosh platform and with varying versions of application software. The solution chosen was to create a Visual Basic for Applications (VBA) (Microsoft Corporation, 2000d) procedure within the same Access database described earlier. Web-based (especially client-side) programming techniques were avoided because of variable client computer setup and security issues involved in attempting to examine files on a client computer over the Internet. This part of the system required uploading a set of files (combined into a single compressed archive) over the Internet to and from each participant's computer and the database server. During the Performance Test, the VBA procedure was continually running, monitoring a certain file directory every 60 seconds for arriving submissions and executing an automated scoring routine. The VBA scoring procedure implemented programming techniques (e.g., use of Microsoft Automation objects, methods and properties) which enabled automated execution of file system commands (e.g., file searches and directory listings), reading of text stream files, interfacing with external applications (e.g., Microsoft Word and Excel), opening files in these programs, and examining their object hierarchy.

After completing the tests, students were able to view their profile privately by entering their ID and password on a web-based form. The profile displayed their scores along with detailed information concerning the responses and correct answers to every item on the tests. After the post-test, the profile displayed both the pre-test and post-test information so that the student could assess their progress.

Conclusions

Regarding exposure to ICT in K-12 schooling it should be noted that the results only reflect the situation in the limited geographic area covered in this study. It was found that integrating ICT into a larger number of school subjects and starting ICT exposure earlier in school appear to have a positive impact on ICT Literacy, and this is increasingly evident in more recent graduates. Thus, one would expect that if ICT use in K-12 schools continues to increase, the ICT Literacy level of students entering post-secondary studies (in particular those entering teacher preparation programs) will continue to rise. K-12 schooling must be expected to provide a significant portion of a student's exposure to ICT, and the current situation (as per the baseline pre-course assessment) is that students overall do not appear to have enough exposure to ICT in their K-12 education. However, if the apparent trends discussed above are real, this situation should ameliorate with each passing year.

K-12 programs should also be aware of the characteristics associated with individual differences in ICT Literacy that have been identified in this study or in the literature. K-12 schools should continue to take measures to ensure that both boys and girls, both humanities and science-oriented students, and all students regardless of academic ability or family SES (especially access to a home computer), have ample opportunity for ICT experience. K-12 schools also have an important role to play in fostering positive attitudes and self-efficacy regarding the use of computers.

It is clear and perhaps obvious that exposure to computer technology in a variety of school contexts, homes and elsewhere is related to higher entry technical skills and knowledge. This raises some interesting issues. For example, to what extent is there a self-selection factor at work? That is, it might be hypothesized that students who have some sort of predisposition to work with computers are attracted to those courses that involve computers to the extent they have choice. If so, the suggestion of increasing the number of courses which use computers in order to increase literacy may have limited effect. An analogy to this logic is the argument that we reduce the sales of ice cream cones in the northeast because of the known correlation between ice cream cone sales and deaths by drowning. The fact that being male was a significant predictor in the multiple regression equation and that males tend to be more attracted to technology provides support for this hypothesis.

This study has demonstrated an applicability of automated testing to assess students' knowledge of ICT skills and procedures. Note that in the course, not all ICT skills were tested in an automated fashion: some were tested using conventional formats. One question to be raised is the reliability, validity, and usefulness of the automated testing process. Another is scalability: to what extent can a larger number and type of skills be successfully assessed using automated procedures? Increasing numbers of students and shrinking resources provide a practical impetus to this line of questioning. Potential benefits might include scalability, freeing of instructors' time to engage in assessment and instruction that demands more complex human judgment, and individualizing programs for improved learning and greater efficiency.

The age-old question arises, should every student in an instructional technology class be required to complete exactly the same assignments? Could we not create a system of individualization in which students would be directed to those learning assignments where their skills and knowledge is weak and in turn away from those learning assignments where their skills and knowledge is strong? Of course, this concept works well in theory but there are practical limitations. First, how does an instructor identify, among all the required basic skills and knowledge, which each student has acquired or not? Given hundreds of students and dozens of skills quickly renders this a task of unreasonable proportions. However, were all or the majority of the skills able to be assessed automatically, and via distance learning technology to boot, the logistics, operational problem could be solved. A second barrier is how to communicate, to each student, his or her profile of skill acquisition, that is what skills have been mastered and what skills have not? Individual student-instructor consultations with hundreds of students, some who may be studying as distance students is also prohibitive from a logistics point of view. However, results of automated testing can be generated through web-forms and delivered, individually, tailored to each student.

A third problem is remediation. For any given skill deficiency, what is the student to do to overcome it? Once again, if a specific learning activity with specific learning resources can be identified which will lead to a removal of a skill deficiency, the reporting system can also inform each student what they need to do in order to remove the deficiencies. Obviously such a system works best when the learning resources are available to students on a 24 X 7 basis.

Finally, there is the question of verification of acquisition of skills by students, so they can decide whether or not they need more study or can proceed to the next skill set. Because the assessment program has been automated, it can also be used by students to perform self-checks to determine what they have learned and still need to learn. In terms of using an individualized and computerized assessment system, it has been shown that (1) students' judgments about their own learning progress is often erroneous and (2) having access to an objective computerized testing system increases learning (Tennyson, 1981). These and other benefits of computer managed instruction systems are well documented (e.g., Szabo and Montgomerie, 1992). Plans for expanding the automated testing described herein into a full-blown CMI system are currently underway.

Further Research

Further research should be done on individual variations in computer usage. Cuban, Kirkparick & Peck (2001) identified 'open door' students whose computer competence enhanced their motivation and self-confidence to do well in school and opened doors to learning. These students were predominantly male, from diverse ethic backgrounds, and all had gained computer experience outside of school.

Another area identified for further research is adapting the instruments developed in this study for use in K-12 school environments for the purpose of longitudinal studies that would assess the ICT Literacy of students and determine if there is a trend towards increasing ICT use and ICT literacy in the geographic area covered by this study, in other regions in Canada and in other countries. Such K-12 studies may also be able to identify additional variables regarding ICT use in schools that will provide greater understanding of individual differences in ICT Literacy. This study only examined two simple variables related to the earliest grade of computer use and a count of the number of high school subjects that used computers. There are likely a host of other school-related variables that may increase our understanding of K-12 ICT Literacy such as school SES, school type, attitude of principal and other teachers regarding technology, expenditures on technology (e.g. hardware, software, and support), professional development opportunities, teacher ICT Literacy, student-computer ratio, level of Internet access, amount of time students have access to computers, level of sophistication in the use of particular software tools, and the complexity of projects completed using technology.

Further research should also be conducted into developing and implementing models for covering ICT in teacher education programs. Teacher education programs must help pre-service teachers increase their level of ICT knowledge and practical skills along with their understanding of integrating ICT into teaching. Improving the coverage of ICT in teacher education programs is a complex challenge; coursework is only one aspect of incorporating ICT into these programs. There are many factors that impact technology in pre-service teacher programs including faculty professional development, faculty incentives, funding, technology infrastructure, technical support, leadership, long-range planning, accreditation standards, technology use in K-12 schools, and technical competency of incoming students (Bielefeldt, 2001)

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Assessment of the Impact of the Gates Foundation's Teacher Leadership Project (TLP) as Reported by TLP Graduates, Their Principals and Teaching Peers

Dr. David E. Dean
Information Resources
Eastern Washington University
United States
dave.dean@mail.ewu.edu

Abstract: The Teacher Leadership Project (TLP) is a technology infusion effort funded by the Bill & Melinda Gates Foundation. The TLP provides K-12 teacher participants with technology infusion training and technology funding for participants' classrooms.

This presentation describes a study of the impact the TLP has had on its participants as reported by the TLP "graduates," their building Principals, and some of their teaching peers.

This study was designed to learn about some of the "ripple effects" of the Teacher Leadership Project. Are TLP graduates sharing their technology integration skills and techniques with others teachers in their school and district? What leadership roles have TLP grads assumed in the district? How has participation in the TLP impacted graduates' desire to pursue additional schooling or certification training? Are their broader district-wide impacts that are occurring because of the influence or activities of TLP graduates?

Introduction

This report describes results from a study designed to discover the impact Teacher Leadership Project graduates are having on their schools and school districts. This study solicited the input of the 407 teachers who graduated from the Bill & Melinda Gates Foundation's Teacher Leadership Project (TLP) between June 1998 and June 2000. Current TLP participants (graduates in June 2001) were excluded from this study.

Included in this report are: (1) background information on the TLP, including its goals and methodologies; and (2) results from quantitative and qualitative analysis of graduate impact surveys.

Background on the Teacher Leadership Project

In the summer of 1997, 27 teachers from public and private schools, in Washington State, came together to determine how best to use technology in their classrooms. These teachers developed a vision, mission and a staged model for implementation of technology as a learning tool across the curriculum. The model emphasized the relevancy of computing in the context of elementary education. It encouraged teachers to capitalize on integrative strategies. It encouraged teachers to plan, manage and reinforce computer activities as they would their other lesson plans and materials. It utilized a "teachers teaching teachers" development model.

In the fall of 1997, these teachers began to test their plan. The addition of new computers to participants' classrooms brought the student-computer ratio down to 4:1; each received a printer and a presentation device; and they began to infuse technology into their lessons. Not only were these teachers learning about using technology, they also had the equipment to begin testing the strategies for learning with their students.

A new environment emerged in the classrooms of TLP participants. Teachers reported that students often became teachers, and teachers learners. Students were engaged, curious and interested in active inquiry. TLP participants began collaborating with each other and serving as peer mentors. Participants adopted a mentoring, collaborating style of interacting. And through regular meetings and workshops, teachers had the opportunity to share and learn from their peers' new strategies.

As of June 2000, this program, the Teacher Leadership Project, had concluded its third year and had reached more than 400 teachers. These graduates are the population included in this study. The Teacher Leadership Project Impact Study was designed to learn about some of the "ripple effects" associated with participation and then graduation from the TLP.

Teacher Data Collection

Research participants in this study were teachers (mostly grades 4-8) who had attended and graduated from the Teacher Leadership Project (TLP). Participants came from public and private schools (K-20) located across the State of Washington.

Survey design took place during January and February 2001. The eight TLP Regional Coordinators who worked with the first three years of TLP participants (graduation years 1998 - 2000) were contacted via phone and interviewed. Regional Coordinators were asked to identify ways that TLP teacher participants were impacting their schools. Regional Coordinators' input fell into four impact areas: (1) training and development activities, (2) leadership activities, (3) personal development activities, and (4) other impacts to the participant or the school district and community. Two impact assessments were designed around these four impact areas.

Data collection took place throughout the state of Washington between April 3, 2001 and April 30, 2001. One hundred and forty five completed graduate impact surveys were returned to the researcher and used in this study. Two hundred and seventy one completed principal and peer surveys were returned to the researcher and used in this study.

Summary of Quantitative Data (Graduate Surveys)

The majority of TLP graduates who responded to the impact survey were female (73%) and over 40 years of age (63.8%). Most of the respondents teach grades 4 – 8 (90.8%) and have, on average, 15 years of teaching experience. Teachers indicated there were between 6 and 7 graduates in their school district; however, the respondent was typically the only TLP graduate in his/her school building.

Research Question Number 1

To what extent are TLP graduates engaged in ***training and development activities*** *and to what extent is their level of activity linked to their participation with the TLP?*

Survey data indicate that graduates are active in a majority of the identified training and development activities. In most cases, participants perceive that their participation in the training and development activities is strongly linked to their TLP experiences. Respondents most uniformly report they are engaged in the following training and development activities:

- Presenting informal technology training sessions for teachers in their school (94.4 percent participation)
- Engaging in informal peer mentoring activities (92.4 percent participation)
- Developing instructional materials, which are utilized by other teachers – tip sheets, integrative lesson plans, webquests, etc. (82.1 percent participation)
- Presenting formal technology training sessions for teachers in their school (70.3 percent participation)

Each TLP graduate trains, on average, 57 teachers in a typical school year. Courses taught fall into three categories: Microsoft Windows / Office / and other productivity software (49% of all courses taught); Integration / Curriculum topics (38% of whole); and Multimedia topics (13% of whole).

Research Question Number 2

To what extent are TLP graduates engaged in ***technology leadership activities*** *and to what extent is their level of activity linked to their participation with the TLP?*

Each of the technology leadership activities showed some level of participation by TLP graduates. Scores indicate that a majority of respondents are active in two of the listed technology leadership activities. A strong linkage was indicated between participant's involvement with the TLP and their participation in the listed technology leadership activities. Teachers most uniformly reported they were engaged in the following technology leadership activities:

- Led or assisted with development of district technology plan (56.9 percent participation)

- Led or assisted with district technology purchases (51.7 percent participation)
- Led or assisted with blending of district curriculum plans and district technology plans (47.5 percent participation)
- Led or assisted with evaluation of hardware and software or recommendation of standards for district hardware and software purchases (46.5 percent participation)

Research Question Number 3

*To what extent are TLP graduates engaged in **personal development activities** and to what extent is their level of activity linked to their participation with the TLP?*

While there was some level of participation by respondents in all of the listed personal development activities, a **majority** of respondents did not indicate their participation in any one of these activities. However, participants did indicate a strong linkage between their involvement with the TLP and their participation in the listed personal development activities. Teachers most uniformly reported they were engaged in the following personal development activities:

- Applied to participate in additional (post-TLP) grant funded technology training opportunities (46.2 percent participation)
- Received grant-funded training (other than 1st year TLP participation) (28.7 percent participation)
- Pursued formal schooling at university / community college pertaining to integration of technology into the curriculum (27.1 percent participation)
- Served at professional conference (22.5 percent participation)

Research Question Number 4

*To what extent have respondents observed or experienced "**other impacts to the TLP graduate or the school district and community**" following their completion of the TLP and to what extent do they perceive a link between these "**other impacts**" and their participation with the TLP?*

Survey data indicate that graduates agree that these "other impacts" are occurring in their schools and school districts. In most cases, participants perceive that the "other impacts" are strongly linked to the presence of TLP graduates in the district. A majority of respondents agreed to all six of the "other impact" statements:

- TLP graduates are viewed as role models by building or district administrators due to the graduates' technology infusion skills (95 percent agreement)
- TLP graduates are noticeably more enthusiastic and energized individuals after their TLP experience (94.9 percent agreement)
- TLP graduates are viewed as role models by many teachers in the building due to the graduates' technology infusion skills (94.3 percent agreement)
- TLP graduates are viewed as role models by many parents due to the TLP graduates' technology infusion skills (73.7 percent agreement)
- Parents have become more involved in the classroom and with their student's learning activities because of the TLP graduates' effective use of technology and discovery learning activities (60.3 percent agreement)
- The school or district's scope and sequence has changed due to the impact of TLP participants' technology infused discovery learning activities and TLP-funded technology rich classrooms (58.1 percent agreement)

Summary of Qualitative Data (Principal and Peer Surveys)

Two hundred and seventy one completed principal and peer surveys were returned to the researcher and used in this study. Individual comments, provided by principals and teaching peers appear below. Information in these comments that would identify the graduate or the graduate's school district has been changed to respect the anonymity promised to respondees by the researcher.

Principal & Peer Survey Question Number 1

*"Please identify any changes in the individual's involvement with **training and development activities** that you believe can be attributed to his/her participation in the TLP."*

Responses were clustered into the following themes:

TLP graduates have a significant positive impact on the school and community: For example, "The TLP is a wonderful blessing to small, rural schools. This TLP graduate is a visionary and yet practical, always involved in training in our building, district, and across the state and nation. This TLP graduate is a chief advocate for change and development of our technological resources and skills."

TLP graduates provide training and other assistance: For example, "As a result of the TLP, Kate has become a confident technology trainer for teachers in our building and our district. She has provided training sessions in the areas of Microsoft Word, PowerPoint, and Excel. She has demonstrated ways to integrate technology into the curriculum and acted as a Master Teacher and mentor for novice technology users."

TLP graduates are peer mentors: For example, "On a personal basis Janelle has been available always, for me to receive training on programs, which are coming on newer computers I'm receiving through the levy funds. She has done staff inservice demonstrations on School Kit, PowerPoint, and Word and hands-on workshops with the computers in her room (middle school staff of 8 teachers). Had she not shown how simple it was to use PowerPoint (for instance) I might not be using it."

TLP graduates model the principles of the Teacher Leadership Project: For example, "Sara offered a school-wide inservice for classified and certificated staff, all functioning at various levels of computer competency. She led us through a variety of activities, including those which involved scaffolding techniques to build lesson plans and curricular structures using templates and introduced us to Schoolkit and other invaluable programs. Each of us, with Sara's leadership and guidance, came away with increased understanding and lesson structures individualized to the specific needs of our own classroom."

TLP graduates have a significant impact on students and student learning: For example, "Ms. Hall did lots of computer training and development activities with her students. Her 6th grade social studies class did Western Hemisphere MS PowerPoint presentations, while her 7th grade social studies created Eastern Hemisphere PowerPoints, Siberia brochures using MS Publisher, and constructed and read graphs in preparation for the WASL. Her 8th grade social studies did a yearlong research paper written in a magazine format, which used MS Word documents and Internet research. The students also used Word to write reports, which were presented, to the public."

Principal & Peer Survey Question Number 2

*"Please identify any changes in the individual's involvement with **technology leadership activities** that you believe can be attributed to his/her participation in the TLP."*

Responses were clustered into the following themes:

TLP graduates have a leadership role in the school district: For example, "She has been vocal in decisions being made in the district. Because of this training, the district listens to her ideas. She is our school's technology leader and is also a leader at the district and state level on the use of instructional technology."

TLP graduates model the principles of the Teacher Leadership Project: For example, "It was Janet who first raised the idea of an in-district version of TLP. She and two other TLP teachers have taken the lead in planning and instructing at our in-district session."

TLP graduates have a significant impact on students and student learning: For example, "Sara has almost single-handedly developed a core of students whom she has trained as "tech kids," literate in a variety of computer skills and competencies and able to troubleshoot problems and difficulties which might arise in the computer lab or in the computers in our classrooms. These students have a helpful and problem-solving approach and a sense of pride in what they do. This program is a direct result of Sara's instruction. In addition, Sara works collaboratively with our computer lab instructor and the other TLP participant in our school, in developing a scope and sequence and Essential Learnings in Technology, both in terms of committee work at the district level and site decisions at our school."

Principal & Peer Survey Question Number 3

*"Please identify any changes in the individual's **personal or professional development activities** that you believe can be attributed to his/her participation in the TLP."*

Responses were clustered into the following themes:

Many TLP graduates pursue additional training due to their TLP experience: For example, "With the leadership role she has evolved into, she is now convinced that she should complete her Masters Degree with a major in administration. She will make an excellent principal!!"

The TLP energizes many of its graduates to continuously renew their skills: For example, "Mr. Flynn continues to grow through reading and participation. His teaching practices will be even better next year than they were this year—high praise for a state finalist for Teacher of the Year. I'm sorry if I sound like his mom, but this guy is unbelievable!"

TLP graduates model the principles of the Teacher Leadership Project: For example, "I believe as a professional educator, Jim promotes technology through leading by example. His professional involvement in school district activities has shown others that technology can and does work well with our existing curriculum that is required to be taught."

TLP graduates have a significant impact on students and student learning: For example, "Claudia intentionally looks for *appropriate* use of technology as she crafts her lessons and units. She leads a Science Team and has incorporated robotics into her program. She was anxious about the PCs her first year but has grown by leaps and bounds over the next 2 years. It takes *time* to develop skills in using tech—and Claudia keeps growing!"

Principal & Peer Survey Question Number 4

"Please identify any ***impacts to the school district*** *that you believe can be attributed – either wholly or partially – to the influence of TLP graduates in the district."*

Responses were clustered into the following themes:

TLP graduates have a significant positive impact on the school and community: For example, "It is hard to say where we'd have been without it. However, I do know we have entered an exciting world, and a great deal of that is due to Rachel. Thank you so much for the opportunity."

TLP graduates model the principles of the Teacher Leadership Project: For example, "We have had others teachers apply for the TLP. Teachers at our school, along with teachers from other Catholic schools in our city took the course offered this past year on technology integration in math and science. Her expertise is recognized in the classroom and as part of the technology committee. Debbie has been a very positive influence for technology."

TLP graduates have a significant impact on students and student learning: For example, "WOW! For the kids it has been a HUGE impact. They are creating projects, researching, and gaining computer skills that enhance their learning. As each school has sent people to TLP, parent groups and other staff members have seen the benefits of TLP and are seeking out training in their buildings. This is a GREAT program!"

Parental and Community impressions of the school district is enhanced due to TLP graduates: For example, "Many parents have expressed a concern about the minimal use of technology in our district. Because of the teachers who have participate in this project, the administration has seen a HUGE number of teacher request from parents who wish their children to be in one of the "classrooms with all the computers in them" as a result, the district is increasing budgets to provide more computers and software for all the buildings – something we have had little support for in the past."

Summary

Both quantitative data, collected from TLP graduates, and qualitative data, collected from their principals and teaching peers, indicate that TLP graduates are having a dramatic positive impact on their teaching peers, their schools and school districts, students, parents, and other members of the community. The impact is significant as shown via this study.

Graduates are engaged in a variety of activities in the areas of training and development and technology leadership. They continue to enhance their professional credentials via schooling and other professional development activities. Administrators, teachers, and parents perceive TLP grads to be technology leaders. Graduates are more enthusiastic in their teaching following their involvement with the TLP. Participants contribute greatly to the technology integration efforts in their schools and school districts.

Respondees have stated that TLP participation has, in fact, been a life-changing experience. The Bill & Melinda Gates Foundation, and the teacher-founders of the TLP, can be assured that the impact of the TLP is being felt in many ways beyond participants' initial involvement with the program.

Schools, universities, and other organizations across the country who wish to implement a technology-infusion program that produces demonstrable and measurable long-term impact on teacher participants, students, schools and school districts should consider the example of the highly successful Teacher Leadership Project in Washington State.

For Additional Information:
The full *Teacher Leadership Project – Impact Study* (Spring, 2001) and other technology infusion evaluation reports can be found at: http://www.gatesfoundation.org/education/evaluation/default.htm

Simulating and Evaluating the Yekioyd Methodology

JoAnna Dickey, Dept. of Curriculum and Instruction, Eastern Kentucky University, USA,
joanna.dickey@eku.edu

Steven Dickey, Dept. of Economics, Eastern Kentucky University, USA,
steve.dickey@eku.edu

Kevin Zachary, TRIS Unit, Eastern Kentucky University, USA,
kevin.zachary@eku.edu

Abstract:

The Yekioyd family of statistics provides a method of evaluating the consistency of test items with overall test scores. Their purpose is to aid an educator in developing tests by identifying weak test items. This simulation study at hand provides an analysis of these statistics in a variety of circumstances reflecting the concerns of the educator. We find that the statistics have highly desirable properties under all circumstances.

The relationship between the Yekioyd statistics and the literature on item analysis has been covered elsewhere (Dickey and Zachary, 2001). The only tools of item analysis that are in any way related to the Yekioyd statistics are the homogeneity indices proposed by Long (1934) and Loevinger (1948). The statistics analyzed in this paper are the product of taking the alternate direction to the Long/Loevinger approach. Assume that the information set consists of a binary for the test item for each student and overall student scores. The Long/Loevinger approach orders the data by the binary and counts contradictions occurring in the corresponding sets of scores. The Yekioyd statistics order the data by overall scores and count contradictions in the order taken by the binary. Given the current state of development of the homogeneity statistic, the Yekioyd statistic offers advantages. It features an exact interpretation because of its mathematical formulation. In our previous paper, we demonstrated that Yekioyd procedure is readily subjected to natural weighting schemes that increase its functional value to the educator. These weighted statistics are the upper Yekioyd, YU and the lower Yekioyd, YL. The basic Yekioyd statistic, YB, is unweighted.

n is the number of test questions, p is the proportion of students answering correctly, and q is the proportion of students answering incorrectly. The weighting scheme built into these statistics is based on ordering student responses to a test item by their overall scores in column style with scores declining as one moves down the column. A division line (boundary or B value) is created between the upper np students and the lower nq students. For each range, the deviation variable D is constructed. Its value is one for all upper range students who answered incorrectly and all lower range students that answered correctly. Otherwise, its value is zero. For each student, a value of the weighting variable W is constructed from the student's score and B. In the upper range, B is subtracted from the student's score. In the lower range, the student's score is subtracted from B. W is not a weight in its own right. The actual weight given to a deviation occurring with a particular student is the W value associated with that student divided by the base for the weighting. In each range, the base for weighting will be the summation of W values in that range.

The resulting construction is a weighted statistic that reflects the greater undesirability of deviations that occur far above or far below the line of division between the upper and lower ranges. Such weights should reflect the distance from the line of division to the number line location at which the deviation occurred. This division point will be calculated by the average of the scores of the two students on the boundary of the np/nq division. This average serves as the boundary value, B.

In order to achieve comparability across questions with varying p values, both statistics will be scaled by a factor reflecting the number of locations for deviations divided by the number of possible deviations. The maximum number of possible deviations in each of both ranges is the smaller of np and nq. Our notation will represent this smaller one of the two values with (np:nq).

Let i be the index of the rank order of student scores, with 1 assigned to the highest student score and n assigned to the lowest student score. The basic Yekioyd and the weighted statistics are:

$$YB = \frac{\sum^{i=1}_{n} Di}{\text{the smaller of } 2np \text{ or } 2nq}$$

$$YU = \frac{\sum^{np}_{i=1} Wi(Di)}{\sum^{np}_{i=1} Wi} \times \frac{np}{(np:nq)}$$

$$YL = \frac{\sum^{n}_{i=np+1} Wi(Di)}{\sum^{n}_{i=np+1} Wi} \times \frac{nq}{(np:nq)}$$

Interpretation of these statisitcs is based on the following table. The table applies the assumption that nq < np. Otherwise, np would appear instead of nq, with no change in implications.

Yekioyd Value	Deviations Not Occurring	- Deviations Occurring	= Net Contribution To Consistency
1.0	0	2nq	-2nq
.75	.5nq	1.5nq	-nq
.50	nq	nq	0
.25	1.5nq	.5nq	nq
0.0	2nq	0	2nq

The weighting in YU and YL precludes a simple analysis of their properties. For this reason, simulations were performed to display their properties. Two conditions were imposed on the simulations to achieve neutral comparability. These conditions are that YB is constant across the questions and that the locations of deviations in the rank order of student performances be comparable across questions. The simulations will have 20 student scores ranging from 98% to 60% in increments of 2% in consecutive numbers. This distribution of grades makes it possible to perform exact interpolation in several instances. There will be 9 questions labeled Q1 through Q9 with p values ranging from .9 to .1 in increments of .1.

In order to be evaluated on mathematically comparable locations of deviations, case definitions will be framed in terms of given YB values. The YB values of .25, .50, and 1.0 are interpreted in the case definitions as 1/4th of a range, 1/2 of a range, and the whole of a range. The concept of centering used here means that the deviations are clustered about the middle of the range segment with equal numbers of deviations equally spaced on either side. The case definitions are:

High Concern Case: When all deviations are centered in the upper YB portion of the YU range or centered in the lower YB portion of the YL range.

Low Concern Case: When all deviations are centered in the lower YB portion of the YU range or centered in the upper YB portion of the YL range.

Intermediate Case: When each range contains its deviations centered around the middle of the range by rank order.

Values of the Simulation Matrix:

	Q1 p=.9 B=64	Q2 p=.8 B=67	Q3 p=.7 B=71	Q4 p=.6 B=75	Q5 p=.5 B=79	Q6 p=.4 B=83	Q7 p=.3 B=87	Q8 p=.2 B=91	Q9 p=.1 B=95
Score	W1	W2	W3	W4	W5	W6	W7	W8	W9
98	35	31	27	23	19	15	11	7	3
96	33	29	25	21	17	13	9	5	1
94	31	27	23	19	15	11	7	3	1
92	29	25	21	17	13	9	5	1	3
90	27	23	19	15	11	7	3	1	5
88	25	21	17	13	9	5	1	3	7
86	23	19	15	11	7	3	1	5	9
84	21	17	13	9	5	1	3	7	11
82	19	15	11	7	3	1	5	9	13
80	17	13	9	5	1	3	7	11	15
78	15	11	7	3	1	5	9	13	17
76	13	9	5	1	3	7	11	15	19
74	11	7	3	1	5	9	13	17	21
72	9	5	1	3	7	11	15	19	23
70	7	3	1	5	9	13	17	21	25
68	5	1	3	7	11	15	19	23	27
66	3	1	5	9	13	17	21	25	29
64	1	3	7	11	15	19	23	27	31
62	1	5	9	13	17	21	25	29	33
60	3	7	11	15	19	23	27	31	35

Σ Wi

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
YU	324	256	196	144	100	64	36	16	4
YL	4	16	36	64	100	144	196	256	324

Scaling Factors

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
YU	9	4	2.33	1.5	1.0	1.0	1.0	1.0	1.0
YL	1.0	1.0	1.0	1.0	1.0	1.5	2.33	4	9

Σ Wi ÷ Scaling Factor

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
YU	36	64	84	96	100	64	36	16	4
YL	4	16	36	64	100	96	84	64	36

Three sets of simulations were performed on the nine questions. These corresponded to YB values of .25 for set one, .50 for set two, and 1.0 for set three. With the case definitions provided earlier, all questions examined exhibited identical YU and YL statistics. These statistics are shown below.

		High Concern		Low Concern		Intermediate Concern	
Set	YB	YU	YL	YU	YL	YU	YL
1	.25	.438	.438	.063	.063	.250	.250
2	.50	.750	.750	.250	.250	.500	.500
3	1.0	1.00	1.00	1.00	1.00	1.00	1.00

The weighting scheme is intended to cause a decrease in sensitivity to deviations near the boundary and an increase in sensitivity to deviations far from the boundary. The results of the simulations confirmed the characteristics just noted. For any value of $YB < 1$, YU and YL will be above YB in the high concern case and below YB in the low concern case. In the intermediate case, the weighting is neutral in its effect, producing values for YU and YL that are equal to YB. In sets 1 and 2, the effect of the weighting between high concern and low concern cases appeared to be symmetric, e.g. $(.438+.063)/2=.25$ and $(.750+.250)/2=.50$. When $YB = 1$, YU and YL were forced to 1 either because all locations in a range had deviations or because the centering as set forth in the case definitions induced the same result via the mean of the weights at the centered location.

The operating principle in the preceding simulations was that the educator's concern with a deviation is indicated by its distance from the boundary measured by overall scores. If this view is accepted, then the cases are comparable on the basis of the educator's concern as well as mathematically comparable. In the measurement of YU, the high (low) concern case is a worst (best) case scenario if $p \leq .5$, but not if $p > .5$. This means that when a question has a $p > .5$, a condition can occur that is worse or better than is possible for questions where $p \leq .5$. In the measurement of YL, the parallel is when $p < .5$. In terms of the educator's concern, questions with different p values have different potentialities. YU and YL can reflect the extent of these differences. In order to explore this question, the simulations were repeated with case definitions that were not comparable situations across questions with different p values. These case definitions were:

Worst Case: When each range contains its deviations located as far from the boundary as possible.

Best Case: When each range contains its deviations located as close to the boundary as possible.

Set One: YB = .25 (i.e. 25% of all possible deviations occur) Questions 1, 3, 5, 7, and 9 are intractable because 25% of np and nq are not integers and deviations must occur in whole units.

Worst Case:

	Q2	Q4	Q6	Q8
YU	.484	.458	.438	.438
YL	.438	.438	.458	.484

Best Case:

	Q2	Q4	Q6	Q8
YU	.016	.042	.063	.063
YL	.063	.063	.042	.016

Set Two: YB = .50 (i.e. 50% of all possible deviations occur)

Worst Case:

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
YU	.972	.938	.893	.833	.750	.750	.750	.750	.750
YL	.750	.750	.750	.750	.750	.833	.893	.938	.972

Best Case:

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
YU	.028	.063	.107	.167	.250	.250	.250	.250	.250
YL	.250	.250	.250	.250	.250	.167	.107	.063	.028

Set Three: YB = 1.0 (i.e. 100% of all possible deviations occur)

Worst Case:

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
YU	1.89	1.75	1.57	1.33	1.00	1.00	1.00	1.00	1.00
YL	1.00	1.00	1.00	1.00	1.00	1.33	1.57	1.75	1.89

Best Case:

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
YU	.111	.250	.429	.667	1.00	1.00	1.00	1.00	1.00
YL	1.00	1.00	1.00	1.00	1.00	.667	.429	.250	.111

As YB goes to 1.0, the effect of the weighting scheme diminishes to 0 for all situations where a deviation will occur at every location. The YU statistic for a high p question and the YL statistic for a low p question do not have this limit property. In these situations, the weighting scheme continues to function even at YB = 1.0. This allows YU and YL to provide an indication as to the severity of differences in questions. When YB is .25, the difference in high p questions and a question with a p value of .5 was very small with observed differences ranging from negligible to as much as .046. As YB increased to .5, the observed differences rose to as much as .222. When YB reached its limit at 1.0, a difference of as much as .89 was observed. This means that the worst (best) case for a question with a p value of .9 can be 89% worse (better) than the worst (best) case for a question with a p value of .5.

Overall, we are left with the perspective that high or low p questions do little good for or harm to a test's consistency in terms of the number of deviations occurring or not occurring. None the less, such questions can do either considerably more harm or considerably less harm per occurrence of a deviation than questions with p values near .5 if YB is high. YU and YL indicate whichever the situation is and provide a useful measure of its extent.

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Effects of Training in an Interactive Television Environment

Rita L. Dobbs
Department of Technology
The University of Texas at Tyler
United States
rdobbs@mail.uttyl.edu

Abstract: The purpose of this study was to determine if formal distance education classroom training or classroom training combined with laboratory experiences would affect the concerns of college faculty and administrators about the implementation of interactive television (ITV) in their institution. Twenty-seven faculty and administrators employed full-time in the fall semester at Texas State Technical College-Marshall participated in the study. The instrument used to collect the data was the Stages of Concern Questionnaire (SoCQ). The quasi-experimental study utilized a pretest posttest control group design utilizing three groups with Analysis of Covariance (ANCOVA) used to analyze the data. The results of this study indicated that classroom training and laboratory experiences were effective in assisting college faculty and administrators in progressing more rapidly through the stages of concern when confronted with teaching in an ITV classroom.

Introduction

In 1997-1998, 54% of the public two-year and four-year higher education institutions in the United States offered courses via two-way interactive television (ITV). At that time, 61% of the respondents indicated that distance education delivery utilizing two-way interactive video would start or be increased by their institution within the next three years (National Center for Education Statistics [NCES], 1999). However, only about a quarter of higher education institutions offering distance education courses required faculty to have training in distance education instructional methodologies (NCES, 1999). The implementation of two-way interactive video classes can be an expensive venture for an institution, yet the research indicates that training does not seem to factor into the process.

ITV instruction presents a change in teaching methodologies for traditional face-to-face teachers. In their groundbreaking work on change, Hord, Rutherford, Huling-Austin, and Hall (1998) wrote, "the single most important factor in any change process is the people who will be most affected by the change" (p. 29). Even though the technology and the institution are important to the successful implementation of a distance education program, the faculty, staff, and administrators utilizing the system are the most important factors in successful implementation (Hord, Rutherford, Huling-Austin, & Hall, 1998). Moore and Kearsley (1996) suggested that success of a distance education program in an institution is dependent upon the internal commitment by the teachers and others within the organization. However, training for faculty utilizing ITV systems is seldom offered.

As institutions begin to utilize distance education technologies, it is important that instructors have the advantage of training in the new instructional approaches. Implementing a successful distance education program, in this case, ITV, for the institution is critical to the sustainability and expansion of the college. Because change is a process, administrators and faculty must embrace the new innovation for a successful and profitable distance education telecommunications program (Hord, Rutherford, Huling-Austin, & Hall, 1998). Personnel must be given the necessary training to alleviate their stages of concerns about the new innovation, ITV, so that the change process can be accomplished and successful implementation of the innovation can occur. These premises provided the bases for this investigation.

The Study

This research was conducted at Texas State Technical College-Marshall (TSTC-M), which is located in Marshall, Texas, a rural East Texas town of approximately 25,000 people. The college is part of the TSTC system, the only state-supported technical college system in Texas and new to the use of ITV for instructional purposes. Twenty-seven full-time faculty and administrators of the college volunteered to participate in the study. The participants were divided into three groups with the first group receiving classroom instruction and hands-on activities in ITV methodologies. The second group received classroom instruction only. The third group served as the control group for the study and did not receive any training.

Each participant in all three groups received the 35-item Stages of Concern Questionnaire (SoCQ) on the first day of the scheduled classroom training. The control group attended the first fifteen minutes of the first scheduled classroom training to complete the survey. Once their survey questionnaire was returned, the control group members were dismissed from the classroom training session. Respondents indicated on a Likert scale the degree to which each concern was true and circled a number from 0 to 7 on the printed scale. Respondents were given as much time as necessary to complete the survey before actual classroom training began. Each series of the questionnaire consisted of items that are important at a certain stage of concern, according to the Hall, George and Rutherford (1986) concerns theory. Each of the seven stages of concern was represented by five questions on the survey. A scale score was obtained for the peak score and for each of the stages of concerns on the questionnaire.

After the SoCQ was completed, the researcher presented nine hours of classroom instruction in distance education methodologies to the 18 participants in groups two and three. Each group met one day every second week for three hours of instruction. Classroom training consisted of three, three-hour sessions over six weeks of instruction. Participants took part in discussion and hands-on activities that familiarized them with the technology and the necessary skills for teaching in an ITV classroom. At the conclusion of the last classroom session, the participants who elected to end their training with the classroom portion were administered the SoCQ as a posttest. The classroom and laboratory group was comprised of the faculty and administrators who wished to receive college credit for their participation in the classroom sessions. In order to receive credit, this group participated in 18 hours of individual, hands-on practice in the distance-learning classroom in addition to the classroom instruction. Logs were maintained by the participants and kept in the ITV classroom. Logs were reviewed by the researcher and by the Dean of Instruction for TSTC-M to ensure that each participant completed the required 18 hours of practice. Participants presented a 15-minute lesson in the ITV classroom to a remote site as part of their course requirements for credit at the conclusion of the training and hands-on experiences. Upon completion of the presentations, the SoCQ was administered to the classroom and laboratory group and to the control group.

Findings

When using the SoCQ, Hall, George and Rutherford (1986) recommended two methods of dealing with group data. The first method tallies the number of individuals that score high on each stage to obtain the range of peak stage scores within a group. Peak scores are related to the stage definitions in the questionnaire. The authors noted that "the higher the score, the more intense the concerns at that stage. The lower the score, the less intense the concerns at that stage (p. 31). The second method, and the method utilized in this study, is to "aggregate individual data by developing a profile that presents the mean scores for each stage of the individuals in the group" (p. 32). The aggregate score was derived from the sum of the responses given to the five questions addressing each stage of concern. The total stage raw scores for each of the participants in each group were used in the ANCOVA test to determine differences among the groups. The results of the study are presented in Table 1.

The initial pretest score on the Stages of Concern Questionnaire was used as the covariate in this study. Analysis of covariance (ANCOVA) was used to adjust for initial differences between groups before a comparison of the within and between groups was made. Gall, Borg and Gall (1996) suggested "the preferred statistical method is analysis of covariance in which the posttest mean of the experimental group is compared with the posttest mean of the control group with the pretest scores used as a covariate" (p. 496). Independent *t* tests of least squares means, Tukey, were conducted on the comparison results of the groups to determine which differences between and among groups were significant.

Results of the data analysis for the experimental populations in this study indicated that significant differences favoring the experimental strategy for the classroom combined with laboratory experiences group occurred in four of the seven stages of concern at the $p < .01$ level of confidence.

Concerns research shows that concerns change over time in a developmental manner. Because this is true, professional development for faculty and administrators should address the stages of concern in a progressive manner if the innovation is to be effective. The sum of the responses to the five questions addressing the seven stages of concern should show the progressive development of an individual or group moving from a high awareness or self concern to the refocusing concern that indicates acceptance and willingness to implement an innovation (Hall & Hord, 1987).

When evaluating the classroom and laboratory group in this study, the analysis of the data indicated that this group had shifted its focus away from concerns primarily about self and had begun to evaluate the management, consequence, collaboration, and refocusing stages that are essential for the new innovation, distance education, to be successful at TSTC-M.

High concerns in stage 3 for the classroom and laboratory group indicated that this group was concerned about logistics, time and management concerns. The highest adjusted mean score for the classroom and laboratory group occurred in stage 4. This indicated that the group had concerns about the effects of distance learning on students. Their next highest adjusted mean score was in the adjacent stage 5, collaboration. This indicated that the group had concerns about the collaborative efforts of distance learning. The high score on the refocusing stage, with a low score in the awareness stage, indicated that the individuals who had participated in classroom and laboratory experiences were concerned about its effects on students. They were also concerned with collaboration efforts to make distance education more effective for students involved in the process.

The analysis of the data of the classroom group in this study showed a significant difference at the $p < .01$ level of confidence in two stages of concern. The highest adjusted mean score for the classroom group was in stage 5, collaboration. A significant difference between the classroom and the classroom and laboratory groups appeared at this stage. A significant difference between these two groups also occurred in the consequence stage. These differences indicated that classroom training was beneficial to both groups but the actual laboratory experiences helped the faculty and administrators feel more comfortable about distance education. The classroom group also showed a significant difference from the classroom and laboratory group in the impact dimension. This shows that the classroom training made the group more aware of distance education but faculty and administrators need the additional laboratory experiences before beginning instruction in the distance learning classroom.

The control group profiles in this study align with that of the nonuser in the stages of concern. The concerns of nonusers are typically the highest on stages 0, 1, and 2, and typically lowest on stages 4, 5, and 6. The highest adjusted mean score for the control group occurred in stage 1. This indicates that the group was more concerned with personal position and well being in relation to the change. With the second highest adjusted mean score falling in stage 5, the results of the ANCOVA suggested that the control group was also highly concerned with working with others. The "tailing-off" stage 6 indicates that the group did not have ideas that compete with the distance education innovation. The responses for the control group followed the typical pattern of a nonuser of distance education. This group appeared to have little interest in distance education.

The classroom and laboratory group progressed steadily through the Stages of Concern with the aid of training and laboratory experiences. The classroom group made some developmental moves but adjusted means were not significant. The graphic view of the control group results resembled the profile of the typical nonuser described by Hall, George, and Rutherford (1986).

The results of this study should not be generalized to extend to other institutional groups without comparative data. The findings must also be viewed with limitations specified by the experimental design, the participating faculty and administrators, the researcher, the questionnaire, and the statistical analysis.

Analysis of Covariance Results of Stages of Concern

Stage of Concern	adjusted mean(se)		F-value	Probability
Awareness			1.03	ns
	Training +	8.39 (1.64)		
	Training	10.07 (1.63)		
	Control	11.87 (1.70)		
Informational			.79	ns
	Training +	17.47 (1.68)		
	Training	14.76 (1.85)		
	Control	15.43 (2.18)		

Personal			2.32	ns
	Training +	18.97 (2.40)		
	Training	13.97 (2.79)		
	Control	11.62 (2.82)		
Management			7.04	p < .01
	Training +	17.11 (1.93)		
	Training	11.97 (2.11)		
	Control	6.47 (2.11)		
Consequence			7.70	p < .01
	Training +	21.99 (1.88)		
	Training	14.61 (2.12)		
	Control	11.51 (2.22)		
Collaboration			7.14	p < .01
	Training +	21.53 (1.24)		
	Training	17.00 (1.31)		
	Control	14.14 (1.61)		
Refocusing			6.52	p < .01
	Training +	16.51 (1.77)		
	Training	11.50 (2.39)		
	Control	6.55 (2.44)		

*indicates significant difference between means designated *
+indicates significant difference between means designated +
#indicates significant difference between means designated #

Table 1: Analysis of Covariance results of the Stages of Concern 0-7 by group

Conclusions and Recommendations

Based on the findings of this study and recognizing the limitations stated in the previous section, the following conclusions were drawn:

1. The classroom training combined with laboratory experiences strategy was more effective than classroom instruction only or no treatment for addressing concerns, of college faculty about the innovation of distance education.
2. The classroom training combined with laboratory experiences strategy was more effective than classroom instruction only or no treatment to prepare faculty and administrators for teaching in a distance education classroom.
3. The classroomtraining combined with laboratory experiences strategy was more effective than classroom instruction only or no treatment to help faculty and administrators move from the early stages of concern, awareness, informational, personal, to the task and impact stages of concern of management, consequence, collaboration, and refocusing.
4. The SoCQ was an effective instrument for evaluating faculty and administrator concerns about the innovation of distance education.
5. Classroom and classroom combined with laboratory experiences are important to the successful implementation of distance education platforms.
6. Faculty and administrators will be more willing to accept and institutionalize the new innovation of teaching in a distance-learning environment as a result of classroom instruction and classroom instruction combined with laboratory experiences.
7. Professional development in distance education methodologies should be offered to faculty and administrators to address their concerns, about the new innovation and to

increase institutionalization of the innovation.

8. The results of this study corroborate the evidence found in the review of the literature that classroom training combined with laboratory experiences should be provided to all users of telecommunications systems.

9. Training in distance education methodologies is a critical component for successful institutionalization of an innovation.

Determining if classroom training and classroom experiences aid in the smooth acquisition of the innovation of interactive television classes provides pertinent and useful data on how higher education administrators and faculty embrace and adapt to change as measured by the SoCQ. This study was conducted under the assumption that personnel implementing distance education programs desire a smooth and successful acquisition of the innovation.

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New Teachers and Technology: Positive Factors

Judith Duffield, University of Colorado at Denver, US
Myka Raymond, Englewood Public Schools, US

Each of us involved in encouraging technology for learning can list factors that inhibit the use of technology in schools. The lack of skills, confidence and tools are the usual suspects. When all these are present, many teachers still choose not to use technology. This study looks at five first year teachers who are using technology in order to determine the factors that encouraged them to be active technology users.

The subjects were selected from a pool of recently licensed teachers from eleven teacher education programs who are members of a PT3 consortium in a western state. Each program nominated teachers who were believed to be using technology in their first teaching position. Those nominated were selected based on their self-described use of technology, location in the state, grade level taught, and the students they served. The five subjects selected all are high technology users and represent the range of grade levels, locations, and settings.

The subjects will be observed twice, once in the fall and once in the winter. During these observations, the teachers, their colleagues, and their supervisors will be interviewed. The data will be analyzed to determine which factors lead to the teachers using technology in their first year. The ISTE/NETS list of Essential Conditions will serve as a starting point. We will also consider factors from the literature on the adoption of innovations and compare the strategies used to teach these teachers about technology.

Data collection will be completed before the SITE Conference. The purpose of this short paper will be to share our preliminary findings and receive feedback from the session participants.

An Analysis of the Influence of Gender, Grade Level, and Teachers on the Selection of Mathematics software by Intermediate Students

Donna Ferguson, Ph.D.
Department of Educational Technology
University of Northern Colorado
United States
dferguson@coe.unco.edu

Abstract: The purpose of this study was to investigate the relationships between gender, grade level, teachers, and the selection and use of mathematics software as measured by the type of mathematics software chosen, time-on-task, and reasons given for selection. Research data were collected from 202 third, fourth, and fifth grade students in a single elementary school located in northeastern Colorado.

This study investigated gender preferences of intermediate level elementary students. The overarching research question was: What relationship is there between gender, grade level, teachers, and the selection and use of mathematics software as measured by the type of mathematics software chosen, and time-on-task?

Results from this study add to the gender bias knowledge base and provide suggestions for software developers for improving movement toward gender equity in software design. The future for women in the field of technology is tenuous at best (Harrell, 1998). The obstacles females face eventually translate into highly paid men dominating the engineering and computer science arenas while women are relegated to data entry and word processing (Hakansson, 1990; Henwood, 1993). This study gave insight into factors that may influence this trend during the age range where females begin to lose their interest in computing, between third and fifth grade (Harrell, 1998; Hopkins, McGillicuddy-DeLisi, & DeLisi, 1997).

Research Design

The study population was 235 elementary students at the intermediate level from a school district in northern Colorado. One piece of mathematical software was chosen from each of four categories: drill and practice, instructional game, simulation, and tutorial. Students were taught how to use each of the four pieces of mathematics software and then asked to choose their favorite during a free selection time. They recorded both their time on task and the title of the software they chose.

Discussion

The analyses of this study revealed few significant differences for gender and grade level selection of software. However, the individual teacher was found to play a significant role in student choices. These analyses both confirm and dispute prior research on software selection which noted girls prefer drill and practice software, while boys prefer gaming software. The results for time-on-task by gender, grade level and teachers all showed significant differences which also disputes earlier findings.

Software selection by gender, grade level, and teacher variables was a primary focus of this study. Students in this study chose the drill and practice/tutorial mathematics software less often than either the instructional game or simulation mathematics software. The instructional game and simulation mathematics software were both more interactive than the drill and practice/tutorial software and allowed the students to select from a variety of activities within the software. It is possible students in today's classrooms have reached a level of sophistication where traditional software no longer satisfies their needs or expectations.

Girls ($n = 15$) were significantly more likely to use drill and practice/tutorial software than boys ($n = 6$). Studies conducted by Huff & Cooper (1987), Laurel (1998), Malone & Lepper (1980), and Sanders (1995) all found boys are more likely to prefer gaming software than girls. Results from the statistical analysis of this study dispute these former results, as the proportion of girls ($n = 40$) and boys ($n = 43$) who chose instructional game software was not significantly different. Differing results, however, could be due to the fact the software in this study was an instructional game as opposed to a recreational game or perhaps because these students had been taught to use the software during the study. The simulation software used in this study was composed of two distinct sections. The first section asked students to work in stores to solve problems and earn money. Previous studies (Malone & Lepper, 1980; Laurel, 1998) have indicated girls prefer working with problem solving software. The second section of the simulation software allowed students to spend the money they had earned in the shops, playing arcade games. The proportion of girls (n = 45) and boys (n = 53) who chose simulation software was not significantly different. There is a void in the literature concerning student selection of simulation software. It is possible, however, the two very different sections in the simulation software (gaming and task-oriented skills) counterbalanced each other. Had the simulation software not included both sections, results may have differed.

Statistical analyses from this study indicate grade level had no effect on students' selection of mathematics software. The proportion of third, fourth, and fifth grade students who chose a particular type of software differed only by classroom teacher.

Apple Classrooms of Tomorrow (ACOT) research (Sandholtz, Ringstaff & Dwyer, 1994b), as well as work completed by Lohr, Ross and Morrison (1995) indicate the type of instructional delivery in a classroom affects the way students interact with their own learning process. Perhaps the software students selected as their favorite was a reflection of the instructional approaches used by their teacher. Statistical analysis from this study indicates a significant difference between teachers and the type of mathematics software their students selected as their favorite.

This study clearly demonstrated a difference between the time girls and boys spent working with their favorite type of software, with boys consistently spending more time-on-task regardless of software choice than girls did. These results seem to contradict previous findings (Martin, 1991; Murphy & Gipps, 1996) noting boys were more comfortable with computers because they generally had greater access to them at home (Gressard & Loyd, 1987; Mandell & Mandell, 1989; Moe, 1984). All but one student in this study reported having a computer at home and more students reported the primary user of that computer as female rather than male. Although computer use in the home may be a predictor of attitude (Aman, 1992), it does not appear to be a predictor of software selection or time-on-task.

There were significant differences in time-on-task by grade with fourth and fifth grade students consistently spending more time-on-task than third graders. These results are most likely an indication of student maturity level or perhaps a reflection of instructional methods used in their classroom.

While this study did not show significant differences for software selection by gender or grade level, it did show a difference by individual teacher. Further research into the factors underlying these differences is recommended. What methods are these teachers employing in their classrooms that may affect the choices students make when working with software?

Conclusion

Although data from this study indicate no gender significance for software selection, it did illustrate the impact teachers can have on students' time-on-task and software choices. It is important for teachers to be good consumers and evaluators of software like their students. Many teachers have not experienced the technology rich background their students now inhabit. Teachers need instruction on how to seamlessly integrate technology into their classrooms, thoughtfully evaluate software, and be willing to share the responsibility of teaching and learning with their students.

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Why Some African-American Youth's Selves are Driving the Digital Divide

Jesse J. Foster, II
Center for Teaching and Learning, University of Nebraska-Lincoln
United States of America
Jfoster2@unl.edu

Abstract: For too long now, we have been attacking the digital divide with a "Field of Dreams" mentality; if we build it they will come. We have tossed money at the divide under the auspice that it will magically disappear if we sprinkle it with the pixie dust of corporate funds and government resources. This paper examines the assumption that the digital divide is not merely about computers, modems, and hardware. Instead the researcher asserts that the key to solving the digital divide is inside the individual users. The paper is the result of qualitative and quantitative research conducted in and around Tuscaloosa, Alabama. The qualitative methodology included interviews, classroom observations, and surveys of African American and European American students in two post-secondary institutions, and a series of technology workshops for middle and high school aged students. This paper is composed of the literature review, as well as the primary theoretical framework behind the research.

Digital Divide

Hoffman and Novak (2000) in their paper, "Bridging the Digital Divide." concluded that European Americans were significantly more likely than African Americans to have a home computer in their households (44.2% vs. 29.0%). European Americans were also more likely to have access to a personal computer at work (38.5% vs. 33.8%), although this difference was not statistically significant (p=.087). In terms of Internet access, European Americans were more likely to have ever used the Web (26% vs. 22%), and the gap between European Americans and African Americans became proportionally larger the more recently the respondents stated they had last used the Web. Further investigation revealed that 12.9% of European Americans vs. only 5.8% of African Americans used the Web 1 week before their survey response date. According to Hoffman and Novak, this roughly translates into 5.2 million (+/- 1.2 million) African Americans and 40.8 million European Americans (+/- 2.1 million) who have ever used the Web, and 1.4 million (+/- .5 million) African Americans and 20.3 million (+/- 1.6 million) European Americans who used the Web in the past week. European Americans and African Americans also differed in terms of where they have ever used the Web. Most notably, European Americans were significantly more likely (14.7% vs. 9%) to have ever used the Web at home. African Americans were more likely to have ever used the Web at school, and European Americans were more likely to have ever used the Web at work and at other locations (such as friends' houses, libraries, etc.), but these differences were not statistically significant (Hoffman & Novak, 2000).

The Divide is Getting Wider

Over the course of the last 10 years, researchers have offered numerous and varied solutions to crossing the digital divide. Voelker (2001) reported that the World Health Organization has joined with a number of public and private partners to improve access to high-quality scientific information for research centers. They are upgrading connections and adding new equipment, and the divide is still widening. The American Library Association (Kranich, 2001) noted that libraries offer not only access to computers and networks, but also the content, training, and expertise crucial to ensure widespread participation in our information society. The ALA has identified equity as a priority action area for the next 5 years and has attempted to articulate how local libraries can ensure equity in the digital age. Yet, the divide continues to grow.

Roach (2000b) cited the conventional approach by non-profit groups and corporations to digital divide initiatives which is to provide computers, Internet access and technology training to people in disadvantaged communities, an approach that has been generally unsuccessful in bridging the divide. Despite all of these warnings, and all of the programs designed to address the digital divide, it is still present. More importantly, headlines tell of a widening gap between upper- and lower-income groups and between single-parent and two-parent families. *Falling through the Net: New Data on the Digital Divide*, a report released in 1998 by the Commerce Department's National Telecommunications and Information Administration (NTIA), noted that although access to communications technology is "soaring," the "digital divide . . . is actually widening over time" and has "turned into a "racial ravine."

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There is something seriously wrong with the ways we presently address the digital divide, beyond the fact that they are blatantly ineffective. Perhaps Ramon Harris, executive director of the Executive Leadership Foundation's Technology Transfer Project, was right when he suggested that the digital divide is not about the technology (Roach, 2000). It is possible that Harris was very close to the right answer when he suggested that the digital divide is about access to information as well as placing value on that information.

Social Perceptions of Computers and Computer Users

The truth about technology, at least as far as computers are concerned, is that regardless of how useful they are, their users are consistently viewed in an undesirable light. Computer savvy people are often perceived as, and referred to as "nerds" or "geeks." It happens on the playgrounds, in private conversations, and even among researchers. Coolidge (1998) entitled his article, which investigated high technology companies in the United States looking to teenagers to fill jobs testing software, designing Web sites, and writing computer programs, "Teen geeks ride to tech rescue." Fotheringham's (1999) article on the year 2000 date conversion problem for computers and why the first computer programmers were directly responsible for the magnitude of the problem, was entitled, "Behold the Y2K bug--Revenge of the Nerds and Geeks." Monroy (2000) referred to women who were becoming competent in information technology jobs as "girl geeks." A group of volunteers that taught Java and Unix programming languages in Ghana referred to itself as Geekcorps (Dewan, 2000). Morse (2000) noted that one of the nation's premier computer repair companies is Geeks2Go. Cohen's (2000) article in the New York Times, discussing the Internet as a tool people can use for revenge on another person, referred to such an action as "Revenge among the Nerds." Whitmore (2000) reported that the gatherings of Internet and Information, an association of Internet business pioneers were nothing more than "a gathering of geeks" (p. 38). Koeppel (2000) referred to Silicon Valley in California as the "Valley of the Geeks." There is a defined and definite social perception of computer users. Bill Gates, with his small body frame and large glasses, is the personification of this image. Lohr (2000) even went so far as to suggest that this image problem is the reason for the shortage of computer programmers in the United States.

Research has suggested that negative attitudes and unfavorable perceptions of computers may adversely affect computer literacy (Marcoulides, 1988). Similarly, limited computer experiences were related to computer anxiety and lack of confidence in computer use (Huang, Waxman, & Padron, 1995). This information should be viewed in light of Marriott's and Brant's (1995) assertion that the way cyberspace is marketed to America contributes to negative perceptions by many minority students. They cited the fact that 'surfing the Net' is a foreign language made up of foreign ideas. Most African Americans do not surf. Watson (1996) noted that the "Big Brother is watching you" belief that some African Americans have toward technology also contributed to the negative perception of technology held by many African Americans. Marriott and Brant (1995) agreed with the idea that paranoia plays an important part in the equation. They asserted that computers evoke a deep-seated fear, perhaps even paranoia, among African Americans youth. It is possibly something about the machine's ability to be in every component of your life that scares them (Marriott & Brant, 1995). Many African Americans have said they do not want computers in their homes because they worry those faceless functionaries might use them to spy (Marriott, & Brant, 1995). Finally, Marriott and Brant (1995) contended that young African Americans are the hardest to sell on technology. To them, computers and computer people are the epitome of White nerdiness. Technology is "too much Bill Gates and not enough . . . Bill Bellamy" (p. 62).

Impact of Social Perceptions

Self-concept

The notion of the self-concept extending both backward and forward through time appears in the literature in diverse forms. James (1890) used the term "potential social Me" and distinguished it from the "immediate present Me" and the "Me of the past." Freud (1925) wrote about the "ego ideal," which referred to the child's conception of what the parents consider morally good. For Horney (1950), neurosis occurred when the idealized self became the focus of the individual's thoughts, feelings, and actions. The concept of the "ideal self," the individual's view of "how I should be," was important in the work of Rogers (1951) who claimed that the individual's self-regard depended on the discrepancy between the actual self and the ideal self. The notion of potential selves also intrigued Gergen (1967). He has argued that their range and complexity have been ignored in the focus on the "central tendencies" of the self (p. 64). Similarly, Gordon (1968) analyzed the retrospective, current, and prospective elements of the self, and Schutz (1964) discussed tenses of self, noting the difference between the Present Tense (acts in progress) and the Future Present Tense, which includes anticipated or imagined acts.

More recently, Levinson (1978) has described "the Dream" and has been concerned with the imagined possibilities of the self as motivating forces. The Dream is a personal construction that contains the "imagined self " associated with a variety of goals, aspirations, and values, both conscious and unconscious. With maturation, the Dream becomes cognitively refined and more motivationally powerful. Levinson, however, has focused on dreams; he has not analyzed nightmares or negative possibilities. Similarly, Cummings (1979) wrote of a personally salient "lost dream or hope" that, when reinstated, can serve as a powerful therapeutic procedure to overcome problems such as addiction, negativism, and lack of caring.

Recent reviews of the empirical literature on the self-concept from both the psychological and sociological perspective (e.g., Epstein, 1984; Gecas, 1982; Greenwald & Pratkanis, 1984; Suls, 1982; Zurcher, 1977), reveal that, except for some limited attention to the "ideal self," the content of conceptions of the self, other than those of the current self, have not been emphasized. There have been a variety of efforts to empirically explore individuals' understanding of the future (e.g., Davids & Sidman, 1962; De Volder & Lens, 1982; Goldrich, 1967; Lessing, 1968; Teahan, 1958; Wallace, 1956), but this work has rarely been concerned with how the future is represented in the self-concept.

The link between the future and the self-concept is implicit in the writings of the symbolic interactionists who argue that the self as an organizer of behavior is always anticipating, always oriented to the future (Lindesmith & Strauss, 1956; Stryker, 1980). To Mead (1934), having a self implied the ability to rehearse possible courses of action depending on a reading of the other person's reactions and then being able to calibrate one's subsequent actions accordingly. Whenever individuals engage in this type of role taking, they are in the process of creating potential selves, and there can be as many of these selves as there are times when the self is the object of definition, expectation, or evaluation. Other sociological theorists extended Mead's idea and tackled directly the relation between the self (or identity) and motivation. Foote (1951), for example, believed that all motivation was a consequence of the individual's set of identities. The individual acts to express his or her identity: "Its products are ever-evolving self-conceptions" (p. 17), and "When doubt of identity creeps in, action is paralyzed" (p. 18). When action does manage to proceed with an uncertain identity, it is completely robbed of its meaning.

The self is acquired through social interaction and is a product of particular sociocultural environments (Cooley, 1902; Markus & Cross, 1990; Mead, 1934). The self is viewed as a more or less integrated whole composed of abilities, values, personality attributes, preferences, feeling states, and attitudes (Geertz, 1975; Markus & Kitayama, 1991). A central goal of individuals with this view of the self, termed the "independent self-construal" by Markus and Kitayama (1991), is to "continually identify these attributes and then to insure that they are persistently expressed and affirmed" (Markus, Mullally, & Kitayama, 1997, p. 13).

These attributes, abilities, and preferences are not bound to particular situations or relationships but instead are seen as transcendent and enduring. Although situations may activate different subsets of attributes in the working self-concept (Markus & Kunda, 1986), the core self-representations are assumed to be relatively invariant over time. This belief is reflected in the cultural valuing of consistency across situations. Persons whose behavior varies from one situation to another are very often viewed as waffling, immature, or hypocritical. Because one's attributes and abilities are central to self-definition, people tend to affirm and elaborate those abilities at which they excel relative to others and the attributes that make them appear relatively unique and special. In fact, the self-concepts contain four to five times as many positive attributes as negative ones (Herzog, Franks, Markus & Holmberg, 1994).

Future Possible Selves

Self-concept has revealed the great diversity and complexity of self-knowledge and its importance in regulating behavior (cf. Carver & Scheier, 1982; Gergen, 1967; Greenwald & Pratkanis, 1984; Higgins, 1983; Kihlstrom & Cantor, 1984; McGuire & McGuire, 1982). Until recently, however, one specific domain of self-knowledge has remained relatively unresearched. This domain is commonly referred to as "possible selves." This specific domain of self-knowledge refers to how individuals think about their potential and about their future (Markus & Nurius, 1986). Possible selves are the ideal selves that we desire to become. Possible selves are also the selves we could become, as well as the selves we are afraid of becoming (Markus & Nurius, 1986). The possible selves that are hoped for might include the successful self, the creative self, the rich self, the thin self, the incompetent self, the alcoholic self, the unemployed sled, and the total, complete failure self (Markus & Nurius, 1986).

According to Markus (1986), an individual's repertoire of possible selves can be viewed as the cognitive manifestation of enduring goals, aspirations, motives, fears, and threats. Furthermore, because possible selves provide the specific self-relevant form, meaning, and direction of these dynamics (Markus & Nurius, 1986), they provide the essential link between the self-concept and motivation. The graduate student who fears he will never finish his dissertation carries with him a personalized fear. Furthermore, the graduate student is likely to have a well-defined possible self that represents this fear—the self as having failed, as bitter, as a poet who can't publish her poems.

Possible selves arise from representations of the self in the past and they include representations of the self in the future (Markus & Nurius, 1986). They are different and separable from the now selves, yet they are intimately connected to them. Markus and Nurius pointed out that possible selves are individualized and personalized, but they are distinctly social. For the most part, possible selves are the direct result of previous social comparisons in which the individuals own thoughts, feelings, characteristics, and behaviors have been contrasted to those of salient others. This is where the problem begins for many African Americans. Whereas, an individual is free to create any variety of possible selves, the pool of possible selves derives from the categories made salient by the individual's particular sociocultural and historical context and from the models, images, and symbols provided by the media and by the individual's immediate social experience.

Possible selves, therefore, have the potential to reveal the inventive and constructive nature of the self, but they also reflect the extent to which the self is socially determined and constrained (cf. Elder, 1980; Meyer, 1985; Stryker, 1984). Young African American females who are track participants no doubt absorbed the victories of Marion Jones into their own possible selves. Stories of people dying from the effects of smoking serve to create negative possible selves for smokers. In this same manner, images of savvy computer users as geeks and nerds may create negative possible selves for many youth. This is, however, more detrimental to the possible selves of African Americans in general and African American males in particular, because there are very few positive models to aid in the creation of positive possible selves to combat or counteract these negative possible selves.

It has been suggested that possible selves are important components of motivations, because they function as incentives for future behavior (i.e., they are selves to be approached or avoided), and because they provide an evaluative and interpretive context of the current view of self (Markus & Nurius, 1986).

Markus & Nurius (1986) further contended that the function of possible selves derives from their role in providing a context of additional meaning for the individual's current behavior. Individuals' self-knowledge of what is possible for them to achieve is motivation as it is particularized and individualized; it serves to frame behavior, and to guide its course. In short, possible selves serve to select among future behaviors (i.e., they are selves to be approached or to be avoided).

Self-efficacy

One of the fundamental components of this study is self-efficacy. Self-efficacy theory is an important component of Bandura's (1986) more general social cognitive theory, which suggested that an individual's behavior, environment, and cognitive factors (i.e., outcome expectations and self-efficacy) are all highly interrelated. Bandura (1978a, p. 240) defined self-efficacy as "a judgment of one's ability to execute a particular behavior pattern." Wood and Bandura (1989) expanded upon this definition by suggesting that self-efficacy beliefs form a central role in the regulatory process through which an individual's motivation and performance attainments are governed. Self-efficacy judgments also determine how much effort people will spend on a task and how long they will persist with it. People with strong self-efficacy beliefs exert greater efforts to master a challenge while those with weak self-efficacy beliefs are likely to reduce their efforts or even quit (Bandura & Schunk, 1981; Schunk, 1981; Weinberg, Gould & Jackson, 1979). Efficacy beliefs help determine how much effort people will expend on an activity, how long they will persevere when confronting obstacles, and how resilient they will prove in the face of adverse situations—the higher the sense of efficacy, the greater the effort, persistence, and resilience. Efficacy beliefs also influence individuals' thought patterns and emotional reactions. People with low self-efficacy may believe that things are tougher than they really are, a belief that fosters stress, depression, and a narrow vision of how best to solve a problem. High self-efficacy, on the other hand, helps to create feelings of serenity in approaching difficult tasks and activities. As a result of these influences, self-efficacy beliefs are strong determinants and predictors of the level of accomplishment that individuals finally attain. For these reasons, Bandura (1997) argued that "beliefs of personal efficacy constitute the key factor of human agency" (p. 3).

Self-efficacy theory (Bandura, 1977) suggests that there are four major sources of information used by individuals when forming self-efficacy judgments. In order of strength, the first is performance accomplishments, which refers to personal assessment information that is based on an individual's personal mastery accomplishments (i.e., past experiences with the specific task being investigated). Previous successes raise mastery expectations, while repeated failures lower them (Gist & Mitchell, 1992; Saks, 1995; Silver, Mitchell & Gist, 1995). The second is vicarious experience, which is gained by observing others perform activities successfully. This is often referred to as modeling, and it can generate expectations in observers that they can improve their own performance by learning from what they have observed (Bandura, 1978; Gist & Mitchell, 1992). Social persuasion is the third, and it refers to activities where people are persuaded, via suggestion, into believing that they can cope successfully with specific tasks. Coaching and giving evaluative feedback on performance are common types of social persuasion (Bandura,1977; Bandura & Cervone, 1986). The final source of information is physiological and emotional states.

According to theory and research (Bandura, 1995), individuals with low self-efficacy also have low self-esteem and harbor pessimistic thoughts about their accomplishments and personal development. In terms of thinking, a strong sense of competence facilitates cognitive processes and performance in a variety of settings, including quality of decision-making and academic achievement. When it comes to preparing action, self-related cognitions are a major ingredient of the motivation process. Self-efficacy levels can enhance or impede motivation. People with high self-efficacy choose to perform more challenging tasks (Bandura, 1995). They set higher goals for themselves, and are more apt to persevere in their pursuit of said goals. Actions are pre-shaped in thought, and people anticipate either optimistic or pessimistic scenarios, depending on their degree of self-efficacy. When setbacks occur, they recover more quickly and maintain commitment to their goals. Self-efficacy also allows people to select challenging settings, explore their environments, or create new environments. Researchers (Maddux, 1995; Schwarzer, 1992, 1994) have suggested that a strong sense of personal efficacy is related to higher achievement. This concept applies to such diverse areas as school achievement, career choice, and sociopolitical change. It has become an essential variable in clinical, educational, social, developmental, and personality psychology (Bandura, 1997; Maddux, 1995; Schwarzer, 1992, 1994).

This Research

Attitudes do matter. If African American students are proficient with technology, but do not believe that technology has a use in their lives, or offers a positive future possible self, they will probably not work with technology despite their proficiency. In this respect, attitudes and beliefs about technology serve to "make or break" the cycle of computer avoidance among African Americans in general. On the other hand, African American students who believe in the utility of technology in their lives, and that computers offer a positive future possible self, may persevere through challenges that face novice technology users.

Researchers have investigated the relationship between computer attitudes and computer adoption or uptake (Cox, Rhodes, & Hall, 1988; Davidson & Ritchie, 1994; Kay, 1990). The importance of attitudes and beliefs for learning to use new technologies is widely acknowledged (Bandalos & Benson, 1990; Dupagne & Krendl, 1992; Francis-Pelton & Pelton, 1996).

Several studies have found that individuals' attitudes toward computers might improve as the result of instruction (Kluever, Lain, Hoffman, Green, & Swearingen, 1994; Madsen & Sebastiani, 1987; Woodrow, 1992). In other studies, attitude scales comprised of component subscales were developed. Subscales measured attitudes toward the social issues relating to computer use (Francis & Evans, 1995; Popovich, Hyde, & Zakrajsek, 1987); computer liking, computer confidence, and computer anxiety or comfort (Delcourt & Kinzie, 1993; Loyd & Gressard, 1984b); achievement (Bandalos & Benson, 1990); and usefulness in education, personal usefulness, and value (Francis-Pelton & Pelton, 1996). Like other individual characteristics hypothesized to play a role in the continued growth of technology proficiency, attitudes and beliefs are not easily taught and must be developed by individuals over time.

The driving force behind this study was the slow, yet constant marginalization of African American students based on their "inability" to academically match their European American counterparts. This is particularly alarming when one considers the power of information technology and the generalized demand for Americans to be proficient at this task, if they are to be successful. As a collective group, African American male and female students have scored significantly lower on standardized achievement tests than other populations for far too long. Research suggests that this condition is widespread (Oakes, Gamoran, & Page, 1997; Steele, 1997). African American students are under-represented in programs for gifted and talented students, tend to be over-represented in special education programs and are consistently underrepresented on the honor rolls, which represent academic achievement based on grade point averages. Such observations are consistent with those of Gibbs (1989), Ogbu (1987), and Shapiro et al. (1993) regarding the educational plight of the African American student in our society. These observations are also consistent with those of Harter and Jackson (1992) on effects of intrinsic motivation on academic achievement, learned helplessness (Maier & Seligman, 1976), and the role of protective factors on academic achievement in African American students (Crocker & Major, 1989). Therefore, it is possible that motivational variables may influence African American students' computer usage differently than European American students. If these motivational variables and their effects can be determined for African American students, then it may be possible to develop instructional strategies to improve the integration of computers into their lives, and begin to use the technology as the powerful information tool it is.

Using Technology to Encourage Motivation and Achievement in Academically At-Risk Secondary Students

Kay L. Gibson
Department of Curriculum and Instruction
Wichita State University
United States of America
kay.gibson@wichita.edu

Abstract: This paper reports research efforts to establish how successful use of technology relates to achievement and motivation of at-risk secondary school students; and to identify aspects of technology use that appear to have a positive effect on these students' learning outcomes. Using school records, academically at-risk students were identified in one middle school situated in a mid-western city. These students were interviewed and observed in technology classes. Interviews were also conducted with the technology teacher concerning how the curriculum was designed and taught. Initial findings in this study, were inconclusive. In anticipation that a larger number of participants will begin to reveal categories and patterns of responses, data from a group of high school students will be included with existing data. It is hoped that eventually results from research such as this will help teacher educators better prepare pre-service teachers to choose effective technology teaching strategies and to integrate them into their classrooms.

Introduction

It is generally believed that the wise use of technology in teaching can lead to enhanced student motivation and achievement (Becker 2000; Chen & Looi 1999; Mistler-Jackson & Songer 2000). One reason that the use of technology can increase the learning achievement of students has to do with the very nature of technology (Kozma & Croninger 1992). Cognitive psychology suggests that learning is an active process in which the learner uses existing cognitive resources to construct new understanding from information provided by the environment and knowledge from prior experiences stored in long-term memory. Obviously, then prior knowledge has a major impact on current learning. Knowledge is best remembered when it is stored both as a mental image as well as a verbal description (Paivio 1990). Technology is complementary to cognitive learning in that it provides the means by which visual and verbal representations can be constructed and can model or perform certain processes such as problem solving that facilitate successful learning (Salomon 1988).

The literature provides numerous examples of improving the retention rate of at-risk secondary students as well as enhancing motivation through the use of technology (Chen & Looi 1999; Gan, 1999; Mistler-Jackson & Songer, 2000; Wishart & Blease, 1999). In part, technology is motivating because it is a hands-on approach that allows students to take charge of their own learning (Candon 2000, Taylor-Dunlop & Norton 1997). Not only did technology motivate at-risk students to learn when they were at school, it was also a major reason that at-risk students came to school due largely to the kinesthetic nature of interactions with technology (Taylor-Dunlop & Norton 1997). Dewey (1900) proposed that the use of hands-on activities provided intellectual stimulation for students that in turn increased learning. Considering Dewey's theory in an educational technology perspective, Herschback (1998) observed that technology demands of students an interaction with the learning environment and therefore was useful "in designing integrative and higher-order learning" (p. 55).

However, simply using technology in the classroom does not automatically result in improved learning and teaching (Mecklenburger 1990). To be truly effective, technology integration into classroom practice must recognize students' abilities, needs, and learning styles as well as the content structure of the discipline (Dunn, Dunn, & Price 1989). Additionally, the Laboratory of Comparative Human Cognition (1989) suggested that technology use with at-risk students is more effective when it is used in conjunction with collaborative groups of students with a well defined learning goal; involves complex simulations that require higher-order thinking; and connects students with their family, community and other cultures.

Background

When the National Educational Technology Standards (NETS) were incorporated into the program goals of the undergraduate teacher preparation program at Wichita State University, teacher educators began to examine effective uses of the integration of technology into classroom practice. Faculty worked in teams across four semesters to describe ways in which technology was currently being used in the program and to look for additional ways to effectively integrate technology into the various program courses.

The undergraduate teacher preparation program has a strong field component in all semesters of the program. Over forty public schools in the city school district provide field placements for students in the teacher preparation program. This gave rise to the opportunity for informal discussions with teachers in the field regarding their beliefs about the link between the use of technology and learner motivation. These discussions revealed that in-service teachers too were seeking possible ways in which they could effectively integrate technology into their existing curriculum to better facilitate successful learning.

Further these classroom teachers pointed out that they had become aware of a number of students who were only making a passing grade in their technology class while failing all of their other classes. They wondered if there was a connection between technology usage in the classroom and an increased level of student motivation to learn. These observations led to the question, "What types of technology integration most effectively encourage and motivate students to learn and achieve?" Answers to this question can help pre-service teachers, teacher educators, and classroom practitioners to provide a more responsive learning environment for all learners. The informed technology integration decisions of practicing teachers ultimately enhance all students' learning experiences and increase positive student outcomes (Kauchak & Eggen 1998). Teachers need to know what factors of technology use are crucial for consideration as they develop curriculum delivered at least in part through technology. This research sought to establish how successful use of technology relates to achievement and motivation of at-risk secondary school students; and to identify aspects of technology use that appear to have a positive effect on these students' learning outcomes.

Method

For the purposes of this study, at-risk students were those who did well in technology classes but who were receiving Ds or Fs in all or most other classes. The technology teacher using school transcripts identified a list of possible participants. The parents of these students were sent a letter explaining the research and a consent form to return should they wish for their child to participate. A total of 12 of the 16 possible participants returned consent forms and therefore, were included in the study.

An interview schedule was developed for use with the students that consisted of eight questions. Additionally, probe questions were written for five of the eight questions. The interviews were conducted in the technology classroom during class time. One researcher asked the interview questions while the other recorded responses. Interviews were also taped to insure accuracy and thoroughness of recorded responses. Most (9) of the students were interviewed during their technology class, however, three were given permission to come for the interview during another class. Once students were interviewed, they were observed working in the technology class. The two observers informally discussed the student's technology project with him/her, which helped to verify the student's responses to the interview questions. Informal interviews were also conducted with the school administrator and the technology teacher.

Individual student interviews, observation data, and the administrator and teacher interviews were coded using the constant comparative method (Maykut & Morehouse 1994) to establish themes, categories, and issues across the data. Additionally, the two researchers and a research assistant independently coded the data and then discussed the data, coding and recoding it until 100% agreement was reached. Through the multiple types of data gathered and researcher agreement, triangulation of the data was obtained and reliability established.

Findings

This paper reports the data results and findings concerned with the student interviews. The schedule of interview questions was constructed guided by the researchers' assumptions that technology was motivating a) because of its novelty, b) because the class was organized in a more appealing way for the learners than were other academic courses, and c) because technology activities required less reading and writing for completion of class assignments.

Responses regarding access to computers and the Internet other than at school did not support the researchers' assumption that access to technology was only available at school during technology class and therefore was motivating because it was a uncommon activity. Of the twelve student interviewees, eleven (92%) reported that they had regular access at home (n=10) or at a parent's place of employment (n=1).

The students used the Internet for a variety of activities. The most common use was playing games (n=8, 67%) followed by sending and receiving of email (n=7, 58%). Other Internet activities included research (n=6, 50%), school projects (n=5, 42%), general information searches (n=5, 42%), presentations (n=2, 17%), chat rooms and making birthday cards (n=2, 17%). Students also reported using a total of 10 different applications and software packages including Word, Excel, Adobe Acrobat, Word Perfect, Photo Shop, Paint, Clip Art, Print Master, PowerPoint, and Grolier's Encyclopedia.

When interviewees were asked what they liked about using technology, eight (75%) of the students answered that they enjoyed searching for and learning new information. One student liked "accidentally finding new information on the Internet. There were six students (50%) who responded that they liked the ability to do artwork and other creative things using technology. Responses from six students (50%) also identified the ease of using technology was one thing they liked. Comments such as "It's easy to correct", "I don't have to write", "It's faster", "I can make what I want (so it)...looks professional", and "easy to get information faster" were included in the 'ease of use' category.

Responses to a question asking what the interviewee liked about technology class indicated that for several of the students (n=2, 17%) the organization of the class was important especially in terms of self-directedness. Types of responses included in this category were "I can talk with other people", "I get to do more on my own", and "There's just more freedom in our technology class". Two other students (17%) described teacher characteristics of "nice" and "willing to help" as what they liked about their technology class. However, the largest number of students (8, 75%) gave responses concerned with the type of content that was learned in the technology class and indicated that was what they liked about their class. These students enjoyed "the opportunity to learn", "work(ing) on a web page", "learning to insert pictures...into documents", and finding "new stuff ... like new links and graphics".

The students were also asked if they worked with other students during the technology class. The researchers anticipated that group work might be appealing to the at-risk students. Initial responses do appear to support this assumption. Eight students (75%) reported that they frequently worked with others on projects and seven students (58%) said that they helped other students even if they were not working on the same project. Only three (25%) of the students said that they did not work with or talk with other students.

Interviewees were asked several questions pertaining to the amount of reading and writing required in the technology class because the researchers believed that less use of reading and writing skills would be motivating to the at-risk secondary students. However, a total of seven students (58%) responded that there was "a lot more" reading in the technology class (n=6, 50%) or that there was "more (reading) than (in) other classes" (n=1, 8%). Three students (25%) answered that the amount of reading required was the same as other classes while only two (17%) responded that there was less reading involved in their technology class than there was in other classes. When asked how much writing was required in their technology class, four (33%) said more was required than in other classes, four (33%) said less, and two (17%) said it was the same amount of writing in all of their classes. Two (17%) of the students were undecided.

To conclude the interview, the student interviewees were asked why they thought they did better in technology class than in some of their other classes. Seven (58%) believed that it was partly due to the fact that their technology class was easier for them than other classes; while 3 (25%) of the interviewees said they did well in technology class because they found it interesting. One student said he thought he did better because "other classes (were) too easy" but technology class was challenging. Two students said they were not sure why they did better.

Conclusions

The initial findings of this study showed that all of the at-risk students who participated in the research, used technology at home and at school on a regular basis for playing games, emailing, completing various type of school assignments, participating in chat rooms and making birthday cards. They had a substantial knowledge of a variety of applications and software. Most of the students (n=8, 75%) enjoyed searching for and learning new information while the same number enjoyed the skills that they learned in their technology class such as constructing a web page, activating external links, inserting pictures, and designing graphics. Most of the students (n=8, 75%) enjoyed the opportunity to work with other students on projects in their technology class. It was found that for these at-risk students the amount of reading and writing required in their technology class was not a factor that influenced their motivation when working with technology. Finally, a majority of the at-risk students believed that they did well in technology class because they either found the work easy (n=7, 58%) or interesting (n=3, 25%).

These findings, though not conclusive, do suggest that technology can motivate at-risk secondary students to achieve when the learning environment allows group work, when the content is perceived by the students as easy to learn and when the students view the content as relevant and interesting. It is anticipated that additional interviews with at-risk secondary students will help to clarify and validate these initial findings.

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Process of teacher's buy in and Web design project adopting constructivist model

Misook Ji, University of San Diego, US

Abstract

Current education is facing the challenges of the high standards which the 21st century demands. The new standards emphasize the importance of technology integration as a catalyst for instructional change. Technology integration may offer an active, meaningful, and authentic learning environment for engaging students more in the learning process, and encouraging student ownership of their learning, which are essential parts of the new standards. The need for competent, well-prepared, talented and dedicated teachers in every classroom has been described as the major key to effective technology integration.

Consistent with technology use as the catalyst for instructional change, a paradigm shift from traditional teaching and learning to a constructivist model is critical to accomplish society's expectations for education. Learning through a Web based design project would be one way of facilitating an authentic learning environment, which includes mastery of basics, inquiry, collaboration, and responsibility as the hallmarks of effective education.

One particular component in the new standards has focused on teachers' pedagogical beliefs and practices related to technology integration into teaching and learning. The new standards demand a paradigm shift in teaching and learning with technology, and challenge many teachers to modify, transform, and even abandon their traditional model of teaching and learning into an unfamiliar new model to accomplish these expectations. The process of change in teacher's pedagogical beliefs and practices is often a painful and difficult one, causing teachers a good deal of stress. Teacher educators need to know more about this process to be able to help teachers make the shift smoothly.

In the constructivist view, widely accepted as a legitimate pedagogy, teaching is considered as a "process of helping learners to construct their own meaning from the experiences they have by providing the opportunity for those experiences and guiding the meaning-making process" (Jonassen, Peck, and Wilson, 1999). Teachers must construct their *own* understanding of this theory and need to design effective and meaningful teaching methods to implement this theory into practice.

An authentic learning environment which is designed to make a connection between meaningful learning and the socially interactive community, is vital to fulfill societal expectations for educational. The environment is the adoption of a constructivist pedagogical approach in a collaborative culture. This might be accomplished within a Web-based curriculum, for example. Such rich learning environments would provide opportunities for learning activities in which "students are engaged in a continuous collaborative process of building and reshaping understanding as a natural consequence of their experience and interaction with the world" (Dunlap and Grabinger, 1996).

Although technology integration and a constructivist approach to teaching and learning hold the promise of promoting meaningful learning in a rich-context learning environment, teachers often have difficulties adopting a new way of teaching, and in changing their pedagogical beliefs and perceptions. These difficulties may not result simply from teachers' lack of familiarity with combining computer technology and a constructivist approach, but rather may be a result of their failure to recognize a new way of thinking and designing. In the process of applying constructivist concepts, teachers need support and encouragement from educational leaders, researchers, and teacher educators to help them refine their methods and change their teaching practices consistent with a constructivist approach. The process requires that teachers invest more time, effort, and even struggle to cope with conflicts and barriers in their school environments.

Teachers' changes in instructional approach are the result of a thoughtful process, which is their construction of knowledge about what 'works' and doesn't work in the classroom. It is cautioned that technology integration is not just a matter of "plug and play" from others' work, and that "tweaking" someone else's idea isn't nearly as satisfying, nor effective working out your own ideas for your own classroom. The concept of teachers designing their own activity and curriculum, responding to the dynamic and unique conditions of their classrooms, would be more in keeping with a constructivist classroom.

Therefore, instead of being passive borrowers, teachers need to "buy in" (Perkins, 1991), to become active designers.

The research examined the process of change in teachers' pedagogical beliefs and practices doing Web based design project and how they struggle and triumph in creating new strategies. This study employed a qualitative research design, using descriptive case study methodology. The teacher participant in this study was a teacher who was engaged in her second project in which her students were designing Web-based projects in order to learn and communicate about a subject matter. Her students designed authentic Web-based projects in which they became technology leaders in the school and the school district, helping the teachers and other students.

This study intended to describe one teacher's understanding and pedagogical beliefs toward seeking to use a constructivist model of teaching and learning, and the process of change in that direction, and doing so in the context of the teacher's designing Web-based projects with her students. This study described a teacher's pedagogical beliefs and perceptions before and after having her students do a constructivist technology project, in order to understand how these beliefs have changed. The research also focused on understanding the effects of constructivist design on teacher's teaching strategies and constructing pedagogical beliefs. The purpose was to find ways of helping teachers to "buy in" (Perkins, 1991) to becoming an active designer rather than being a "plug and play" (Harris, 1998), passive direction-follower.

The research provides implementation, which enable teacher preparation institutions to better prepare preservice and inservice teachers for active design of buying in constructivist model of teaching which integrates technology.

A Multilevel Analysis of the Relationship between School and Teacher Variables and Students' Usage of Technology

Seung H. Jin
Curriculum and Foundations
Cleveland State University, United States
seung.jin@csuohio.edu

Joshua Bagaka's
Curriculum and Foundations
Cleveland State University, United States
j.bagakas@csuohio.edu

Abstract: The purpose of this study was to determine the impact of teacher and school variables on students' usage of computer technology in elementary schools. Participants in the study were 10 classroom teachers and 219 fourth- and fifth-grade students representing rural, urban, and suburban in the Northeastern region of Ohio. The findings in the study show that, teaching experience, teachers' attitudes towards technology, and their school's technological environment were significant predictors of the students' adjusted classroom average technology usage. Teaching experience and teachers' attitudes towards technology had a positive relationship with students' technology usage.

Over the past two decades, there have been significant increases in the use of technology and in access to computer technologies in schools. However, there are important questions of students' competence in necessary technological skills. If students are expected to develop technological fluency for their learning, their teachers must also possess this fluency. If some teachers neglect to use technology in their teaching or to teach the second-level skills of knowledge integration for deeper understanding, students may not be equally prepared to become knowledge workers functioning at higher levels in society.

Many studies investigated students' usage of technology underscore teachers' role in integrating technology. A study about educators' beliefs and technology-related activities revealed that teachers who used e-mail at home, used Internet in classrooms felt technology improved their teaching roles (Norris, Soloway, Knezek, Topp, Young, & Box, 2000). Parr (1998) emphasizes that the beliefs of students and teachers influence the use of technology in their classroom and that the learning context with technology is co-constructed by teachers and learners. Mills (1999) stresses that a successful integration of computer technology in instruction must be approved, accepted, and implemented by teachers. Honey and Moeller (1990) indicate that teachers' educational beliefs play an important role in integrating technology into the curriculum. The purpose of this study was to determine the impact of teacher and school variables on students' usage of computer technology in elementary schools.

Methods

Participants in the study were 10 classroom teachers and 219 fourth- and fifth-grade students representing rural, urban, and suburban in the Northeastern region of Ohio. The subjects were identified to be in two levels of an organizational hierarchy. At the level-1, a short survey is being administered to fourth and fifth grade students to assess their technology-related learning environments and their level of usage of technology such as word processing, drawing, presentation, spreadsheets, keyboarding, game, reading software, encyclopedia, web searching, e-mail, etc. At the level-2, a survey was administered to 10 classroom teachers whose students (level-1) participated in the study. The teachers' questionnaire was designed to assess teachers' technological beliefs, practices and demographic characteristics such as accessibility to computers at home and in the classroom, technological training, gender, teaching experience, and area of teaching.

Students' responses to the survey items were internally consistent with a Cronbach's Alpha reliability coefficient of 0.84. A combined scale of *technology usage*, created from these eleven items was utilized as the primary outcome variable of the study. Teachers' attitudes toward technology, their perceptions on school technological environment, as well as their usage of technology was used as the primary independent variables of the study. Due to the fact that students are nested within teachers (or classrooms), hierarchical linear model (Bryk & Raudenbush, 1992) was best suited for data analysis of the study.

Results

Table 1 presents the teacher-level model (level-2) results for the prediction of students' technology usage by school contextual and teacher variables. At this level, the outcome variable is the students' adjusted classroom average usage since the students level variables were grand mean centered at the student-level (level-1) model.

Variable	Coefficient	t-value	p-value
Teaching experience	0.22	4.12	0.012*
School location (1=urban, 0=non-urban)	0.22	1.46	0.203
Teacher's attitudes towards technology	0.74	3.78	0.018*
School technological environment	-0.59	-3.74	0.019*

Table 1: Teacher-level model results for the prediction of students' technology usage by school contextual and teacher practice variables; * $p < 0.05$

The findings in Table 1 show that, teaching experience ($\beta = 0.22$, $p < 0.05$), teachers' attitudes towards technology ($\beta = 0.74$, $p < 0.05$), and their school's technological environment ($\beta = -0.59$, $p < 0.05$) were significant predictors of the students' adjusted classroom average technology usage. Teaching experience and teachers' attitudes towards technology had a significant positive relationship with students' technology usage. Surprisingly school's technological environment had a significant negative relationship with students' technology usage.

Conclusions

The findings in the study may suggest that, teachers' attitudes towards technology are more important in enhancing their students' technology usage than school technology environment. A possible explanation for the negative relationship between school's technological environment and students' technology usage may be due to varying teachers' expectations. It is possible that teachers who utilize technology more have a higher level of expectation on their school's technological support and resources. Contrary to other studies which have shown a negative relationship between teaching experience and technology use, the sample of teachers who participated in the study varied only minimally in their teaching experience, from two to eight years.

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Deepening the Impact of Technology through an Inquiry Approach to Teaching and Learning: A Cross-Case Analysis of Three Teachers' Experience

Margarete Juliana, Research Center for Educational Technology, US

INTRODUCTION

Teachers know that in order for students to learn they have to be engaged in the learning process and preferably interested in the topic. Robert Fried takes this a step further as he highlights the need for both teachers and students to become passionate about their learning (2001). This study focuses on three teacher professionals whose teaching practices capitalize on the use of multiple technologies and inquiry method as a means to deepen student learning, engagement, and understanding. Though there are many exhortations to use inquiry to stimulate thinking and learning, it is more easily said than done, given teacher educational models and pressure on teachers to increase student achievement on standardized tests.

PURPOSE OF THE STUDY

The term "inquiry" encompasses many meanings (Short & Burke, 1996) and can have confusing and negative connotations for teachers. Although commonly associated with science education (Ben-Chaim, Ron, & Zoller, 2000; Pierce, 2001), inquiry can be used with any curricular area. This study provides a window into the experiences of three veteran teachers who use inquiry in a classroom equipped with multiple technologies. This study reveals how teachers who ascribe to the inquiry method use technology to support inquiry and learning, and reveals the benefits (and drawbacks) of incorporating inquiry and technology in the classroom. The goal of this study is to determine the differences and similarities in teachers' beliefs and strategies about incorporating inquiry and technology. Through a cross–case analysis, we will be able to see a broader range of understanding about the use of technology to support inquiry, and the findings can present models of use that other teachers can reflect upon as they think about their own teaching and technology infusion.

BACKGROUND

The Ameritech Electronic Classroom (AEC), a unique research facility at Kent State University and part of the Research Center for Educational Technology (RCET), has been in operation since spring, 1998. One strand of the research focus of RCET is: "Under what conditions can technology be used by students for problem solving, inquiry, and critical thinking, and what are the impacts of such use on student learning?" (RCET, 2000). This question was the impetus for this study.

Area teachers and students call the AEC "school" half a day, every day, for a six-week period. Teachers bring their own units, and are supported by an administrative specialist, instructional specialist and technology specialist during the time they come to the AEC. Teachers who come to the Ameritech Electronic Classroom are identified through a selection process which involves being nominated by their principal. The teachers then participate in a one-week orientation that focuses on the inquiry method supported by a variety of technology.

During the one-week orientation, teachers read about and discussed the issues involved in creating authentic work for students (Newmann & Others, 1996). They created guiding questions as the backbone of their inquiry units (Traver, 1998), and discussed how to design units that involve students in the development of questions that guide their own learning (Short & Burke, 1991). This professional collaboration was continued throughout the year with periodic meetings to discuss topics about teaching with inquiry and technology, and to share unit plans and ideas as "works in progress". These meetings were set for one time per month for the first year and changed to quarterly for the second year with online communication and support available.

PARTICIPANTS

The participants in this study were two fourth grade teachers, and one eighth grade teacher from area schools. Nancy*, a fourth grade teacher, who has taught for 11 years, chose a unit on conflict. Sarah, another fourth grade teacher, who has taught for 15 years, chose to continue a unit on immigration that she had begun at the first of the year. Robert, an eighth grade teacher, who has taught for 28 years, focused on oral histories. All units were interdisciplinary, incorporating mostly social studies and language arts as the target curricular areas.

METHODOLOGY

The following methodology was used for each case. In order to assure validity of the data, multiple data sources have been used in this study. Teachers were interviewed after their one-week orientation during the summer, just prior to their turn in the Ameritech Electronic Classroom. They were interviewed once a week with a semi-structured format that allowed us to tailor some questions to issues that emerged from the prior week's interview and observations. All teachers were observed two times a week in the Ameritech Electronic Classroom and once per week in their home school classroom. This allowed us to see differences between their strategies and orientation to teaching within and outside of the technology immersed environment. All three teachers had technology in their home school classrooms to some degree. A teacher reflection journal was recorded weekly, and unit and lesson plans provided a final data source.

DATA ANALYSIS

The rubric for authentic and intellectually engaged learning (Newmann, Secada, & Wehlage, 1995) will be used to code the data with the software, Ethnograph. Instances of use of technology will be noted, as well as teachers' rationale for using technology, and how they believe it supports student learning. These responses will then be coded for patterns. Categories that emerged will be analyzed to develop a framework of each teacher's understanding and mental model of the concept of inquiry, how the teacher believes it enriches student learning, and how technology supports teacher and student inquiry in the classroom. These individual cases will then be compared and contrasted.

CONCLUSION

The results of this study will create a picture of how teachers use technology to support inquiry. Our experience with teachers, such as those in this study, shows that they are committed to engaging their students in learning through a multitude of means. Learning, to these teachers, is about delving deeply and broadly into topics that they believe are relevant not just to them as educators, but also of interest to their students. They also know the importance of aligning all learning to state standards and to the objectives of state level standardized tests. This is not an easy tightrope to walk. Even with years of experience in the classroom, these teachers express the difficulty of the balancing act they willingly walk every day. Capturing these teachers' experiences and reflections can provide an important window into how expert teachers maintain their passion for learning by embracing both inquiry and technology use to deepen the impact of student authentic learning.

[This study is in its final weeks of data gathering. As such, the data analysis has not been completed.
Project Completion Timeline:

- November, 2001 – Data collection completed
- November, 2001 - January, 2002 – Data analyzed and results compiled
- February, 2002 – Study write-up completed]

* Teachers names were changes for confidentiality purposes.

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Teaching Activities Through the Internet & a Study in Anadolu University

Isil Kabakci, MA
College of Education
Anadolu University
isilk@anadolu.edu.tr

Prof. Dr. Yasar Hoscan
College of Industrial Arts
Anadolu University
hoscan@anadolu.edu.tr

Abstract: Internet, which has entered into our daily life with the rapid changes in data processing, has brought many developments into the educational area through easy access to the information and rapid communication services for users. The use of Internet in training environment has been providing new educational opportunities especially for adults in addition to their main education. Teaching activities through the Internet, which remove the physical handicaps such as time and place, enable the individuals to continue their education within their professions. Teaching activities through the Internet for various purposes have been organized by institutions which gradually rising in number over the world.

Introduction

Obtaining data in great amounts, easy accessing to information and rich communication possibilities of Internet has formed the idea of Internet for teaching purpose, and this has pioneered the formation of the "teaching activities through the Internet" concept. There are various definitions for teaching through Internet in literature. Khan (1997) defined the "Teaching Through Internet" as a teaching program to form a meaningful teaching environment which will increase and support learning by using the features of the Web and which is supported by computer technology. On the other hand, Relan and Gillami (1997) defined "Teaching Through Internet" as "to create formal and co operational learning environments by using the features and possibilities of WWW, by applying educational strategies to teaching environment" (Henke, 1997, p:1). These definitions for teaching through Internet state that since Internet includes the accessing to information, synchronous and asynchronous communication services, it enriches the teaching environments, supports learning based on cooperation, makes it easier for students to evaluate themselves and for instructors to evaluate the students.

There are various types of use of Internet, which means the use of Internet for the purpose of teaching and it is possible to group the teaching activities through Internet into four groups (Senis, Mutlu & Çetinöz, 1999).

- ➢ Providing Internet support for Structural lessons
- ➢ Internet based presentation of structural lessons
- ➢ Application of virtual University
- ➢ Internet based certificate programs

Teaching activities are increasing rapidly through Internet, which can be used in different ways in teaching environments, depending on this, more students in number can continue their educations using these programs free from the place and the time.

Purpose

Main purpose of this study is to examine teaching activities through Internet and to analyze effectiveness of these mentioned applications. As for the aim, the first two units titled as "Introduction to Information Technologies" and "Algorithm Concept and its Fundamental Features" of "Fundamentals of Information Technology" course which is given in order to make the students in all Faculties, Institutions and Vocational Schools using structural education in Anadolu University to gain computer-literacy and which is for one term course was designed as an Internet teaching activity by using WebCT and the success of the students taking this course was determined by using two different Teaching Activities Through Internet (Internet Supported Teaching and Internet Based Teaching) and traditional teaching activity within the presentation of the content.

Methodology

As for the aim, a model with pre-test and post-test control groups was applied in the study. 71 subjects from 2000-2001 Academic Year Spring term students of "Fundamentals of Information Technology" in Anadolu University participated into the study. First of all the content was converted into teaching activities through Internet by using WebCT and then in order to examine the students' success pre-test and post-test which were consisted of the units that were mentioned was given to the students by the researcher. A subject-success test was applied as a validity and reliability study before the research was conducted. The subject-success test was given as a pre-test to the groups before the units that were mentioned were followed. The first group used "the Internet-Supported Instruction" as teaching activities in the "Fundamentals of Information Technology" whereas the second group was trained by using "the Internet-Based Instruction" in the same course. The last one was the traditional group, which the Internet was not used. At the end of the study, thepre-test was given as the post-test.

Findings and Comments

To analyze the data and its comments, first of all the scores of the pre-test and post-test applications of the experimental and control groups were gained and then each students' arithmetic average pre-test scores were examined to find out whether there was a significant difference between the scores by using one-way ANOVA analysis. Among the arithmetic average of pre-test and post-test scores of the students in each three groups, it was defined that there was a significant difference in the advantage of the post-test. In order to define the direction of the significant difference in post-tests one of the multiple comparison tests, Tukey's Honestly Significant Difference Test (Tukey's HSD test) was used. Table 1 demonstrates the findings gained in the study.

Experimental Groups	Experimental Group I	Control Group
Experimental Group II	15.79*	15.57*

*P<0.05

Table 1. Tukey's HSD Test Findings of the post-test scores of the Groups

According to the results of the study, first of all, it was defined that there is a significant difference in the advantage of first experimental group in which Internet Supported Instruction was applied. Additionally, it was found that there is also a significant difference in the advantage of the control group in which the traditional teaching instruction was applied.

Secondly, it was defined that there is a significant difference in the advantage of the control group in which traditional teaching instruction was applied. This finding shows that there is a significant difference in the students' success level in both traditional teaching instruction group and Internet supported instruction group in the advantage of the first group.

Conclusion

The main findings of this study are:

1) ***The teaching activities of Internet-Supported Instruction*** are more effective on students' success in "Fundamentals of Information Technology" course than ***the teaching activities of Internet-Based Instruction.***
2) ***The teaching activities of which the Internet is not used*** are more effective on students' success in "Fundamentals of Information Technology" course than ***the teaching activities of Internet-Based Instruction.***

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Using Information Visualization To Enable Teachers To Search And Teach With The Internet

Daniel A. Kauwell
University of Illinois
405 N. Mathews Ave.
Urbana, IL 61801
217.244.9682
kauwell@uiuc.edu

Introduction

Historically, issues such as the retrieval of information have been the problem of Librarians and information scientists and only of ancillary interest to educators. However, we need to consider that current government estimates show that more than 95% of American K-12 schools and virtually all institutions of higher learning are connected to the Internet (National Center for Education Statistics 2000). Indeed, billions of dollars have been spent to provide the infrastructure and equipment to achieve this.

Now that we have all these schools wired it remains to be seen what we are going to do with the Internet. There are many pedagogically sound uses of the Internet and certainly one of them is access to information from around the world. Ultimately, most educators would like to see a day when students can access the limitless collection of media on the Internet and find many relevant resources related to their topic of study. Clearly, the seemingly boundless trove of information, art, music, literature and other forms of media on the Internet is one of its greatest potentials. Information and media that in the past might have been available to only a few, can now be accessed by the many. However, anyone who has tried to find quality informat ion on the Internet, realizes that this is often difficult (Jansen, Spink et al. 1998; Silverstein, Henzinger et al. 1999). This is backed up with personal conversations I've had with teachers, where the most common complaint heard is "I know there is a lot of good 'stuff' on the Internet but, I just don't have time to find it." Yet in spite of the difficulties associated with finding information, students are being called upon to learn from distributed sources of information on the Internet. As many as 30% of K-12 teachers have reported that they required students to find materials on the Web to a large or moderate extent (National Center for Education Statistics 2000). To address this issue in the past there have been many efforts to build static, manually maintained, domain and grade level specific collections of "good" pages. Unfortunately, these repositories are difficult to sustainable. What is needed are new methods of finding information, learning from it once it is found, and sharing that information with other teachers and students.

Let's be clear here, the problems we have with finding information on the Internet are not unique only to teachers and is not "just" a training issue for them. Finding and learning from information on the Internet is problematic for teachers, those preparing to become teachers, students, and anyone else desiring to learn from information found on the Internet. To overcome the problems in searching the Internet many advocate teaching better search skills that ultimately rest on the searchers' cognitive abilities to formulate a query, filter information, assess validity, organize results, and generally make sense of what can be a very ill-structured task. Yet cognitive abilities have obvious limits, and mastering search skills takes time on task that many searchers do not have to master often complex query languages that vary from search engine to search engine (Jansen, Spink et al. 1998). Research on information retrieval shows that most well formulated queries involve seven to fifteen search terms and relatively sophisticated query logic (Meadow 1992; Korfhage 1997) yet, the average number of search terms in a Web query is somewhere between 2 and 2.5 words (Silverstein, Henzinger et al. 1999). Furthermore, less than 5% of all Web searches use Boolean operators and of those that do, it's estimated that as many as 50% may be using them incorrectly (Silverstein, Henzinger et al. 1999).

When and if information can be found, the teacher must do something with it to make the in formation available to students and, students must now "do something" with it to construct knowledge. Current search engine interfaces do little if anything to support the knowledge construction process. Studies I am currently conducting indicate that most students (undergraduate students in education, most of whom are preparing to become teachers) use a variety of strategies for selecting Internet sites and learning from them. Often however, they pick the "first" site that appears on the search results or those with a "catchy title." This sadly strikes me as reminiscent of a trip to the library where students pull the first book off the shelf (more often than not the encyclopedia) that seems to have any information on their topic and commence to write a paper. If we are to fully utilize the Internet, we need to prepare teachers and, help teachers prepare students, to find and learn from information on the Internet. Better skills and tools are needed to find and learn from information, better methods for dissemination of information once it is found and organized into meaningful structures, and better ways to maintain repositories of information for use by teachers and students.

Imagine for a moment, a high school history teacher who does a search for "World War II". They are presented with a list of perhaps hundreds of thousands of "hits" from which they have to find the "good" sites. If the teacher uses one of the more popular search engines they will get pages from a sampling from about 16% -30% of the Web and, the validity of these pages is indicated solely by the search engine or index's relevancy ratings which is highly questionable (Spink and Greisdorf 2000). The teacher must then sort through the hits, determine which ones are good, browse through the sites for other related pages and perhaps they will click through to other sites not returned by the search engine. If this raw information is to be used to prepare a unit on World War II, something must be done with it to make it useful. If the teacher chooses, and knows how, they may be able to make a html list of the sites they found in a hierarchical order for dissemination to other teachers or their students. But, this all requires a good deal of work, lacks the means for easy dissemination and furthermore, the links collected are subject to "link rot". Without constant checking, over a relatively short period of time, many of the links found will be broken.

Alternatively, imagine that the same teacher could search the Web with multiple search engines simultaneously and manipulate the hits in such a way that information about Normandy could be placed on the appropriate location on a world map by simply dragging an icon that represents the Web page. Information about Germany's eastern front could be placed in Russia and information about the Burma Road could be located along the actual route. Instead of printing pages the teacher could easily cut and paste information from the page or make notes that would pop-up whenever a mouse was place over the icon that represents the Web page on the map. When the page icons are clicked on, the entire page could be displayed in a browser for more information. Irrelevant hits could be deleted and new sites that are found while browsing could be easily added to the map. If the entire "search space" information could be saved, map, notes and all, it would be very easy for the teacher, colleagues or students to access the information to use for their own purposes. Such search spaces could be easily made available to other and they could even be collaboratively constructed. Let us further imagine that all who use this search space implicitly contribute to keeping the links updated, help find new links of interest and adjust the

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relevancy weightings for sites showing similar information simply by using the search space for their own purposes. Over time, data could be collected that would shed light on other dimensions as well. Such as which sites are best suited for a high school teacher vs. a university researcher. Perhaps patterns could be detected that would allow detection of "misinformation" put out by groups pushing particular perspectives (e.g. groups that advocate there was no holocaust). Or, perhaps patterns that highlight women's perspectives or a particular countries involvement in the war could be highlighted. Through normal searching and learning activities, a repository of search spaces, or knowledge structures could be built, maintained and modified simply by users searching the Internet for their own purposes.

Our Approach

We have developed a graphical user interface that applies visualization to Internet search results. Instead of lengthy lists of search results, the Visualization of Information Tool (VisIT) presents the user with a graphical, spatial representation of the search space where each Web site is represented and all of the hits returned are clustered within that site representation. Now the user can "see" the hits returned by the search engine and other pages at the site and, when any of the pages are clicked the appropriate page is displayed in the browser window (Figure 1.). Searchers query multiple search engines simultaneously to construct a search space and, heuristic based rules augment search engine relevancy rankings. Upon placing the cursor over any page, a pop-up box appears with search engine comments (if any) and the first 'n' characters of text found on the page (Figure 2.). Users can scan text from the page in this manner and they can make a more informed decision as to which pages to explore further by clicking on them. This interface allows users too not only quickly scan hundred of hits at once but, numerous perceptual cues are added to convey more information as well. Arrows are drawn that show which pages in the search space are referencing other pages, the color intensity of pages indicate relevancy weighting, visited pages are marked to enhance navigation, etc.

Once information is found, we need to assimilate it into our existing knowledge structures and graphical representations can help with this process (West, Farmer et al. 1991). To facilitate, VisIT's graphical displays can be saved, and re-opened later. Users can edit the search space by deleting sites, grouping sites, making annotations on pages, labeling sites and more. Background images can also be inserted allowing users to place information on a meaningful referent (Figure 3). In this manner users can begin to construct a "knowledge space" from their search space, one in which they have taken information from various sources and constructed meaningful external representation or cognitive artifacts (Norman 1991).

Conclusion

Soloway and his colleagues (Soloway, Norris et al. 2000) recently pointed out that some are arguing that computers have failed in education. He shows that the failure is not in computers ability to be an effective tool but, that the failure is in the implementation of computers (or lack of implementation). Now that schools are connected to the Internet, we will soon be hearing debates on its effectiveness as an educational resource. However, unless educators better equip themselves and their students to succeed in learning on the Internet they will fail. Teachers and students need better tools to search and learn from the Internet and the early indications are that VisIT may point to a promising new direction. VisIT will be demonstrated in this session and participants will be able to try out the software for themselves.

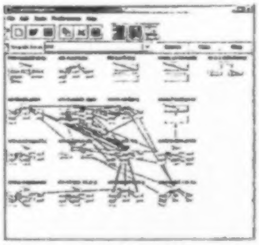

Figure 1. Initial Search Space in VisIT

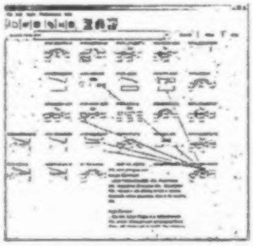

Figure 2. Pop-Up Box With Text From Page

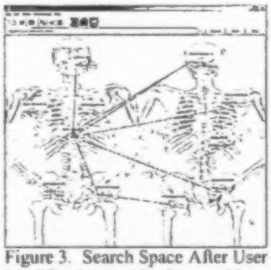

Figure 3. Search Space After User Modification and Background Image

The author is a doctoral student in Educational Psychology at the University of Illinois, Urbana-Champaign and is co-developer of VisIT along with Professor Jim Levin. I'd like to thank our programmers, Young Jin Lee, Hwan Jo Yu, Jeff Ellen and Arun Bhalla, without whom VisIT would not be possible.

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Influence of Home Access on Attitudes, Skills, and Level of Use for Teachers and Students in Technology Integrating Classrooms

Gerald Knezek
University of North Texas
United States
gknezek@tenet.edu

Rhonda Christensen
Institute for the Integration of Technology into Teaching and Learning
University of North Texas
rhondac@tenet.edu

Abstract: The interaction of home access and school use of computers has been a topic of discussion among educational researchers for more than a decade. Evaluation of a U.S. Department of Education Technology Innovation Challenge Grant and a Preparing Tomorrow's Teachers to Use Technology Implementation Grant have given the authors an opportunity to address this issue within the context of large scale data sets gathered from several levels of formal education. This paper features findings related to the influence of home access to computers and the World Wide Web on the use of information technology in the classroom. Several positive and some negative indications are presented with respect to teachers, students, and technology at home and in school.

Procedures

Findings in this paper are based on self-reported survey data provided by teachers and students. Paper-based as well as on-line (html) data collection techniques were employed. Attitude and skill data were typically gathered using 5-point Likert type rating scales (strongly disagree = 1 to strongly agree = 5) or 7-point Semantic Differential items pairs (ex: Computers are: friendly __ __ __ __ __ __ __ unfriendly). Item responses were summed within categories producing reliable, content valid and construct valid measurement scales. Measurement properties of the Teachers' Attitudes Toward Computers Questionnaire (TAC), the Teachers' Attitudes Toward Information Technology Questionnaire (TAT), the Technology Proficiency Self-Assessment Questionnaire (TPSA), the Computer Attitude Questionnaire (CAQ), and the Young Children's Computer Inventory (YCCI) have been reported elsewhere (Knezek, Christensen, Miyashita, and Ropp, 2000).

Home Access to Information Technology for Teachers

> Home computer access is associated with positive attitudes, skills, and levels of classroom use for teachers; home access to the Internet is even more strongly tied to positive indicators in these areas.

TAC, TAT, and TPSA data were gathered from 113 elementary and high school teachers in a public school district in Texas during spring 2001. Teachers who reported access to a computer at home had more positive ($p < .05$) ratings on 11 of 14 information technology indices gathered. Level of interest in information technology, as well as two measures of belief in the utility of electronic mail for classroom interactions, were not significantly impacted by whether or not a teacher had a computer at home. All 4 areas of assessed skill proficiency, including World Wide Web, using Integrated Applications, Teaching with Technology, and skill at using Email, were significantly higher for teachers who had computers at home. In addition, level of use for classroom integration, as measured by self-reported Stage of Adoption of Technology and self-reported Concerns Based Adoption Model Level of Use, was significantly higher for teachers with home access (Christensen and Knezek, 2001).

The analysis of the previous paragraph was repeated for teachers who reported having access to the Internet at home, versus those who did not. All conclusions were the same as those reported for computer access at home versus none, with the exception that the two measures of the belief in the utility of Email for classroom interaction were both significantly more positive for those with Internet access vs. those without ($p < .05$). Teachers who had access to the Internet at home were more positive in their belief that Email was useful for classroom interactions. Teachers who only had access to a computer at home, but not access to the Internet at home, were not significantly different in this area from teachers who had neither computer nor Internet access at home (Christensen and Knezek, 2001).

In a third analysis, additional data gathered from 74 middle school teachers reconfirmed these findings for home computer and Internet access versus none, for attitudes and level of use (Christensen and Knezek, 2001). (Skill data was not acquired for these teachers.) It is hypothesized that teachers benefit from home access to a computer and the Internet because together these capabilities extend resources and access into a time and place outside the classroom, where teachers can take time to develop their own competence and confidence. It is also conjectured that if teachers use technology at home more often, then teachers will be more comfortable with technology in school.

Home Access to Information Technology for Students

> Home access by students is associated with greater skill in using Email and the WWW; however, greater access to information technology at home may also be associated with lower empathy (caring concern for thoughts and feelings of others) in elementary and middle school students.

YCCI data were gathered from 1737 K-6 students during the fall of 1999 and spring of 2000 from the eight elementary schools in north Texas. Analyses of this data from several perspectives indicated that the general impact of technology integrating teachers over several months, across grades 1-6, appears to have been the greatest in the area of Attitudes Toward Computers on students without computers at home. This was evidenced by significant ($p < .01$) declines in student attitudes toward computers, from fall to spring, among those students without home access to computers who also had low integrating teachers in school (Knezek and Christensen, 2000). Students without computers at home who had high integrating teachers in school showed no significant decline.

In a CAQ/YCCI study involving 218 7-12 grade students from a middle school and high school in a Texas public school system during the spring of 2000, and 113 elementary plus 87 middle school students from the same school system during the spring of 2001, the students with computers at home were found to have lower empathy at the elementary school level ($p < .02$), and lower empathy ($p < .09$) as well as higher skills on Email and WWW at the middle school level (skills were not measured for elementary). An additional finding from the same study was that access at home did not appear to be strongly related to (self-reported) student access in school ($f = .358$, 1x85 df; $p = .55$) (Christensen and Knezek, 2001).

The finding regarding empathy is worrisome and worthy of further study. The finding regarding home vs. school access is good news in that it implies that schools provide equal access to computers for all students, regardless of whether or not they have access outside of school. Further research is needed to determine if the hypothesized directionality of home access fostering classroom integration is accurate, if desire for classroom integration fosters home access, or if some other phenomenon is responsible for both.

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Examining Computer-Mediated Discussions of a Multimedia Case Study of Mathematics Teaching

Yusuf Koc
School of Education
Indiana University
United States
ykoc@indiana.edu

Susan C. Herring
School of Library and Information Sciences
Indiana University
United States
herring@indiana.edu

Catherine A. Brown
School of Education
Indiana University
United States
cathbrow@indiana.edu

Abstract: The main goal of this paper is to examine how pre-service secondary mathematics teachers, in-service secondary mathematics teachers, mathematicians, and mathematics teacher educators communicated about a multimedia case study through computer mediated communication (CMC). Computer mediated discourse analysis (CMDA) (Herring, 2001) guided the data analysis phase of the investigation. The analysis revealed evidence of individual and group differences with respect to participation in CMC. For example, the average number of messages per day was 2.86 and the average number of words that the participants posted daily was 316.62. These values suggest that the participation rate was relatively high and that the computer-mediated discussion was active. The female participants presented their ideas briefly, and males wrote more. Males appeared to focus on more details, which is an interesting observation because traditionally it is believed that females focus on details more than males.

Introduction and Background Information

A survey of the literature indicates that educators possess a great interest in online environments for teaching. As yet, however, little systematic research is available that compares online communication with face-to-face communication in educational settings. Since Internet use has become widespread in teaching and learning contexts, it is essential to examine how computer mediated communication (CMC) influences human learning with respect to face-to-face communication. Key questions that need to be examined include, "Is CMC an effective tool in teaching and learning?", "Does CMC affect equality of participation among individuals?" and "Does CMC, in as much as it provides more time for reflection, enhance the sophistication of language used in educational settings?".

This paper illustrates some applications of Computer Mediated Communication (CMC) in a university-school collaboration project, the Collaboration for Enhancement of Mathematics Instruction (CEMI) project at Indiana University. The CEMI project aims to assist both pre-service and in-service teachers to develop their understanding of mathematics teaching and to create an effective collaboration between Indiana University and Monroe County Community School System of Bloomington, Indiana.

This research examines how four populations of people with a common interest in mathematics teaching and learning – pre-service secondary mathematics teachers, in-service secondary mathematics teachers, mathematicians, and mathematics teacher educators – communicate about a multimedia case study, Making Weighty Decisions (Bowers, Doerr, Masingila & McClain, 2000). Each of these populations can be characterized by their status in the mathematics education community because instructor-student relationships exist among them. For example, pre-service teachers are students of both mathematics educators and mathematicians. In addition, in-service teachers might be students of the university faculty. Thus, the participants' status will guide our descriptions of them. These people with varying status met both on-line and face-to-face to discuss the multimedia CD. In this paper, we report the on-line part of the CD discussions. Our goal is to examine how member of the four cultures communicate about the multimedia case study through CMC, making use of computer mediated discourse analysis (CMDA).

The purpose of the CEMI project is to engage members of the four cultures (in-service secondary mathematics teachers, in-service secondary mathematics teachers, university mathematicians and university mathematics educators) in Lesson Study Groups (LSGs) similar to those commonly found in Japan (Lewis & Tsuchida, 1998). Each LSG member was asked to view the multimedia case study CD and related materials individually and then to respond to on-line discussion prompts. Discussion prompts were designed to encourage participants to reflect on the teacher's role in planning for and facilitating classroom activities, the mathematical content of the lesson, and the level of student thinking throughout the lesson. The on-line discussion took place within the Inquiry Learning Forum (ILF) (http://ilf.crlt.indiana.edu) and proceeded for approximately five weeks.

Specifically, this study seeks to determine the following:

- What are diverse members of a professional community (in-service secondary mathematics teachers, in-service secondary mathematics teachers, university mathematicians and university mathematics educators) doing as they talk about mathematics teaching and learning?
- What role and power structures are influential among the participants?

Data Sources

Each of six Lesson Study Groups (LSGs) engaged in two online discussions. The first one lasted two weeks (from 09/11/2000 to 09/25/2000) and then members met face-to-face to reflect on the CD after that. Next, another three-week online discussion took place (from 09/25/2000 to 10/16/2000). Finally, a second face-to-face meeting provided an opportunity for the participants to share their ideas. In this study, we used the transcripts of on-line discussions of the multimedia case study by three LSG as data sources. It should be noted that since each LSG engaged in two online interactions, we analyze six sets of data, three of them are from the first discussion and the other three are from the second one. We selected the three LSGs among six of them randomly. Each of the three LSGs includes one teacher, one mathematics educator, one in-service teacher and three to four pre-service teacher. In addition, two of them include a mathematician. Totally, we analyzed postings of 18 people, 8 males and 10 females. However, two female pre-service teachers only engaged in the second discussion.

In this study, we analyzed regular e-mail messages posted on discussion lists, thus our data is typical form of asynchronous Computer Mediated Discourse (CMD) with one-way transmission (Herring, 2001). Herring characterizes e-mail based systems as asynchronous CMD forms because they do not require that the users be logged on at the same time. She also proposes that e-mail based systems are an example of one-way transmission in CMD because "a message is transmitted in its entirety as a single unit (p.615)."

Methods/Theoretical Approach

Computer mediated discourse analysis (CMDA) (Herring, 2001) guided the data analysis phase of the investigation. Specifically, we obtained descriptive statistics on participation by role and gender, and conducted pragmatic analysis of speech acts. We analyzed participation for each discussion for CMC. This involved counting the number of messages and number of words contributed by each participant as a means of determining whether the project members participated in the discussions equally. In addition, we examine whether some groups dominated other groups.

We also used the exchange structure of Francis and Hunston (1992), originally developed by Sinclair and Coulthard (1975) for the analysis of classroom discourse, to analyze the transcripts of the discussions. Exchange structures are sequences of speech acts (agree, inquire, inform, react, etc.) produced when individuals are engaging in conversation. The model was developed for face-to-face conversation, but has been applied to educational CMC by Herring and Nix (1997). The goal of the present analysis is to understand what kind of speech acts takes place in CMC in discussing the multimedia CD. Additionally, we compared the speech act usage of groups within the groups.

Results

What follows are some examples of the results. Although we have many interesting results, we cannot report all of them due to space limitations.

Participation

Overall

Descriptive statistics reveal that 18 participants posted 106 messages during a five-week period. The participants posted more messages in discussion1 than in discussion2, although discussion2 lasted one week longer. The moderator posted four messages prompting the discussions in discussion1, but two messages in discussion2. This might have the reason for fewer messages in the second discussion session.

As it can be seen from Figure1, the average number of messages per individual for discussion1 and discussion2 is 3.81 and 2.50, respectively. Interestingly, in discussion1, the average number of messages per mathematician (5.00 messages) is significantly higher than the average number for the entire population in discussion1 (3.81 messages). Because the mathematics educators posted only two messages during the first discussion (average= .67 messages), the average number of messages in that discussion session was decreased.

Figure1: Average number of messages

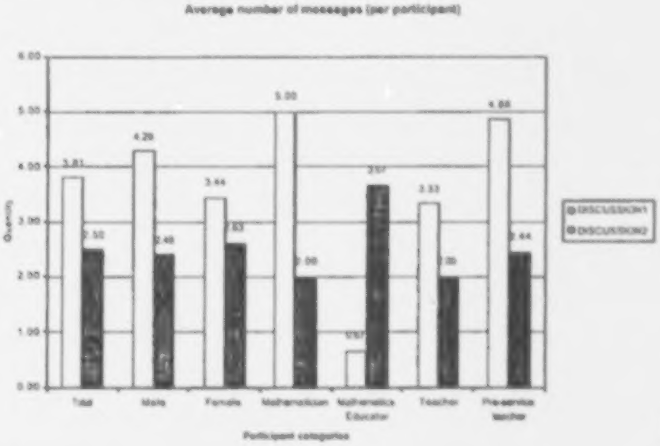
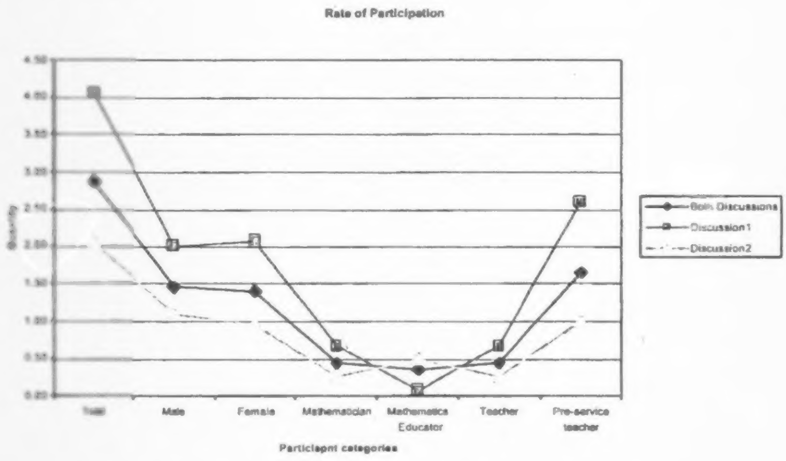


Figure2 indicates that the average number of messages per day is 2.86 and the average number of words that the participants posted daily is 316.62. These values suggest that the participation rate is relatively high. The participation rate is considerably high for discussion1 (4.07 messages). In discussion1, the participants were asked to respond to clear-cut questions. In other words, they were not open-ended; however, in discussion2, the moderator asked open-ended questions so that the participants could post all their comments and critiques. It seems that open-ended questions might have decreased the rate of participation in the second discussion although it lasted three weeks.

Figure2: Rate of participation



In addition, the average message length is 110.52 words, indicating that the participants posted long messages. Since the participants are highly educated people, this finding seems reasonable. Finally, the statistics indicate that the computer-mediated discussion was active. The participants also posted almost equal size of messages both in discussion1 (109.34) and discussion2 (112.11). The average values are almost the same for discussion1 and discussion2. Previously, it was revealed that the participants posted more messages in discussion1 than in discussion2. However, now it is found that although they did not post the same number of messages in the discussions, the size of the messages are similar. This is not surprising because the same individuals posted all the messages.

Group Differences

The data show that 10 females posted 52 messages and 8 males posted 54 messages. In other words, the average number of messages posted by males (6.75 messages) was higher than the average number of messages posted by the females (5.2 messages). It may mean that males expressed themselves more than females. In addition, the average length of messages posted by males was 118.06 which was larger than 102.69 of females. This finding suggests that females presented their ideas briefly, but males wrote more.

Also, there were significant differences among the cultural groups participating in this study. For example, the average message length was 100.25 words for pre-service teachers; however, this value was 126.13 words for mathematicians and 154.69 words for mathematics educators. These findings seem meaningful because pre-service teachers may know less about teaching than mathematicians and mathematics educators.

Speech Acts

Overall

Overall, the participants were engaged in 678 speech acts throughout the online discussions. The speech act analyses indicate that generally the participants are informing each other, sharing their observations, inquiring and commenting on their own statements as they discuss the multimedia case study. These results are consistent with the findings of Herring and Nix (1997) for a distance education course. However, unlike in Herring and Nix's study, the participants use very few directive speech acts, suggesting a relatively polite and egalitarian environment.

Group Differences

It was revealed that females asked more open-ended questions (14) than males (8 questions; inquiry). Possibly females wanted to learn the details of the multimedia case study more than males. Another striking result is that pre-service teachers asked more questions than any other status group (13 open-ended questions out of 22). Although asking questions can be considered as the symbol of power, the group with the least power asked more questions. On-line communication might have resulted in this finding. The pre-service teachers might have felt more comfortable. Thus the traditional roles of teacher-student were not preserved in the computer-mediated environment.

It was revealed that that males share their observations (45 times) more than females (31 times), while females asked more open-ended questions. Pre-service teachers shared their observations mostly (47 out 76 times). This may be because as students they regularly prepare assignments including reflections, descriptions and observations.

Conclusions/Implications

The basic goal of this study was to examine how pre-service secondary mathematics teachers, in-service secondary mathematics teachers, mathematicians, and mathematics teacher educators communicated about a multimedia case study through CMC, making use of computer mediated discourse analysis (CMDA). CMDA helps us understand teacher education phenomena better. The analysis reveals empirical evidence of individual and group differences with respect to participation in CMC. Revealing such differences can help teacher educators and instructional designers build online communities in teacher education settings. Participation statistics also provide evidence that helps us to understand power dynamics within the online community. In this study, power structures are potentially always an issue because instructors and students share the same context. Since teachers have more authority than students, in our research we expected to see teacher educators and teachers participate more. We also observed that members of different groups used some speech acts more than others, indicating that participants have diverse intentions.

As an extension of this study, we will analyze the face-to-face discussions of the same multimedia case study by the same people. Therefore, we will be able to compare and contrast both modes of communication. That study will improve our understanding of online professional development of teachers. In particular, we may uncover some strengths and benefits of CMC over face-to-face communication.

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The renewal of teacher education through networked learning communities: Evolutionary or revolutionary?

Thérèse Laferrière, Laval University, Canada, tlaf@fse.ulaval.ca
Alain Breuleux, McGill University, Canada, Breuleux@Education.McGill.ca

Abstract: The paper considers the framework within which information and communication technologies (ICTs) integration can support teacher education renewal through collaborative learning. Adopting a socio-constructivist approach and a design-experiment methodology, our research team experimented in different contexts, and presents results pertaining to networked learning communities. The identification of themes and patterns in the activity of these learning communities lead to a discussion of ways of renewing teacher education by integrating ICTs in a way which supports collaborative teaching and learning.

Introduction

For the past seven years, co-authors have integrated information and communication technologies (ICTs) in their teaching and research[1]. Judicious use of ICTs in order to further the understanding of ideas, practices, and concepts as well as pedagogical principles and notions has captured their imagination. With other colleagues, they set in 1995 to design a virtual community of support and communication for pre-service teachers as the first phase of a TeleLearning Professional Development School (TL-PDS). Moved by the vision of interconnected learning communities, each site contributed through an already successful innovation with regard to teacher education.

At the University of British Columbia/Vancouver site, a community of inquiry was an alternative route provided to interested students registered to the post-baccalaureate teacher education program. In Toronto, the CSILE Team was developing the next generation of its computer-supported intentional learning environments. At the McGill University/Montreal site, summer institutes attended by in-service teachers were already focusing on new learning technologies. And at the Laval University/Quebec City site, a network of professional development schools (PDSs), called *Le réseau des écoles associées à l'Université Laval* was already in place.

Working from their own locus of strength, each site soon began to design new learning practices supported by ICTs for their own communities (pre-service and/or in-service teachers interested in making sense of ICTs for teaching and learning). At first, six design principles revealed to be critically important: ease of access to ICTs, co-constitutionality, participatory design, local grounding, multi-modal social interactions, and diversity[2]. Other design principles apply more directly to the socio-constructivist approach adopted: the classroom as-a-community of learners, active collaborative learning, progressive distributed expertise, collaborative reflective teaching, collaborative knowledge building, and interrelatedness[3].

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[1] This work was done with the support of the TeleLearning Network of Centres of Excellence, Canada.

[2] Brief definitions of these principles are the following: Ease of access: Networked computers and online resources and tools need to be accessible without loosing too much time once basic technical skills are mastered. Co-constitutionality: The development of a socio-technical infrastructure relies on electronic connectivity on the one hand, and on people who value collaborative learning and knowledge on the other; one is not significant without the other. Participatory design: The development of networking capacity involves university-school administrators (partnerships), university- and school-based teacher educators, in-service/pre-service teachers, and K-12 learners. Local grounding: Site-based professional learning communities provide grounding. Multi-modal social interactions: At a local level, learners meet face-to-face, on campus or at the professional development school. Diversity: Learning communities are different in their local champions, circumstances, settings, tools, artefacts, cultures, and languages (in particular English and French).

[3] The socio-constructivist principles applied are briefly defined as follows. The classroom as-a-community of learners: K-12 learners as well as pre- and in-service teachers are learning in networked classrooms designed to become centers of inquiry where people, things, and ideas are valued, and where teaching for understanding is a common goal. Active collaborative learning: The networked classroom fosters active collaborative learning rather than individual learning. Progressive distributed expertise: Teacher knowledge, which is distributed among and far beyond individual participants, may be accessed; virtual collaborative spaces provide opportunities to share resources and expertise to solve complex and ill-structured problems. Collaborative reflective teaching: The design task is that of providing a collaborative learning environment within which problem-setting and problem-solving are carried out in relation to real classroom events.

The latter principles are of a transformational nature, and the driving idea is that knowledge of technology in education is a key driver and a key enabler. This paper tackles the complexity that hides behind the following simple statement: a visible and durable change in teacher education is not an easy task, and is particularly delicate with regards to innovative pedagogical practices by means of technology. Periodical analysis such as the ones by Cuban (2000) demonstrate it. Zhao, Byers, Pugh, & Sheldon (2001) suggested to take the "evolutionary rather than a revolutionary approach to change" with respect to school teachers. We argue that this path needs not only to be taken with school teachers but also to the ones expected to be the providers, namely teacher educators. The networked learning communities our R & D Team has been designing brings evidence to this end.

Method

Applying the innovation model developed by Zhao et al. (2001), themes and patterns already identified in the analysis of the design and development of networked learning communities (Laferrière, Breuleux, Erickson, and Lamon, in progress) are reflected upon. Those themes and patterns regard the technical and conceptual appropriation of the technical tools by the learning communities. They emerged from qualitative analysis (design experiment approach, Brown, 1992) of the data accumulated over a sixth-year period, and gathered through participant observers' notes, interviews, discussion forums, and other artifacts produced by these communities.

Findings

The networked learning communities may have been first initiated for pre- or in-service teachers, they came to all include pre-service teachers, in-service teachers, graduate students, and teacher educators. In most instances, school learners were all considered members of the learning communities.

The following themes and patterns were identified as benchmarks of progress regarding the technical and conceptual appropriation of ICTs by the learning communities:

1. *the screen is no longer the screen*. The importance attached to social interaction is rediscovered and the networked computer is no longer perceived by the practicing or future teacher as a tool which isolates its user (pupil or student) but as a tool which supports classroom interaction perhaps beyond the limits of normal timeframes ;
2. *technical support is provided by many learners*. In spite of its status or of the status of the individual who is using it, technical support is favorably welcomed by the learner who does not hesitate, in turn, to act in such a way in relation to other learners ;
3. *ties, which begin to bind, people, texts and ideas*. These ties transcend time and space within all described communities. Participants were able to become involved in forms of collaborative inquiry by building from available resources and by exchanging their ideas. These opinions were subject to critical review and were considered and qualified by other students and by instructors. According to this perspective, teacher candidates as well as in-service teachers were able to put forth their contribution in relation to the subscribed and developed ideas. This experience had the effect of modifying the pedagogical relationships within the classroom. The experience also created new pedagogical relationships outside of the class. This also allowed for an increase in face to face dialogues between participants ;

Collaborative knowledge building: This refers to the design of a rich learning context within which meaning can be negotiated and ways of understanding can emerge and evolve. Student teachers engage in designing and inventing tasks such as the organization of the networked classroom, the development of learning projects, the scaffolding of online group or classroom conversations, and the creation of case studies. Interrelatedness: Knowledge objects, events, actors, artefacts, and authors interconnect in ways that add continuity and integration to student teachers' experience as they learn to teach in networked classrooms. They add as well to the experience of practitioners working in networked classrooms.

4. *the level of understanding of a question or problem of one person becomes an inscription available to someone else for reactivation.* The support which must be provided is facilitated by the fact that thought becomes visible in the electronic forum and from the fact that peers contribute; the difficulties experienced by some having recourse, half-way through and in a generalized way, to theoretical perspectives likely to enlighten their reflective practice, become evident in their own eyes, as well as their progress in relation to this undertaking ;

5. *roles are exercised in a dynamic manner.* By inverting the roles of teacher and student in an authentic way (for example, the documents prepared by more advanced student teachers are consulted by the new pre-service teachers in a learning community; the number of readers consulting the work of teacher candidates is widened; teaching notes are written by elementary school learners), participants contribute to the collective knowledge on a given theme or problem ;

6. *the act of writing is part of the research process.* There exists an undeniable potential for immediate feedback. And the continuity of the exercise offers an anchor point for continued reflection. Students who wrote not only for their peers but also for other agents in the field as well as for researchers became initiated into a language used within academic and professional communities. They also positioned themselves by recognizing authority and expertise in the subject matter through the building of community's discourse ;

7. *the number of readers and authors is increasing.* This increase in the number of readers consulting the work of pre-service teachers can make the writings more reflective. That is to say that students' work is not simply a transfer of knowledge to be read by the professor.

These seven themes and patterns capture what participants' in the learning communities have been doing in an increasingly visible manner. The model put forward by Zhao et al. identifies three interactive domains: the innovator, the innovation, and the context. In the case presented, the innovator is a domain extended to all the participants of a specific learning community; the innovation is the learning community, and the context is the faculty of education and partner schools (PDSs).

The innovator' technology proficiency is the first factor identify by Zhao and colleagues that leads to the success of an innovation. Theme 1, *the screen is no longer the screen* and theme 2, *technical support is provided by many learners.* They point out that knowledge of the technology and its enabling conditions plays a major role, and this is also true for the learning communities as the above themes evidence. The second factor Zhao et al. stressed is compatibility between teacher pedagogical beliefs and the technology. In the design experiment, the research team defined telelearning as the use of ICTs for learning purposes. This reflected a belief in socio-constructivism and collaborative learning. Therefore, electronic forums became, besides the Web browser and search engines, software applications of choice. Theme 3, *ties, which begin to bind, people, texts and ideas,* reflects this pedagogical choice. Pre - and in-service teachers as well as teacher educators uncovered together the possibilities of electronic forums for collaborative inquiry. Social awareness is the third and last factor related to the innovator that Zhao et al. identify. They meant the understanding of and ability to negotiate the social aspects of the school culture. In the design experiment, the on-line activity was challenging at times for student teachers that happened to be doing their student practicum in a more traditional classroom (see themes 1, 3 and 5). At other times, it was challenging to school-based or university-based teacher educators who were not ready to make their own thinking visible in the discussion forum (see theme 4). As innovators, participants in the learning communities had to be thoughtful of the values and beliefs of those "of-line" with whom they were pursuing some professional activities.

The three factors that Zhao et al. point to regarding the innovation itself are the following: the project's distance from school culture, the project's distance from available resources, and the project's distance from innovator's current practices. Here again, these three factors bear some relevance in order to describe the learning communities' activity. Distance from school culture was reduced at all universities by the very fact that the learning communities grew out of already existing successful innovations at each site. Distance from available resources has become les and less a difficulty for pre - and in-service teachers. Except in a few cases, this difficulty has now been overcome. As for distance from existing practice, the reality is that, on a daily basis, old and new pedagogical practices coexist. And each time there is an incoming cohort of new members, they vividly feel the distance from their existing learning or teaching practices. Overall, by reflecting the transformational nature of the activity of the learning communities, the seven themes also reflect the distance of their doings from traditional teacher education.

The last three factors identified by Zhao and her colleagues relate to the context: the human infrastructure, the technological infrastructure and social support. One of the TL-PDS design principles is co-constitutionality, meaning the development of a socio-technical infrastructure relies on electronic connectivity on the one hand, and on people who value collaborative learning and knowledge on the other. Themes 3-7 reflect the social dimension of the infrastructure created, whereas themes 1 and 2 reflect its technological dimension. Social support was provided on campus from the dean's office, a few close colleagues, and colleagues from other sites also receiving a federal telelearning grant from the Network of Centres of Excellence Program.

Discussion

Throughout the past six years, the three dimensions of the model here applied interacted with one another in an evolutionary manner. Their respective boundaries were redefined a number of times. For instance, at the very beginning, the innovators were the teacher educators/researchers at each of the sites. As partnerships with schools got established, the number of innovators expanded. To become a member in a network-enabled learning community (pre-service or in-service teacher or teacher educator) meant being an innovator among his or her peers or colleagues, and having to be tactful with regard to how to present one's doings and the doings of the learning community in a professional context where teachers or teacher candidates were less familiar with the use of ICTs. One of the design principles being interrelatedness, continuity and integration efforts have been supported by websites which included the artifacts of more advanced participants and of whole cohorts of pre- or in-service teachers. As a learning community grows along the vision of interconnected learning communities, the network of learning communities becomes a new social context in and of itself, one capable of virtually creating a "critical mass" of a particular innovation. Whereas before the innovation, that is, the learning community, would have been isolated in a given context, a new context emerges out of the synchronous and asynchronous interaction of learning communities.

Zhao and her colleagues studied individual innovators. In the design experiment, teacher educators/researchers took a community approach. Therefore, much interaction within and between the three dimensions has been observable: there are many innovators or participants invited to become more innovative in their learning and teaching; there are learning communities in which the old and the new cohabitate; and there are contexts (schools and faculties of education) whose organizational culture is evolving as it becomes increasingly aware of ICTs' potential for teaching and learning.

This new ecology may seem to be a progress, but it should not distract innovative teachers and teacher educators from the sustainability and scalability issues now well pointed out in the research literature (Blumenfeld, Fishman, Kracjik, & Marx, 2000). The majority of teachers and teacher educators still lack the technology proficiency (*the screen is still a screen*) necessary in order to reconcile their views of learning on-line and learning face-to-face, learning alone and learning together.

Conclusion

Networked learning communities are a framework within which ICT integration to curriculum is most likely to support teacher education renewal through collaborative learning and knowledge building. It is a framework well-aligned on the new theory of learning (Bransford, Brown, & Cocking). Moreover, it is an approach with which we, as teacher educators, came to make sense of ICT in our teaching and learning, and one that is speaking to other teachers interested in the renewal of their teaching as we collectively engage in the knowledge age.

The idea of replacing one or many pre-service teacher education courses by creating networked learning communities, ones also inclusive of beginning teachers and competent teachers and researchers interested in deepening their understanding of driving questions is likely to sound revolutionary to many school-based and university-based teacher educators (Laferrière, Bracewell, Breuleux, Erickson, Lamon, & Owston, 2001). We know, in fact, that for such an idea to grow, a slow evolutionary process is likely to take place.

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Effectiveness of Statistical Training with Computer Simulation

David Lane
Department of Psychology
Rice University
United States
Lane@rice.edu

Zhihua Tang
Department of Psychology
Rice University
United States
ztang@rice.edu

Abstract: The effectiveness of computer simulation in statistical training was investigated in two experiments. In the first experiment, subjects learned the Law of Large Numbers either by watching a computer simulation or by reading a textbook chapter. Prior to the training, subjects were presented with either specific or non-specific content-related questions. Post-training test showed that simulation-based training significantly increased the quality of subjects' reasoning on real-world problems. Question specificity had only a marginal effect on the performance. In the second experiment, the effects of simulation- and textbook-based training were measured immediately after the training as well as after a one-week delay. After the one-week period, subjects trained with simulation not only outperformed those trained with textbook on both a knowledge test and a transfer test, they also benefited motivationally. These findings provide empirical evidence in support of the use of advanced computer technology in educational settings.

With the rapid development of information technology, educators now have at their disposal a great variety of technological applications as instructional tools. The area of statistical education is no exception. In recent years, a substantial amount of resources has been invested in the development of computer simulation programs illustrating various statistical concepts and principles. As a result, statistical simulations are now widely available through the Internet and have become an integral part of statistics curricular at various educational levels.

The increasingly important role that computer simulation has played in training demands an equal amount of effort to assess the effectiveness of these programs. Research on the merits of computer simulation in science education has been conducted in a variety of subject domains, including biology, physics and economics, but the results from different studies often lack consistency. The potential of computer simulation in statistical education has also been investigated in a number of studies, again with mixed outcomes. For example, Wackerly and Lang (1996) found that students learned better with computer simulations compared to those using more traditional materials. delMas, Garfield, and Chance (1999) reported using a computer simulation program to illustrate sampling distribution in a classroom setting. They found that the graphical display of the simulation could aid learning but was most effective under certain conditions, such as being paired with a strategy that directed students' attention to certain features in the simulation. Simply going through the simulation process did not necessarily result in conceptual changes. These researchers therefore concluded that computer simulations alone do not guarantee superior learning.

Statistical training has often been considered as being abstract and difficult to understand. As many have observed, too often students develop only a shallow and isolated understanding of important concepts and fail to apply these concepts in their reasoning. In view of current state of practice, there is a great necessity to search for better ways to facilitate the learning process in statistical education. The current study sought to evaluate the effectiveness of a sampling distribution simulation program developed by Lane (1999). Specifically, we expected that the dynamic, graphical presentation of information is more congruent with the essence of the training subject than a traditional textbook-based approach, thus could facilitate students' learning and transfer (see Lane and Tang 2000 for a more comprehensive description of the study.)

Experiment 1

Method

The experiment used a 2 x 2 factorial design. The first factor was the content delivery medium used in the training. Subjects learned the concept of sampling distribution and the Law of Large Numbers either by watching a computer simulation demonstration adapted from the Rice Virtual Lab in Statistics (Lane, 1999), or by reading a textbook chapter. The chapter was largely text but included examples, graphics, mathematical formula and a table detailing a hypothetical sampling distribution as well. Prior to the training, subjects read two real-world scenarios that pitted a smaller sample against a larger sample. Each scenario came with questions regarding the sampling outcome as a result of different sample size. The questions were either specific or non-specific. In the specific condition, subjects were asked which sample size would lead to a particular outcome. In the non-specific condition, subjects were simply asked what would happen. Question specificity constituted the second factor of the design. In addition to the above four conditions, a no-treatment group was also employed as control.

One hundred and thirteen Rice University undergraduate students who had no formal statistical training participated in this experiment in exchange for extra credit in a psychology course. Subjects were trained and tested in small groups of 4 to 12 people, and their assignment to experimental conditions was randomly determined. In the experiment, subjects first took a 12-minute paper-and-pencil Wonderlic Personnel Test (as a measure of general cognitive ability). Then the four treatment groups were presented with the two real-world scenarios, and went through a specific training session depending on their condition. Each training session lasted between 25 to 30 minutes. At the end of the training, subjects in all the four treatment groups were given explanations as to how to apply the training to the previous two examples to reach the correct answers. They then took the post-training test. Procedure for the control group was slightly different. Subjects in this condition took the second test without going through the training.

The post-training test was designed to measure how well subjects could transfer the training to novel situations. The test consisted of 12 real-world scenarios embedded in contexts very different from those encountered during the training. Among them, nine problems could be solved by applying the Law the Large Numbers and thus constituted the critical items in data analysis. The remaining three problems served as filler items. Subjects' reasoning on each transfer question was rated on a 3-point scale, where 1 indicates an entirely deterministic response, 2 a poor statistical response, and 3 a good statistical response. Two coders, blind to subjects' condition, each coded the responses from a random sample of 18 (16% of all) booklets separately, and agreed on 83% of the answers. This inter-rater consistency was accepted and one of the two coders then continued to code the rest of responses.

Results

A statistical reasoning score was derived for each subject by averaging across the nine critical transfer problems. The average reasoning score from all the subjects were then analyzed using the Analysis of Covariance (ANCOVA) procedure, with subjects' Wonderlic test scores as the covariate. Figure 1 shows the boxplots of the mean reasoning scores as a function of experimental condition. As can be seen in Fig. 1, both simulation-based training groups scored higher than the two textbook-based groups. The difference was statistically significant, $F(1, 107) = 5.64$, $p = .019$. Groups that were presented with specific questions prior to the training did slightly better than groups presented with non-specific questions. However, this effect only reached marginal significance, $F(1, 107) = 3.75$, $p = .055$. The interaction between training medium and question specificity was not significant, $F(1, 107) = 1.94, p = .167$. The boxplots also show that all the treatment groups performed better than the control group. The difference between the control and the average of the four treatment groups was significant, $F(1, 107) = 20.96$, $p < .0001$. Dunnett's test further showed that three of the four treatment groups significantly outperformed the control group ($p < .05$), with the textbook/non-specific question group being the only exception.

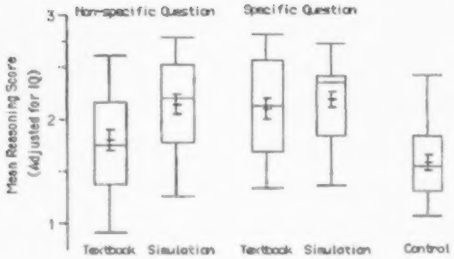

Figure 1. Statistical reasoning score as a function of experimental condition
(Small bars on boxplots depict group mean ± one standard error)

The results from experiment 1showed that simulation-based training led to improved statistical reasoning on ill-defined everyday problems as compared to a traditional textbook-based approach. However, because the post-training test took place immediately after the training, it remained unclear whether this advantage would last over time. Therefore, a second experiment was designed to address this issue.

Experiment 2

Method

A 2 X 2 factorial design was employed. The first factor was the content delivery medium in the training (simulation-based vs. Textbook-based). The second factor was the timing of post-training test. Half of the subjects in each medium condition were tested immediately after the training, and the other half were tested after a one-week delay. A 5th group took the transfer test without receiving the training and thus served as the control.

Training materials for both simulation- and textbook-based groups were the same as in Experiment 1. Testing materials in the current experiment included two sets of questions. The first was a knowledge test consisting of 10 multiple-choice questions. All the questions as well as their respective alternates were phrased in statistical terms. The second set was a transfer test that consisted of 10 real-world scenarios from the first experiment. Seven of the 10 items are the critical items that required applying the Law of Large Numbers in reasoning. The remaining three were filler items. After the training groups took the post-training test, they filled out a questionnaire measuring their attitudes towards the training. The questionnaire contained 11 items and was centered on subjects' self-evaluation of their test performance as well as their judgment about a particular training method. Subjects' responses were based on 5-point Likert scales.

One hundred and three Rice University undergraduate students with no previous statistical background participated in this experiment. The experimental procedure and coding system for the transfer questions were the same as in Experiment 1.

Results

Subjects' accuracy on the multiple-choice test is shown in Figure 2 as a function of training condition. The data was analyzed using the ANCOVA procedure, with Training Medium (2) and Delay (2) as between-subject factors and Wonderlic scores as the covariate. As can be seen in Fig. 2, subjects trained with simulation were more accurate in this knowledge test than those trained with the textbook. However, the difference between the two medium types did not reach significance, $F(1, 79) = 2.35$, $p = .130$. Though subjects' performance became slightly less accurate after the one-week delay, the difference, however, was not significant, $F(1, 79) = 0.48$, $p = .492$. There was also no evidence of interaction between training medium and delay, $F(1, 79) = 0.14$, $p = .706$.

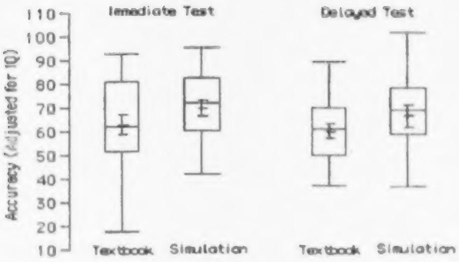

Figure 2. Accuracy on statistical knowledge test as a function of training medium and test timing

Subjects' statistical reasoning score on the transfer test is presented in Figure 3 as a function of experimental condition. A comparison between the training groups and the control group revealed that, overall, training significantly increased the training groups' statistical reasoning on these transfer questions, $F(1, 97) = 7.57, p = .007$. Consistent with the finding of experiment 1, subjects trained with simulation scored higher than those trained with textbook, $F(1, 97) = 3.20, p = .038$ (one-tailed). Subjects' reasoning scores were essentially the same on the immediate and the delayed test. Neither the effect of delay nor the Training Medium by Delay interaction approached significance, $F(1, 97) = .00, p = .994$; $F(1, 97) = .02, p = .894$, respectively.

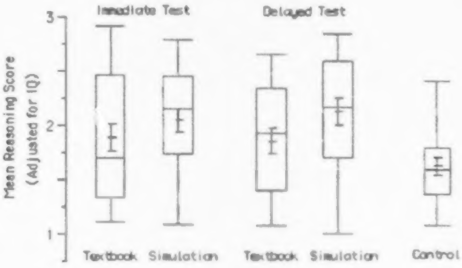

Figure 3. Statistical reasoning score as a function of experimental condition

Subjects' responses to the survey items showed that their self-perceived effectiveness of a training method did not differ much as a function of experimental condition. However, training medium did have a large impact on subjects' motivation. As shown in Fig. 4, subjects trained with simulation gave significantly higher rating on the motivation scale than those trained with textbook, $F(1, 80) = 22.76, p < .0001$. Although the difference was more evident after the one-week delay, the Training Medium by Delay interaction was not significant, $F(1, 80) = 2.10, p = .151$. The main effect of delay was also not significant, $F(1, 80) = 0.01, p = .916$.

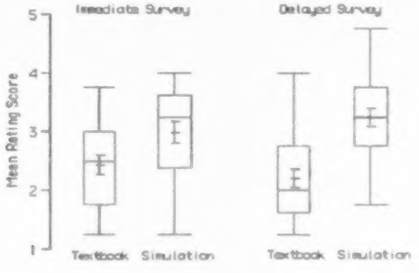

Figure 4. Motivational rating score as a function of training medium and delay

Discussion

The current research provides robust evidence regarding the effectiveness of computer simulation in statistical training. The training content in this study, the Law of Large Numbers, was considered an important yet complicated topic. Bassok and Holyoak (1989) have shown that college student had great difficulty transferring this rule across problem domains. In another study, Nisbett, Fong, Lehman, and Cheng (1988) found that their subjects were able to transfer this principle to new domains immediately following training but not after a two-week delay. In the current study, after going through a 30-minute training session, subjects trained with simulation were more able to identify the key elements of ill-defined everyday problems from a statistical perspective and apply the principle thereafter than subjects trained with a textbook. The benefit of simulation over textbook was manifest immediately after training as well as after a one-week delay. Therefore, the current result suggests that simulation-based training could result in better learning of statistical concepts and further lead to reliable transfer in complex reasoning tasks.

In statistical training, students' motivation often contributes substantially to the learning outcome (Gal & Ginsburg, 1994). Anecdotes had it that students in the classroom are more intrigued by computer simulations than traditional lectures. This idea was put to test in the current study. Although subjects trained with either simulation or textbook rated both training methods as being equally effective, those in the simulation condition consistently gave more favorable opinions when the questions tapped into motivational aspects, such as ease of learning and personal preference. The result thus provides evidence regarding the motivational benefit that students gain from simulation-based training.

The current study emphasized dynamic visual presentation of information in simulation-based training. While visual elaboration is one important characteristics of computer simulation, it is by no means all that simulation has to offer. Many researchers argue that a simulation-based environment is most effective when students are allowed to explore and reach the underlying model on their own. Therefore, user interaction in simulation-based training warrants further research.

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On Educating the Future Generation: Rethinking the Role of Teachers in the Technological Era of the New Century

Nan Li
School of Education
Indiana University of Pennsylvania
United States
li_nan1998@yahoo.com

Abstract: This paper discusses the role of teachers from three aspects. First, it posits that we are living at a final stage of the printing-based culture. All teachers must maintain a new worldview that the change is cultural—as what machinery in the Industrial Revolution had transformed our world—it will be changed dramatically by computer technologies. So will be school learning. Second, it proposes that teachers must adapt themselves to meet the new technological environments. Third, teachers need necessary and timely support to sustain their willingness so that the change and readjustment can proceed smoothly.

Decker Walker (1999) explains, "Future generations will value the ability to use information technology as highly as we value the abilities to read and write today" (p. 9). With the advancement of computer technologies into our lives, work, and everywhere today, one of educational debates is no longer whether schools need to use technology, but how and when to use it effectively. In future education, it would become impossible without computers for teachers to offer enriched learning opportunities. When educating children in a technology-oriented environment, teachers must rethink their role.

When looking around us, we must admit that technology is a most remarkable thing that differs our world—yesterday's from today's and today's from tomorrow's. Taking the Internet as an example, we can see how technology has affected the world. As an outgrowth of the Cold War known as ARPANET for military purposes during the 1960s, the Internet navigation was first released to the public in 1991 (Provenzo, Brett, & McCloskey, 1999). However, within a few years, it has spread amazingly wide. Today, more than 60% of American households with children have computers with Internet access ("Know Future," 2001). A survey by the National Center for Educational Statistics also reported that 95% of US public schools had access to the Internet by 1999.

The computer has become an icon of our times and is endowing our society with a new definition—the technological era or the information age. Let's think about the Industrial Revolution of the 18th century, which transformed many Western countries from a rural to an industrial economy. Yet, at the core of this revolution was technology such as the steam engine that had functioned centrally. The automobile is another example on how technology has shaped our cities and lives today from those of 100 years ago. Should the way we shop, where we work and live be different had we no automobile today? As Provenzo, Brett, & McCloskey (1999) stated, profound social and cultural changes took place as a result of the introduction of new technologies. We are now living at a final stage of the printing-based culture and the computer technology has affected a crucial change in our culture.

Facing this cultural change, teachers must readjust their role. In a traditional paradigm, teachers serve as the role of the transmissive tool of knowledge (Hunt, 1997). Under most circumstances, when people are comfortable with what they're used to, the change would be reluctant since people are more likely to use familiar and trusted tools. However, those *trusted tools* are inadequate for preparing the school children safely into the digital world. As the cross-century ambassadors for better education, teachers must acquire the new ability to use technology to meet children's needs. In some way, teachers need to take a learner's role to obtain technology skills for instructional use.

In recent years, the computer use in school has been increasing rapidly. A report from the U.S. Department of Education revealed that there were approximately 8.6 million instructional computers in schools throughout the United States in 1998 and an estimated 4 million dollars was spent on educational technology and the Federal Communications Commission also set up a 2.25 billion dollar annual fund to assist school libraries with funding for Internet connections. However, the same report also found that mere 20% of teachers felt they were well prepared to utilize technology in their classrooms. This means that the large masses of machines and technological access in fact did not help much to construct quality instruction for teachers in classrooms.

The reasons are many. Yet, the two obvious ones are teachers' fear and inappropriate institutional support. The computer is undoubtedly a powerful tool that can help achieve many instructional goals. However, the machine is valuable only when human intelligence organizes its use productively and if teachers do not know what to make of the tool, fear it, or misconstrue its use, it will only be used badly. A critical fact is that many middle-aged teachers over forty didn't learn to use computers while at college and they are now the mainstay in the teaching force. We can understand that it could be a fearful feeling for adults to look a fool and it thus is easy for teachers to feel uncomfortable with the *machine*, especially when the badly needed support is missing.

In most situations, teachers are willing to learn to use new technologies for their professional and curriculum activities. But a lack of teacher-development program and time dedicated to experimentation can hinder teachers' technology skills and knowledge (Schrum, 1999). Some ongoing programs, for example, are only intended to provide teachers with a brief exposure of training and practice to incorporate technology into classrooms, which is insufficient. Gaining technology skills differs from learning a new teaching model and it needs time. While urging for teachers to readjust their roles under the impact of the technology change, we must understand that they need necessary institutional support to sustain their willingness so that the readjustment can proceed smoothly.

Providing a staff development program must be based on specific needs. The training program is only effective when it can give teachers opportunities to apply their new skills. It's not only timesaving but also easy for teachers to accept the new approach at the site when a problem occurs. Among various means to make technology-oriented professional development successful, Schrum (1999) proposes several methods. To make teachers feel comfortable, the researcher suggests that training programs be provided in a classroom setting where teachers know it will work. A cognitive *apprenticeship* model of teachers helping teachers is also an effective way, in which schools and districts can build up a long-term support relationship by providing trainings such as specific focused workshops followed by time spent observing and working with a colleague educator comfortable using technology.

Under the impact of the cultural change, infusing technology into the curriculum is indispensable. Teachers must recognize the magnitude of the change in order to adapt willingly. It is a trustworthy experience for any major changes to be successful that there must be a focus on the people first and the innovation second. In adapting the change, we also need to understand that institutional support must be closely followed. It is crucial for teachers, especially in the toddler stage, to meet success in their initial forays into the realm of the digital world (Scoolis, 1999). When teachers feel supported, safe, and know where to go for help, their willingness will sustain and the process of the role readjustment can become smooth, the efforts effective, and the outcomes fruitful.

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The Role of Intelligent Tutoring Systems in Education: An Overview of AutoTutor

Max Louwerse[1], Art Graesser[1], Xiangen Hu[1], Natalie Person[2]

Department of Psychology[1]
University of Memphis
United States
mlouwers / a-graesser / xhu @memphis.edu

Department of Psychology[2]
Rhodes College
United States
person@rhodes.edu

Abstract: Intelligent Tutoring Systems have become more common in education nowadays. AutoTutor is one such system. It uses a world knowledge representation, natural language processing, production scripts and a conversational interface. By assisting students in actively constructing knowledge, AutoTutor shows close to natural didactic and conversational skills. Not only is the system beneficial for both students and teachers, it also helps to test hypotheses in various interdisciplinary fields and generates various new research questions, thus playing an important role in education.

Intelligent Tutoring Systems use intelligent computer-assisted instruction (Graesser et al., in press). They communicate with the learner by keeping a record of what knowledge the learner has and what the system needs to teach. Tutorial strategies applied by the system bridge the gap between the learner's knowledge and the expert knowledge. Over the last few years various systems have been proposed and implemented. One such system is AutoTutor.

AutoTutor assists students in actively constructing knowledge by holding a conversation in natural language. A dialog manager coordinates the conversation that occurs between the system and the student. The manager analyzes the input at a linguistic and a discourse level, in order to determine the right tutoring strategy and responds by using synthesized speech, facial expressions and some rudimentary gestures. At least four components can be distinguished in the system (Graesser et al. 1999).

1. *World knowledge representation*: Understanding natural language requires world knowledge. AutoTutor uses a statistical representation of a large body of world knowledge, called Latent Semantic Analysis. It uses singular value decomposition to reduce a co-occurrence matrix of words (or documents) to a cosine between two vectors. AutoTutor uses LSA to give meaning to a student answer and to match that answer to ideal good and bad answers.
2. *Natural language processing*: Although semantics forms the backbone of language understanding, support is needed from other linguistic information like syntax and pragmatics. AutoTutor uses a dialog management system guiding the student through the exchange and accommodating any student input. Fuzzy production rules and a Dialog Advancer Network form the basis of these conversational strategies. A syntactic parser analyzes the input, translates it in a speech act, in order to predict the structure of AutoTutor's response. In addition discourse markers and dialog history are used to provide the student with a natural conversation. These various components allow for a mixed initiative dialog.
3. *Production scripts*: For its didactic skills AutoTutor uses curriculum scripts, loosely ordered sets of skills, concepts, example problems, and question-answer units. Like most human tutors these scripts follow a macrostructural organization of the tutorial. This allows the tutor to keep track of the topic coverage and follow up on any problems the student might have.

4. *Conversational interface*: Although there is no concluding evidence that a talking head has didactic benefits, there is evidence that students prefer interacting with a human-like tutor instead of text. Since AutoTutor accentuates both conversational skills in addition to didactic skills, it uses a talking head with facial expressions and synthesized speech. Parameters of the facial expressions are generated by fuzzy production rules.

Initially AutoTutor was developed for computer literacy. Evaluations of AutoTutor, using the system as a tutor in a computer literacy course, showed gains in learning and memory compared to control conditions. These results are on par, if not better, than gains in normal human tutoring. Furthermore, evaluations of AutoTutor's conversational smoothness and pedagogical quality of dialog moves also support the claim that AutoTutor is a good simulation of human tutors (Graesser et al, in press).

AutoTutor was designed to be reusable for various knowledge domains. That is, its modular structure allows for domain specific adjustments, without reconstructing the general components of the system. Recently AutoTutor was transferred from the computer literacy to the physics domain. Only two of the modules needed to be changed for the new subject matter: the curriculum script and the LSA space. With the exception of domains that require mathematical precision and formal specification, the system can become an expert tutor in many other tutoring domains within a reasonable amount of time.

We can learn a lot from Intelligent Tutoring Systems like AutoTutor. Testing research hypotheses using a computer model is easier and more reliable than using a human tutor. Various research questions are generated by observing students' conversations with AutoTutor. What kinds of questions are usually asked by students? Can a student's performance been measured by his/her language use? How can we classify various misconceptions and what is the best way to deal with them? Are certain linguistic features used more often in certain fields? To all of these and other questions we have found (or are in the process of finding) answers. These would help the future development of AutoTutor, and education in general.

With a system that shows close to natural didactic and conversational skills, that can be used in a range of domains and that can work at any time at any day for an unlimited period, AutoTutor seems to be the ideal teacher. With the current developments in artificial intelligence, cognitive science and computational linguistics, the question can be raised whether systems like AutoTutor do not pose a potential threat to teachers, tutors and educators. The answer is simple. The current versions of AutoTutor, despite their promising results in evaluations, are far from 'human', and it seems likely that future versions will not fully master a tutor's social skills, pragmatics, gestures and emotions. Nevertheless, when viewed as a prosthesis, AutoTutor can be extremely beneficial. Furthermore, with an increasing demand of literacy and thinking skills at high school and college level, which have hardly improved over the last thirty years (RAND, 2001), additional educational means are welcomed. Intelligent Tutoring Systems like AutoTutor could play exactly this role.

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Supporting classroom discourse with technology

Azita Manouchehri
Mathematical Sciences
Central Michigan University
United States
Azita.M@cmich.edu

Abstract: In this work we studied the impact of using NuCalc, a computer algebra software, on the development of a discourse community in a college level mathematics class. We examined: the influence of technology on group interactions; the influence of technology on mathematical investigations of learners; and the influence of technology on teacher's interactions with students. Data points at 4 distinct ways in which the presence of technology positively influenced the learning community we studied. These were: I) technology as a tool for extending mathematical thinking, (2) Technology as a tool for motivating engagement in group discourse, (3) Technology as a tool for regulating discourse, (4) technology as a tool for refining the culture of classroom.

Introduction

In this research, we examined the relationship between technology enhanced mathematics instruction and group discourse. We analyzed the content and structure of the interactions among a group of prospective secondary mathematics teachers, and whether the presence of technology mediated their mathematical discourse. We addressed three research questions:

What affect does the presence of technology have on the quality of peer interaction?
Do more complex patterns of mathematical discourse arise in the presence of technology?
What influence technology has on the teacher's interactions with students?

Participants and Instruction

The participants were 16 college students enrolled in a senior level mathematics course designed for undergraduate mathematics majors and minors seeking a certification in either middle or secondary teaching. The group composed of 6 female and 10 male students.

The faculty member teaching the class was an experienced mathematician and mathematics educator. Her teaching philosophy matched the goals of reform. The activities used in the current study motivated reasoning, perspective taking, and problem solving. The problems required students to make mathematical generalization using both deductive and inductive reasoning. The use of technology in solving these problems neither reduced the integrity of the mathematics involved, nor led students to immediate answers.

Procedure

Data was collected over a period of 3 weeks. Participants met twice a week. Each class session lasted 75 minutes. During the first two class sessions (phase I data collection) we collected baseline data on the quality of mathematical discussions students had. During the 3rd class period, the instructor introduced the NuCalc software (Pacific Tec 2000). During the second phase of data collection, the last three class sessions, the students discussed specific explorations. The whole group discussions were used as the data source

Findings

Our results points at 4 distinct ways in which technology influenced the learning community we studied. These are: 1) technology as a tool for extending mathematical thinking, assisting peers in constructing more sophisticated mathematical explanations, (2) Technology as a tool for motivating engagement in group discourse, increasing peer participation and engagement in group inquiry, (3) Technology as a tool for regulating discourse, (4) technology as a tool for refining the culture of classroom shifting the patterns of interactions between the teacher and learners.

Technology as a tool for extending mathematical thinking: In this work, we assumed that technology would allow room for group construction of knowledge as individuals interact with each other and with technology to develop a shared understanding of problems, and of their solutions (Cole 1996). Indeed, for the participants in this study convergence on both was facilitated by technology.

Technology as a tool for engagement in discourse: In addition to providing students with a cognitive tool for constructing mathematical arguments, technology served as an affective tool for both intensifying and amplifying group discourse. It allowed less reluctant participants enough confidence to enter soci-mathematical interactions in ways that was not possible to them before. In its presence both participation and engagement in problem solving activities and group discourse was increased. This was particularly evident in the significant change we detected in the number of volunteered participation at the two phases of data collection. While during the first phase only 3 students regularly volunteered answers, during the second phase approximately all students were simultaneously involved in sharing and exchange of ideas.

Technology as a tool for mediating discourse: Technology helped structure group discourse by organizing and constraining peer interactions. The participants used the available technology to construct a shared conceptual space as they relied on immediate feedback structure of the system to negotiate meanings and to build and share their basic mathematical assumptions. They frequently produced visual displays to reflect their intermediate understanding of problem and of peers' comments and to test each other's assertions. In the process they either confirmed, or adjusted their own understandings as well as their peers'. This was reflected in the significant increase in the number of times they used technology to communicate their thinking, referred to technology based evidence to convince peers, the amount of time they spent on analyzing problems, and the amount of time they spent explaining their responses. These processes led to the construction of more sophisticated mathematical arguments by the group members.

Technology as a tool for refining the culture of classroom: In this case study, an obvious impact of the use of technology was increased student commitment to mathematical problem solving, and to knowledge sharing. This led to a natural transition of the locus of control in the classroom. While initially, the instructor was the one who shaped and guided the verbal exchange in class, her presence was not as visible when students used technology to verify statements, and to counter or support arguments. During the sessions that the technology was present she felt little need to encourage participation, the students were initiating more arguments themselves and volunteering explanations to peers. The increase in participation and engagement facilitated the transition of authority from the teacher to students. The shifting relationship was manifested in the decrease in the frequency of the teacher's intervention during their problem solving sessions.

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We are Ready but are We Effective?

Yahya Matsom
Department of Adult and Career Education
Valdosta StateUniversity
United States
ymatsom@valdosta.edu

Abstract: This is a report of a study that was conducted to determine if the newly developed planning strategy could be helpful for online course development in Workforce Teacher Education programs at University Council for Workforce and Human Resources Education institutions.

Introduction

In the new educational paradigm, computer and information technologies were the means to change the activities, interaction, and relationship between online educators and students, as well as among students. With proper planning and use, computer and information technologies could empower online educators' creativity and students' responsibility for their own learning. Moreover, the incorporation of computer and information technologies into the educational setting had shown to improve students' abilities to be self-directed learners (Dede, 1997). Computer technology could help students to be more motivated, feel that they exercise control over their learning experiences, and become accountable for their own learning outcomes. Computer technology could serve as a catalyst to transform teaching and learning, and to expand learning productivity and possibilities.

Future education needs effective programs in order to keep up with the new challenges and dynamic evolution of knowledge, computers, and information technologies. Online programs, especially, could be much more affected by these matters. Therefore, a systematic planning approach to properly guide online educators for the development of online courses was needed (Glasgow & Seels, 1998).

Distance learning opportunities that were possible through flexible and dynamic delivery technology had increased the number of students attaining academic degrees. This emerging phenomenon had influenced more university officials to encourage their faculty to convert more traditional courses to online courses or other forms of distance education techniques. Many faculty welcomed the opportunity to use new technologies for delivering their courses, but many of them also resisted this effort for various reasons (Dede, 1997).

In the traditional classroom environment, students and educators had the opportunity to simultaneously and spontaneously interact and communicate face-to-face between and among themselves. However, in online classes those possibilities were limited for various reasons. Class communication and interaction were dependent on the types of technologies used. Also, it was critical to utilize various forms of instruction strategies that were allowed by the new technologies.

Wagner and McCombs proposed three effective guidelines for designing instruction. Those guidelines were: (a) the opportunity for students to operate holistically; (b) students' individual perception and evaluation should develop their behavior; and © students' overall development should be a dynamic growth process. These guidelines showed that online learning was suitable to be utilized for improving teaching and learning, especially when students were central to the education processes.

Online educators were faced with challenges of converting traditional classroom activities to online class activities (Simmons, 2000). The ability of the online educators transferring and transforming traditional class activities to online activities without affecting students' concentration, motivation, thought, mastery, and comprehension was critical. Online educators were also expected to deliver the same quality of education as the traditional class in order for online teaching to be accepted as a future main stream of education delivery.

Purpose of the Research

Currently, university faculty are exposed to many forms of online delivery tools such as e-mail, listservs, web pages, chatrooms, threaded discussion, desktop conferencing, digital multimedia, and other. These opportunities might allow faculty to use an online format to deliver their classes. However, there were other reasons faculty delivered classes online. They were encouraged or mandated by the universities or were voluntarily experimenting with the new delivery approach. Some faculty used a complete online format of delivery whereas others incorporated and integrated various forms of delivery technologies. The purpose of this study was to determine if the planning strategy could be helpful for online course development for the faculty in Workforce Teacher Education (WTE) programs at University Council for Workforce and Human Resources Education (UCWHRE) institutions.

Analysis of Data

The following analysis of results was obtained upon completion of the study.

1. Distance education faculty of various backgrounds have the perception that a systematic planning for an online course does not follow the assumption that the sequence of the elements must be ranked in the same order of importance of the elements of the strategy;
2. The key to effective online classes is to have a good planning strategy – properly sequenced, that encompassed several elements that are important to teaching and learning.
3. The faculty of different distance education experiences – number of years teaching and number of distance classes conducted; (a) were equally skilled and capable to systematically plan online classes development; and (b) were aware of the important elements that should be considered for planning of online courses.
4. Most of the faculty that are currently delivering non-computer based distance classes are equipped with the skills and experience of the basic online class delivery tools (e-mail and web-based);
5. Faculty may have little or no difficulty to deliver online classes if proper training is given, online delivery software are user-friendly, and the supports needed are provided;
6. New faculty seems to be more likely to get involved in a new approach of a teaching format when compared to the seasoned distance education faculty
7. Different experiences, skills, and knowledge pertaining to distance education did not influence new and seasoned distance education faculty who utilized various forms of distance delivery tools to have different opinions on the sequence of a planning strategy for online courses;
8. Different experiences, skills, and knowledge dealing with distance education would lead new and seasoned distance education faculty to have different perspectives on which of the planning elements are more important for online course development process.
9. The distance education faculty in this study are aware that: (a) a systematic approach is important in planning and designing their online classes; (b) if this strategy is utilized properly, it should influence online/distance course planning and designing; (c) this planning strategy is important to initiate the effort of converting traditional class and other forms of distance classes into online courses, especially when the faculty showed strong agreement that online delivery will become the future mainstream of education formats; and (d) the strategy is also suitable to be utilized as its' own planning strategy to transfer the existing traditional course into a complete online/distance course or for integrating traditional and online/distance classes.

Conclusion

Faculty that participated in this study highly agreed that online or distance courses would become one of the mainstream education formats in the future. They also indicated the developed strategy would influence their planning for online or distance courses. Finally, most of the faculty were found to be familiar with some forms of online delivery tools.

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The Effects of Computer Use on Intrinsic Motivation for Continued Study of a Content Area

By Melissa Mohammed
Education Department
Salisbury University
mamohammed@salisbury.edu

Abstract: This pilot study examines how grade 3 and 4 educators may improve motivation though computer usage. By using computer-assisted instruction in a primary subject area, a teacher can encourage students to choose to work in a subject area they previously disliked. The findings of this study are based upon classroom observations conducted during a two-month period.

Students in a mixed 3rd and 4th grade classroom participated in this study. A general measure of motivation indicated that the students preferred a challenging learning environment to other conditions. Furthermore, when the computer was used to present age-appropriate challenge, students were engaged in previously objectionable content areas with few complaints.

Getting the students to recognize that using quality software programs is "fun learning" rather than "fun" or "learning" remains a goal for educators to pursue. Computer usage combines the students' desire for challenge with the their quest for control.

Introduction

What type of technology-based instruction enhances student learning? What type of motivation do educational computer games provide -- intrinsic, extrinsic or both ? How much of the content area learning that a child experiences while playing a computer game stays with the child when the session of computer use is over? If researchers can determine how computer use may motivate a child to learn more content area knowledge, another piece of the educational puzzle will be revealed.

The majority of instructional software has typically been of the drill-and-practice variety (Alessi and Trollip, 2001). While these games are efficient at their tasks, they do not seem to encourage higher levels of cognitive processing. There are, however, several programs that have enjoyed both awards from educators and commercial success. Some of these programs contain some drill sections, but all of them go beyond that capability and engage students in high level cognitive processing. The programs examined in this study capture and maintain children's interest (*Only the Best*, 1999-2000).

Questions about software programs remain. How does software maintain student interest? Is the fun factor the de facto reason for motivation? Should we equate the child's response that a game is fun with the assumption that fun means intrinsically motivating? Or is it possible that "children may be intrinsically motivated to play and win a game, but still be extrinsically motivated to learn school content" (Alessi, personal correspondence)? If we measure intrinsic motivation as the desire to continue studying the same subject matter after playing a game, how much evidence of intrinsic motivation are researchers likely to find?

Literature

Research supporting the positive effects of computer use exist, yet many studies also indicate that the effects are difficult to measure (Kulik and Kulik, 1991). Positive attitude, which may be interpreted as motivation, is one of the most indicated effects of computer use (Kulik and Kulik, 1991). Thus, motivation may provide a measure for examining effects of computer game usage in education. Commercial computer game makers design primarily for motivation, and they are successful in keeping students interested for the approximately 25 hours that it takes to complete a commercial game. A precedent of designing for motivation has been set by commercial game companies, and positive student attitude toward any type of K-12 computer use shows a inclination that may be exploited. High-quality educational computer games could use the motivation factor as a natural lead-in to academic success, perhaps through the related constructs of student choice and desire for challenge.

In terms of subject area achievement and use of computers, games for teaching the content area of math seem to have the greatest results (Katz and Offrir, 1996; Randel, Morris, Wetzel and Whitehill, 1992). The drill-and-practice necessary for mathematics learning seems to lend itself well to computers, because drill-and-practice takes full advantage of a computer's ability to perform a task repetitively. Other areas have produced promising effects as well, when some aspect of the subject matter can be presented in drill-and-practice form, for example in the example of language arts grammar (Randel et al., 1992).

Educational computer games should meet the instructional design motivation criteria as described by Malone: games should incite curiosity, give challenge, stimulate fantasy and provide user control (Lepper and Malone, 1987; Malone 1980, 1983). Others cite challenge and control as the two most important factors (Hanna, Risden, Czerwinski, and Alexander, 1996).

The instructional design definition provided above lacks a few elements covered in the general area of motivation. This area has been researched from many aspects and includes aspects of motivation measuring such as level, orientation, trait or state. Although this study examines the intrinsic versus extrinsic difference, it is important to acknowledge that extrinsic motivation is not always a poor substitute for intrinsic motivation, particularly when the student has accepted the extrinsic motivation with a sense of "volition" (Ryan and Deci, 2000). The high performance level executed by a student with volitional choice is likely to encourage additional work at the same level (Zimmerman, 1998). In addition, the research may indicate that some other type of motivational factor is at work.

Motivation changes with time while playing games (Westrom and Shaban, 1992). An area related to motivation is interest. Interest also has several varieties, and it can be long term, situational or even shorter (Hidi and Harackiewicz, 2000). Like motivation, interest runs along a time continuum (Hidi and Harackiewicz, 2000).

Choice is another factor in motivation. Generally, choice is found to result in positive affect but with little or no performance impact (Flowerday and Schraw, 2000). It has been hypothesized that performance should be removed from the equation when measuring effects of choice (Hidi and Harackiewicz, 2000). All together, computer-assisted instruction seems to have a history of increasing student motivation overall. This study will examine whether the motivation can be channeled to have a particular result.

Design

The mid-western school where this study took place reflects the heterogeneity of the large university nearby. Its ethnic composition may be attributed to the fact that many of the parents are affiliated with the university in some capacity. While more than 75 percent of the population was Caucasian, the other ethnic groups represented include various African groups, African-American, Chinese, Japanese, Iranian, Korean, and Russian. Ability levels were heterogeneous as well.

One self-contained third and fourth grade classroom was selected for participation in the study. This group is both highly vocal about their opinions and inquisitive in nature. This age level has mastered some basic skills, but could clearly benefit from additional practice of elementary knowledge. This age group is characterized as having good self-esteem, fair reading and writing ability, some logic, and high academic goals (Howe, 1993a and 1993b; Newbill and Clements, 2000). The teacher of this group was supportive of using technology in the classroom, but had moderate experience in technology integration.

Software used was Edmark's Thinkin' Things series, The Learning Company's Reader Rabbit series, and Broderbund's Carmen San Diego series, representing science, reading and math, respectively. These software titles were also chosen because they are slightly less available as local off-the-shelf purchases than the KnowledgeWare's JumpStart series, for example, and they were critically acclaimed by educators (*Only the Best*, 1999-2000). Motivation may be better measured if the student is not overly familiar with a program, and certain programs such as the Jumpstart series are more likely to be used in student homes. Furthermore, at least one program, the Carmen San Diego series, highly encourages offline uses (Druin and Solomon, 1996). The Learning Company's Cluefinders series was considered as an alternate program.

The researcher was introduced to the classroom as a classroom observer who would visit over a two-month period. First, she randomly assigned students to one of three groups, representing the groups learning with science, reading, and math software. She took pre-experimental measures during the first week. For example, the students were given the Harter Extrinsic-Intrinsic Motivation in the Classroom Scale, a self-report inventory where the scale measures whether students generally feel empowered in the classroom or whether the students attribute their success to external factors. The information from this instrument was compared with student actions during the study. Finally, the researcher offered the students a choice between a science, reading, or math activity on two occasions during that week and the choices were noted. This part of the study took approximately one week.

For the approximately 25 hours each, the children played one instructional game exclusively, effectively becoming an expert at playing that one game. In addition to the two computers available in the room, the researcher added three computers to the classroom, with the software installed on each one. Interview questions after this part of the study revolved around what the student believed he or she had learned about that particular subject.

The week before the last week of the study, students were allowed to choose an instructional activity in one of the three subject areas. Student choices were carefully noted during this time as the student's choice was the dependent variable of this study.

The final week of the study consisted of asking exit interview questions. Finally, the teacher was interviewed for his or her opinions on each student's motivation in the subject matter prior to and after the intervention.

The researcher recorded the answers to interview questions on audio tape and wrote short versions of the students' replies on a paper copy as a backup to the audio-taped discussions. The following items were recorded on a separate sheet for reference: the gender, grade, and age of each subject along with the student's assigned number and real name. She also monitored the subjects' behavior through the use of a tally sheet. The notes on the tally sheet included: the day number of the study, the minutes the student spent using computer game, whether the student played the game alone or with partners, and any particular choices the student made that were relevant.

Information was analyzed in several ways. First, it was noted what choices predominated for both the self-identified intrinsically and extrinsically motivated groups. Then, interview responses and observation comments were reviewed seeking themes among groups of students.

Findings

Some students did not voice a choice of one subject area over another at the beginning. However, mathematics was most often the stated favorite and the chosen activity. Students, in general, said they enjoyed the educational software. The teacher agreed that the students were definitely motivated on days when they used the computer. These findings repeat what previous research has found about high student satisfaction levels and early motivation when using computers (Kulik and Kulik, 1991).

During open-ended interviews, students most often commented that the experience was "fun." However, only one student referred to the experience as a learning one. A few mentioned the challenge of the programs, sometimes through related phrases such as enjoyed "figuring it out" and "solving problems".

The predominance of these types of phrases demonstrate how students truly prefer to learn. A number of related positive comments are in table 1.

Comment	Number of students expressing thought
"Fun"	5
Felt "challenged"	3
Enjoyed "figuring it out"	3
"Liked" it	3
Enticed by "new games"	2
Could "solve problems"	1
Did "cooler stuff"	1
Did "experiments"	1
Did "something"	1
Did not do "too much of the same thing"	1
Hadn't "done [it] before"	1
"Learned a lot more"	1

Table 1. Student comments about the best features of their computer-based learning experience (n=15).

Students want to feel productive. They enjoy the accomplishment which accompanies game playing. Two students expressed the idea that "I'm good at it" and one replied that it was easy to do.

Providing a choice to the students at the end proved interesting but not conclusive. The students expressed the desire to choose, but when faced with a choice most just wanted to experiment. As for the initial questions vis-à-vis motivation toward a certain content area, students tend to restate the favorite subject after the intervention.

Discussion

Looking for ways to measure the computer's effects on content area learning helps educators meet the need to know when and how to integrate this technology. Using computers in classrooms to encourage interest in otherwise uninteresting tasks may be a use that educators will actually perform.

This pilot study addresses the problems of educational messages "going flat" and the "educational label" being misconstrued (Tyner, 1998). These problems are avoided when learning remains fun. Computers in education can be used for the purpose of sustaining interest and motivation. The challenge is in shifting children's views to thinking that the computer work is just fun not work that is fun. Schools need to pursue technology use in more carefully considered ways. Those who promote educational technology should design plans which offer more seamless integration to teachers and some choice for students.

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A National On-Line Survey of Education Faculties Use of Technology in Perservice Teacher Education Courses

Lillian D. Nunley
Los Angeles County Office of Education
United States
Dyoteamo@aol.com

Abstract: This paper reports the results of a national on-line descriptive survey. Eight hundred and eighteen teacher education faculty members' affiliated with schools, colleges and departments of education (SCDE) from 50 states reported how they used educational technology in preservice teacher education courses. Five research questions were utilized to determine whether there was a relationship between the dependent variables *(DV)*, teacher education faculty members' proficiency *skill* levels using educational technology in education courses and the independent variables *(IV)*: Technology planning; professional development; redesigning courses for technology integration; assessment and evaluation; and issues related to classroom diversity, equity and equal access of technology. Several low to moderate correlations were found significant at the .05 probability level. Survey respondents reported positive attitudes toward the use of technology and valued it as both a cognitive an instructional media. Technology access, support, time and training were identified as major barriers to technology use.

Introduction

In the 21st century America's economic success will depend on a well-educated population that can contribute to a modern, technologically complex workforce and global economy (CEO Forum on Education and Technology, 2000; Fulton & Pruitt-Mentle and 1998; Gates, 1999). Consequently, as the United States adapts to the needs of the new millennium and the nation seeks to assure educational success for all students, it is imperative that new educational programs, tools, and methods to educate American pupils be continuously identified and implemented. Educational technologies have been identified as effective cognitive and instructional media tools, which numerous scholars, policy makers, educators, parents, and business leaders continue to promote and endorse as potent teaching and learning tools in kindergarten to grade 12 (K-12) and in institutions of higher education (IHE). According to Houghton (1997), Means (1998), Plotnick (1996), due to the rapid changes created by technology, a systematic restructuring of schools [and IHE] based on the needs of an information society is required. Moreover, it is accepted and expected that educators will utilize educational technologies in the classroom to prepare new teachers and students to live and work in the new digital age (Abdal-Haqq, 1995). However, Cuban (1999), Green (1999) and Willis (1997) agree that our current education system continues to prepare students in schools designed to meet the needs of an information-static industrial age. Consequently, installing technology in [k-12] schools and [IHE] has done little to promote the kinds of changes that meet the needs of a 21st-century classroom.

Additionally, Abdal-Haqq (1995), and others have identified several factors, which have conspired to produce the expectation (and in some instances the requirement) that today's K-12 teachers and (SCDE) faculty members' possess among their qualifications the ability to utilize computer-based technologies. These factors include: (a) the need to provide relevant and authentic instruction that reflects contemporary and future social, political, and economic demands on students (Trotter, 1998); (b) the compatibility of certain computer-based technologies with newer, research-based approaches to teaching and learning (Gardner, 1995; Gates, 1999; and Office of Technology Assessment [OTA], 1995); (c) student and parent expectations (Goals 2000); and (d) guidelines and mandates from federal, state, and district government agencies, professional bodies, and American business leaders (American Association of College Teacher Education [AACTE], 1998; Gates, 1999; International Society for Technology in Education Accreditation Committee [ISTE], 1996; National Council for Accreditation of Teacher Education [NCATE], 1998b). Due to the laggard pace (SCDE) have taken in adopting technology, improving their performance in preparing technologically proficient teachers will require expanding technology use among teacher educators

(Menergny, 1996). Houghton (1997) and others, identified several obstacles to infusing technology into teacher education programs: (a) limited availability of equipment, (b) lack of faculty training, (c) no clear expectation that faculty will incorporate technology into academic activities, (d) lack of funds, (e) lack of time to develop faculty in using equipment and software, (f) doubt about the pedagogical validity of using some of the newer technologies since the appearance of literature about these tools is relatively recent, (g) lack of technical support, (h) lack of appropriate materials (particularly integrated media materials suitable for teacher education instruction), and (i) the absence of clear programmatic goals for the teacher education program as a whole. According to Schmidt (1995), in order to plan effective educational technology programs for teacher education faculty members' there exist a need to document current levels of educational technology use among teacher education institutions nationwide. Thus, the purpose of this study was to ascertain how teacher education faculty members' at SCDE from 50 states used educational technology in preservice teacher education courses to improve teaching and learning in K-12 learning environments.

The Study

The sample population for the study was approximately 818 teacher education faculty members who had electronic mail (e-mail) addresses and who provided instruction to preservice teachers. The respondents were randomly sampled from 50 U.S. states at SCDE affiliated as member or non-member institutions of the AACTE and NCATE, and the AERA. They were asked to complete an on-line survey utilized to collect data. A major part of the *Educational Technology Survey's (ETS)* 48 items were based on a 5-point Likert scale. The instrument was designed by the researcher based on a selected review of the literature (Becker, 1995; Good, 1997; Green, 1999; Lan, 1997; Likert, 1932; Moursund & Bielefeldt, 1999; Schmidt, 1995). The survey participants were randomly selected from several lists of Internet-published electronic mail (e-mail) addresses located in professional education directories, SCDE (e-mail) addresses, or affiliated teacher education Internet listservs. The respondents received an e-mail message with information about the study and an Internet URL link address; *a website homepage where the survey was located* which guaranteed anonymity and invited them to voluntarily complete the survey.

Returned surveys were coded and the data entered into data files using two software applications: (a) *Survey Systems*™ (Creative Research Software, Inc., 1999), and (b) *NCSS 2000* (Hintze, 2000) statistical software. Descriptive statistics were utilized to describe the survey respondents' general characteristics. Chi-square analysis were performed on nominal and ordinal measures. Correlation coefficients were analyzed using two statistical tests for nominal and ordinal data: (a) Spearman's Rank Correlation Coefficient and (b) Kruskal Wallis statistical test. These tests were used to determine the relationships between the (DV's); teacher education faculty members' technology proficiency *skill* levels using hardware and software and the following (IV's): Technology planning and infrastructure components; professional development and faculty technology training; redesigning courses for technology integration; classroom diversity, equity, and equal access of educational technology use; and assessment and evaluation of educational technology use in preservice teacher education courses and during preservice teacher candidates' field experience and demographic variables.

Findings

Due to the large amount of data collected only the most important findings will be reported. The population for this study was 888 randomly selected teacher education faculty members from schools colleges and departments of education (SCDE) from 50 states. There were 818 usable surveys, which constituted a response rate of 20.0%. An analysis of the respondents' demographic characteristics revealed that 46.0% of the respondents were male and 54.0% were female. The largest percentage of respondents fell within the age group 46 to 55 years. The largest racial ethnic group was Caucasian/White, which represented 86.4% of all respondents. In reference to teaching credentials offered, 68.7% of the SCDE offered graduate teaching credentials and 84.0% offered undergraduate teaching credentials. In terms of teaching skills, 43.7% reported K-12 experience and 52.7% reported higher education experience. Eighty-one percent held doctoral degrees and 14.9% held master's degrees. Most teacher education faculty members taught a variety of courses. Approximately 40.7% reported teaching graduate courses, followed by 39.6% teaching education methods and 30.6% teaching field experience courses. Of the 673 respondents who completed Question 45 of the survey, 93.9% reported home computer ownership.

Nearly 60% of the respondents reported that their SCDE did not have a written technology plan that is updated annually and included national technology standards. Fifty-two percent of the respondents reported that their technology plan did not include a faculty technical assistance team. Sixty-seven percent reported conflicting information about how their education departments address issues related to classroom diversity equity and equal access, and nearly 64% reported that teacher education faculty members did not evaluate the impact of technology use on teaching and learning. Nearly 56% of the respondents reported that their education departments did not conduct faculty training needs assessments annually. Fifty-nine percent of the respondents reported high proficiency skill levels using the following hardware equipment: The microcomputer, CD ROM player, and the modem. Nearly 81% of the respondents reported high proficiency skill levels using the following software applications: word processing and Internet search engines.

More than half of the respondents reported negative attitudes related to educational technology use and rewards and incentives offered by professional development programs at SCDE nationwide. Sixty-four percent reported that their SCDE professional development programs did not connect tenure and research to technology use. Fifty-one percent reported that their education departments did not offer research opportunities related to technology use. However, over 51.0% reported that their education department offered release time to attend technology related training activities. Fifty-six percent of the respondents reported that they did not believe that education faculty members use educational technology to address multiple learning styles. Fifty-four percent reported that they believed teacher education faculty use educational technology to address the expectations of school districts. Fifty-six percent of the respondents reported that their education departments did not support the use of educational technology by offering state-of-the-art technology training models. Sixty-four percent of the respondents reported that education faculty members use educational technology as a cognitive tool and 75% reported that faculty use technology as a instructional media tool to enhance teaching and learning in the classroom.

Seventy-two percent of the respondents reported that their education department assesses preservice teacher education candidates' use of educational technology during course work. A majority (62%) disagreed that preservice teacher education candidates are required to demonstrate mastery of educational technology use during field experience. Sixty-five percent disagreed that teacher education faculty members monitor preservice teacher education candidates' use of educational technology during field experience. Nearly 63% of the respondents reported that teacher education faculty did not evaluate the impact of educational technology use on teaching and learning. Sixty-seven percent of teacher education faculty members reported that their education department addressed issues related to classroom diversity equity and equal access of educational technology use in preservice teacher education courses. However, on a similar question that was designed to elicit the respondents' attitudes about classroom diversity and equity issues and technology models, which incorporate national technology standards, the results revealed that nearly 60% of teacher education faculty members disagreed with the statement.

The data results revealed that males reported and obtained significantly higher mean scores using educational technology hardware and software, had more positive attitudes than females toward hardware technology use in preservice teacher education courses, and used these technologies at a higher percentage rate in the classroom than female teacher education faculty members. In addition, males obtained significantly higher mean score ranks on all educational technology software items except word processing and desktop publishing. The 30-to-39 age group reported and obtained higher mean scores, had more positive attitudes toward hardware technology use in preservice teacher education courses, and used technology at a higher percentage rate in the classroom than teacher education faculty members from different age groups. The data support a positive correlation between the age group 30 to 39 and high software proficiency levels for the five software items listed. The data appear to indicate that a new younger generation is better prepared to use certain educational technology software and hardware in teacher education courses. The group that obtained the lowest mean score ranks for all 10 software items was the over-56 age group.

The data revealed a strong positive relationship between home computer ownership and high scores for *hardware* proficiency skill levels and a strong positive relationship between home computer ownership and *software* proficiency (skill) levels for nine items. Respondents who reported teaching technology courses obtained higher mean score ranks for all 11 *hardware* items and higher mean score ranks for 8 of the 10 *software* items. The second highest mean score ranks were obtained by respondents who reported teaching education foundation courses, and the third highest mean score ranks were obtained by the respondents who reported teaching education methods courses. The lowest mean score ranks for many of the items were obtained by respondents who reported teaching curriculum and other courses. These data appear to indicate a strong positive relationship between types of courses currently teaching and software proficiency (skill) levels for eight items.

Conclusions

Low to moderate correlations was found between several of the IV's and the DV's, significant at the .05 probability level. Survey respondents reported positive attitudes toward the use of technology and valued it as both a cognitive an instructional media. Technology access to equipment, support and training were identified as major barriers to technology use. The results of this study identified the infrastructure, teacher education faculty members' attitudes toward the use of educational technology, training needs, and effective teaching methodologies for technology use in teacher education courses. Guidelines for teacher education programs and school districts can be established using the current research model to provide: (a) skill training and professional development of faculty members' and new teachers; (b) address issues related to classroom diversity, equity, and equal access of technology; (c) provide a theoretical model to redesign teacher education courses and programs and (d) assess and evaluate model technology programs.

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Stakeholder Perceptions of the Use and Value of Computers and Technology in an Elementary School Setting:
A Case Study of the Vision and Reality of Educational Technology

Pam Petty
Western Kentucky University
Bowling Green, KY USA
pam@pampetty.com

Abstract: The purpose of this study was to describe the status of classroom computer use at an elementary (K-6) school with a population of 676 students in a rural county in the mid-south. A further purpose of the study included examining and describing the patterns of beliefs or attitudes toward the use of technology in education and the skill levels necessary for use. Teachers, administrators, and parents within one school were observed and surveyed offering qualitative and quantitative data in order to make recommendations regarding the direction of technological development for the school and determining the types of training needed.

Introduction

By examining one school as a case study, it is possible to probe barriers to and facilitators of technology use. To understand the strengths that support effective technology use in education, and learn about the weaknesses that may inhibit the effective use of technology as a learning and teaching tool, one might examine a school's expenditures on technology, technology use by teachers, and attitudes of parents, teachers, administrators, supervisors of instruction, and technology coordinators regarding technology use. Do teachers feel adequately prepared to integrate technology in the state-mandated curriculums? What effects do teachers' beliefs regarding the importance of technology have on the way they use technology in the classroom? What similarities or differences appear in expectations relating to technology use in the classroom held by teachers, by administrators, and by parents and how might these similarities or differences effect present or future uses of technology in the classrooms?

Teachers and Technology

Research indicates that teachers must use computers competently in their classrooms, both as vehicles of pedagogically sound instruction and for classroom management. They must have knowledge of hardware and software applications (Hardy1998; McNamara1995; Siegel 1995; Walters 1992). However, Rosenthal (1999) sites a survey done by the National Center for Education Statistics (NCES 2000-003) finding that only 20 percent of the nation's 2.5 million public school teachers feel comfortable using technology in their classrooms. Another recent NCES brief (2000-090) elaborates that 13 percent of all public school teachers with access to computers or the Internet at school feel not at all prepared; 53 percent feel somewhat prepared; 23 percent feel well prepared and 10 percent feel very well prepared. These findings underscore other research (Siegel 1995; Schrum 1999; Strudler & Wetzel 1999) which indicates that even if teachers hold positive attitudes toward technology, the lack of time, access and support needed for teachers to feel competent in using technology in instruction may keep teachers from becoming comfortable with technology in their classrooms.

Poole & Moran (1998) suggest that limited and/or inadequate staff development prevents teachers from utilizing existing technology in their teaching. The authors continue stating, "One-shot workshops, added expense of training, lack of continued support, isolated knowledge, unawareness of school needs, lack of knowledge and support from leadership all contribute to the ineffectiveness of technology staff development". Studies show that most teachers do not learn to use computers from taking college courses, attending seminars or workshops, or through traditional inservice programs (Galloway 1997). More continuous training (Hardy 1998) in the use of technology in education over the course of seven years may provide teachers with the experience, comfort, and confidence to successfully incorporate technology into instruction.

Braun (1993) underscores the types of training in technology teachers need as he reports conclusions drawn from research done by the International Society for Technology in Education (ISTE), "Teachers need training in the uses of technology in their curricula; time to develop these uses; and support from their administrators in a risk-free environment – and they need these on a continuing, long-term basis". While many people recognize the need for staff development related to technology, Bailey (1997) states, "Even though there is considerable information about the general characteristics of effective staff-development practices, there have been minimal amounts of information specific to technology staff-development programs".

Wang (2000) utilizes a model published by Lloyd and Welliver (1989) denoting familiarization, utilization, and integration as three phases that provide a framework for computer training for teachers. The focus of the familiarization phase rests on acquainting teachers with computer equipment and terminologies. The utilization phase of instruction involves teachers using computers as personal production tools. Direct integration of technology into the curriculum occurs in the final phase of training. McNamara & Pedigo (1995) discuss a similar training model that follows three basic levels: awareness level, which provides basic knowledge about computers; development of skills level, actual use of equipment and computer software; and application level, integration of computers into curriculum.

Teachers need models to follow when integrating technology into the curriculum. Sherry, Billig, Tavalin, & Gibson (2000) suggest that teachers need mentors, specialists who help guide their understanding of technology, and on-line resources available to them as they attempt to use technology in curriculum integration. This support structure for teachers provides a level of empowerment to the teachers both as learners and as users of technology.

Thornburg (2000) makes an interesting observation as he notes, "Technology is not the point – learning is". In the author's reference to "technological fluency," he suggests teachers should not stop with students merely knowing how to use computers, but teachers should set examples of how to use computers as tools for learning. Poole and Moran (1998) suggest a staff development model called "Teachers Teaching Teachers Technology" (T-4). The plan works on the premise that a team effort toward technology training can promote effective technology learning by teachers. Teachers obtain release time for working to integrate technology into their curriculum and in developing personal technology skills. A team of "experts" from within the school survey teachers for training needs, develop a training schedule of classes, and serve as instructors in those classes. The teachers trained at the initial classes serve as the next level of "experts" when the training session appears next on the schedule.

By contrast, Saul Rockman, (2000) as quoted in Electronic-School believes that teachers should only learn enough about computers to get their work accomplished. He indicates that students would take the lead in using technology if teachers would move aside and give them permission to do so. The technology gap that exists between students and teachers indicates "... students may know more about how to use the technology than adults" (Watson, 1998). Watson, in her research on the how students use information technologies, goes on to suggest the need for more research into how best to assist teachers in using technology to facilitate student learning. *Teachers and Technology: Making the Connection* (1995) developed by the U. S. Office of Technology Assessment, indicates everyone benefits from student and teacher collaborations in using technology as "the K-12 students themselves learn the technology and help their teachers find ways to use it" (on-line version). This notion underscores a resent survey (National School Boards Foundations, 2000) indicating that three out of four teenagers use on-line resources via the Internet.

Weiner (2000) indicates that, based on a survey conducted by Market Data Retrieval, funding spent on teacher training in technology constitutes only a minimal amount of the total budget for technology in public schools in the United States. Of the estimated $5.67 billion spent on technology in public schools during the 1999-2000 school year, only 17 percent went to teacher training.

Training Future Teachers

In reference to encouraging teachers to integrate technology into their classrooms, Dr. Linda Roberts, special advisor on technology to the U. S. Department of Education states, "If you can get teachers to use technology effectively in their own lives, you have won 90 percent of the battle" (Rosenthal, 1999). Rosenthal continues to describe how the National Council for the Accreditation of Teacher Education (NCATE) requires all colleges and universities to train pre-service teachers in how to effectively integrate technology into their curricula as opposed to only offering separate courses about technology. Brush (1998) concurs with this notion as he calls for integrated technology training throughout the teacher education program. Computing instruction integrated throughout the teacher education program, according to Moursund & Bielefeldt (1999) reigns superior over isolated computer classes. Students who receive computer instruction in an integrated manner more naturally integrate technology into the school curriculum as inservice teachers.

Wang (2000) indicates that preservice teachers placed in practicum settings with teachers who view efforts to integrate technology into the classroom as hindrances to routine work will not appreciate the value of computers in education. While much research exists relating to understanding preservice teacher perceptions of technology (Diegnueller 1992), their perceptions of good teaching practices may reflect an obsolete educational system. In a study of preservice teacher perceptions on changing teacher roles and technology, Carr-Chellman & Dyer (2000) asked preservice teachers to respond to a reading on the future vision of education. Results showed that many respondents preferred traditional teacher roles that reflected the same types of teaching methods as they experienced as students. The researchers credit much of this to the notion of "change" in general, independent of the use of technology in education.

Technology Planning

A 1991 policy statement generated from the Council of Chief State School Officers requires that all states develop and maintain written plans for integrating technology in the education curriculum (Improving Student Performance through Learning Technologies, 1991). Anderson (1996) explains that states develop technology plans of a more general nature than district or local school technology plans. The state plans deal with more with non-specific principles, financial support, and issues of district accountability of state funding. District technology plans address the specific needs of a school system and includes an overview of local school technology goals. District plans provide broad outlines of the many aspects of the use of technology in education including administrative concerns, public relations, and other facets of the school system as a whole. Local or building level technology plans focus on curriculum concerns, teachers, and learners. These plans usually include vision statements and set goals for the use of technology to support the curriculum.

Financial, technical, human resources, architectural, and legal aspects serve as major components of technology planning for state, district, and local schools (Anderson 1996). "Although technology planning occurs at multiple 'levels,' many principles are identical. Planners need to engage the services, creativity, and assistance of all stakeholders" (Anderson 1996). The magnitude of this planning requires people to establish timelines, delegate responsibilities, and constantly evaluate the plans during the building and implementation phases. Peterson (1989) indicates that school board members and district administrators may not know the steps to take in planning for technology in their school systems.

Data Collection

The first course of action for this study began in January 2000, by initiating two pilot studies: 1) training for parents interested in the use of technology in teaching and learning; and 2) training for teachers interested in increasing their skills in using technology as a teaching and learning tool in their respective classrooms. Every parent in grades Kindergarten through second grade received a letter explaining the purposes for the computer training, when and where the sessions would meet, and what they needed to do to reserve a space in the training sessions. These sessions lasted approximately eight weeks, meeting once weekly from 6:00 p.m. until 8:30 p.m. As demand for hands-on computer time increased, the school library hours were extended from 3:00 p.m. until 9:00 p.m. to accommodate parents who did not have home access to a computer. Parents attending these training sessions completed both pre and post-surveys examining demographic information, technology skill levels and interests, and beliefs regarding the use of various technologies as teaching and learning tools. Field notes from these sessions reflected parent motivations, concerns, visions, and anecdotes relating to experiences their children incurred in the context of using computers in the classroom during the time they attended the participating school.

The second pilot involved training teachers interested in expanding or improving their skills in using technology as a teaching and learning tool. Twelve teachers participated in these training sessions which met two evenings per week for a period of eight weeks. The sessions lasted approximately two and one-half to three hours each. Teachers brainstormed a variety of topics relating to computer use in the classroom and prioritized the order in which the topics would be offered. Teachers attending these training sessions completed both pre and post-surveys examining demographic information, technology skill levels and interests, and beliefs regarding the use of various technologies as teaching and learning tools. Field notes from these sessions reflected teacher motivations, concerns, visions, and anecdotes relating to experiences with students while using computers in the classroom.

All faculty members, administrators, parents, supervisors of instruction, and technology coordinators associated with the participating school received surveys and consent forms. These surveys were subjected to statistical analysis and were coded based on qualitative responses. A primary goal was to try and discern themes or patterns of beliefs and technology use that might provide useful information for the planning of future technology endeavors at the school.

Results

Perhaps the most significant aspects of this study relate to the comparisons of feedback on issues regarding the use of technology in education from the primary stakeholders at the participating elementary school, i.e., teachers, parents, administrators, supervisors of instruction, and technology coordinators. Much published documentation exists dealing with the benefits and barriers schools encounter in their attempts to integrate technology; however, the extensive body of research reviewed for this study did not explicitly provide findings comparing and contrasting the expectations each group of stakeholders hold for the use of technology in an elementary school setting. This study adds to the literature a discussion of views and beliefs of the stakeholders in one such elementary school and sheds light on how a school might more efficiently and effectively plan for future technology expenditures and integrative programs.

Results of this study indicate the discrepancies in beliefs regarding the use of technology as a teaching and learning tool that exist among the various stakeholders at the participating school. Results also point to areas of common goals regarding present and future technology use. Implications exist for future technology plans, professional development for teachers, and ways to remove barriers to using technology as a teaching and learning tool that presently exist.

Summary

The new millennium brings with it the evolution of technology-supported teaching and learning and also the incredible potential for educators to take advantage of incorporating that technology into their teaching. A review of the literature indicates that our society will continue to rely more and more on technology and future generations must possess the skills to use that technology in the workforce as well as their personal lives. Governmental, private, and business sectors of our society recognize the need for schools to help train students and continue to aid schools financially in their quest for computers and other aspects of technology. Teachers suddenly presented with new and unfamiliar types of technology may or may not readily integrate it into the curriculum as they struggle with inadequate or insufficient staff development. Perhaps Donald Norman (2000) says it best when he states, "Technology is not the answer, but proper technology coupled with informed pedagogy, coupled with teachers who are coaches, guides, and mentors, can lead the way".

Current literature related to the use of technology in education provides us with information about how traditional teaching models change with the introduction of computers and other technology. These changes affect technology planning for a school or a school system. Teacher training and professional development for teachers in the use of technology compose the subjects of several research projects. To date no consensus exists regarding the most effective model for such training. While the literature provides agreement that integration of technology into the curriculum is paramount, the methods for training teachers to integrate technology and the methods for adopting appropriate pedagogy remain random with a "hit or miss" approach. Colleges and universities face similar challenges in preparing new teachers to readily integrate technology in their teaching.

The literature also indicates that the people responsible for making critical decisions regarding the implementation and use of technology in classrooms make those decisions without the proper information or background knowledge. States and local school districts must make vital and pressing decisions regarding the implementation of technology into classrooms. These decisions must take into account all the stakeholders affected, i.e., teachers, students, parents, administrators, and the community. Understanding the current status of technology use in a school (or school system) constitutes the first step in making these important decisions (U. S. Department of Education 1998).

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Evaluation of Motivation, Interactivity and Learning Styles in Web- Based Instruction and On line courses

M.Ponce Meza & M. Farias-Elinos
Research Coordination
La Salle University
Mexico City

Abstract.

Recently Web-Based Instruction has been adopted for many educational systems in order to support distance education. WBI has become popular in that it overcomes time and space limitation in traditional systems. It is important to provide interactivity and motivation for students besides of assuring understanding and learning. This paper introduces a model used in undergraduate and graduate courses based on web pages and its transition to online courses.. Based on the analysis of the students performances, the paper presents the criteria to evaluate the motivation and interactivity and learning styles of the students, comparing it with the results on these aspects developed in courses on these subjects that were not supported by web pages.

I. Introduction

The Internet has affected the traditional education methodology. Especially with the possibility of the World Wide Web (WWW). Using Web-Based Instruction in Undergraduate courses has helped professors to develop new strategies of teaching and learning in their courses. The first stage of this project was developed on the research of finding new ways of using the WWW for teaching specific contents. The second stage was dedicated to the development of specific web pages to support the traditional learning process, and finally, the teaching on line. The last stage, was developed using the experience of the use of web pages in teaching different courses, and evaluating the impact of the web pages in the learning, learning styles, motivation and interactivity showed by the students.

WBI has changed the traditional ways of teaching and learning. In the traditional perspective, teachers and students share the same space at the same time and also, students may work individually or in groups. On the other hand, in WBI, teachers and students may meet asynchronously using communications tools, such as video and sounds at different places. WBI help students to work in a self-driven manner.

Some of the limitations of the WBI is that the lack of face-to-face communications can affect the perceived satisfaction of the students. Then another important concerns in WBI is how teachers can motivate unseen students. There are some specific ways of motivating and develop interactivity in web pages, and online courses. This paper provides an evaluation model that promotes interactivity and motivation for courses based on WBI and detect learning styles. It is objective and based on principles dominating pedagogical philosophy and learning theory.

This paper is organized as follows. In Section II, related works providing motivation and interactivity are presented. In Section III, the model used is introduced. Based on this model the courses are compared for their interactivity and motivation in Section IV. Finally, conclusions and further research issues are discussed in Section V.

II. Related Work

In (2), the authors argue that course design and the teacher's role might affect student motivation. Based on these arguments, they present three ways to enhance the use of WBI: how to motivate students, course design considerations, and how to motivate instructors.

First, the causes for lack of student motivation include lack of preparedness, lack of funds to purchase electronic resources, initial difficulty in using advanced hardware and software, phobia about technology, lack of background on course, interpersonal difficulty, family illness, etc. The authors suggested the following solutions: get to know the students by providing e-mail addresses: email communications and face-to-face meeting sessions.

Second, as possible course design considerations for providing motivation, the following principles may apply: variation and curiosity, relevance, challenge level. Positive outcomes, positive impression, readable style, and interest. Variation and curiosity refer to providing diversity and making changes in content to stimulate attention and curiosity. Relevance refers to connecting student learning to objectives of the course.

Finally, the authors argued that the motivation problem may also affect teachers, and unmotivated teachers may impact the entire class. In order to motivate the instructors themselves, the following suggestions can be made: more time to redesign the course and develop new strategies to use technology in a meaningful way.

There are three ways of interactions explored in this project: student-course material interaction, student-teacher interaction, and student-student interaction. First, for student-course material interaction, a course should be designed to facilitate self-directed learning, and include many illustrations and guidelines. Second, for student-teacher interaction, teachers need to constantly motivate students. Finally, in order to support student-student interaction, communication tools should be provided.

The model of the web pages and online courses are segmented in the following criteria: a) content, b) graphics, sound, c) authority, which includes the quality of the web page writer, and copyright and trustworthiness of web management organization, d) currency, which refers to whether the web pages' content is up-to-date or not, e) general appearance, which refers to the attractiveness of the web page, and f) ease of navigation.

Motivation is evaluated by considering the following aspects: a) attention, relevance, confidence and satisfaction. Attention is determined by the interest or curiosity of the students. Thus students are supposed to answer yes on questions like "Does the display provide curiosity?" or "Does the content invoke curiosity?". Relevance is the applicability of the content to real life or other subjects. Confidence is to describe the students level of understanding of the course material. Finally, satisfaction is to provide the students' satisfaction after the course, including fairness in grading, positive rewards and psychological impacts.

II. Proposed Model

This proposal tries to develop some objective evaluation criteria that can be useful for WBI designers and teachers. Here the categories to be evaluated are: student-to-course content relationship, student-to teacher relationship, and student-to-student relationship. The evaluation criteria for interactivity include elements inducing student reaction. The evaluation criteria for motivation include elements that stimulate student interest. The elements for interactivity and motivation are somewhat overlapping. The evaluation model may not be an absolute index for WBI 'products, but it can be used for comparing the relative performance of web pages.

Constructivism emphasizes the learner's intentions, experience, and cognitive strategies. According to constructivism, learners construct different cognitive structures based on their previous knowledge and what they experience in different learning environments. Thus, constructivists are supposed to have learning environments that are as rich and diverse as possible. Constructivist also believe that knowledge does not exist outside the minds of human beings and that what we know of reality is individually and socially constructed based on the learner's previous experience. Also, they believe that learning consists of acquiring viable strategies that meet one's objectives, and learning can be estimated only through observation and dialogue.

The evaluation model for interactive and motivation consists of three relationships: Student-to course Content, Student-t-Teacher, and Student-to Student. Within each relationship, a number of elements that may affect the relationship are identified. Each element is given a score of 1 if it exist and 9 otherwise. Formulas based on the scores given to these elements for all three relationships are derived to evaluate interactivity and motivation.

1. Interactivity

1) Student-to-course content relationship

- Providing hyperlinks or directions
- Providing scrolls
- Providing multimedia data, graphic, pictures, maps, charts
- Question/Answer (Trouble Shooting) guide
- Is there any exercise for the course?

2. Student-to-teacher relationship

- Virtual Office Hour
- Reward (for any achievement such as early submission, etc)
- Providing contact information for the teacher other than office hour
- Providing media for communication (Synchronous/Asynchronous):e-mail, chat-room, Internet phone
- Providing collaboration between students and teacher

3. Student-to-Student relationship
    - Does the work involve learner-to-learner collaboration
    - Providing media for communication: e-mail, chat-room, Internet phone, bulletin board, feedback
    - Providing contact information among students

2. Motivation

1) Student-to course content relationship

- Providing explicit statement of course objectives
- Providing warm-up exercises
- Does the web page include a sequence of lessons for students and /or teacher?
- Providing the background and/or prerequisite courses required for the course
- Providing multimedia data: graphic, pictures, maps, charts
- Providing summary and review
- Does the web page specify updated date?
- Does each icon have a name that is helpful in guidance?
- Does the course web page have any references
- Does the course require students to use their native language?
- Does the web page provide the time to finish the course (or lesson)?

- Does the web page provide the author information explicitly?
- Does the web page have a copyright?
- Are all web site still valid?

2) Student-to-teacher relationship

- Providing reward for accomplishment
- Providing collaboration between students and teacher
- Providing teacher's biography (Picture, phone number, e-mail address, etc)
- Referring response time of student input (questions or comments)

3) Student-to student relationship

- Does the work involve learner-to-learner collaboration?
- Providing media for communication: e-mail, chat-room, Internet phone, bulletin board, feedback
- Does the course require competitions between students in the class?
- Providing each student's picture or biography?
- Providing students with chance to meet each other at least once during the semester?

4) Learning Styles

- Does the work involve learner's learning style preferences?
- Providing media for communication, matches the learning style of the studens?
- Does the course adecuate the material to the learning style of the students?
- Providing feedback, according with learning style preferences of the students?

For interactivity, the degree of overall interactivity, I, is determined by the following expression. We assume that, the bigger the value I, the higher the achieved interactivity for a specific WBI course. This means that, no matter what educational theory each element comes from, we simply assume that the element, with possible different weight, is helpful for achieving overall interactivity. The value of I can be somewhere between 9 and 1.

Where C1, C2 and C3 are coefficients (or weight value), and SCI (the degree of student-to-course interactivity), STI (the degree of student-to-teacher interactivity) and SSI (the degree of student-to-student interactivity) are determined as follows. We assume that the degree of each type of interactivity has higher value as more elements are provide for the type.

Similarly, for motivation, the degree of overall motivation, M, is determined by the following expression. As in interactivity, it is assumed that, the higher the value of M, the higher the achieved motivation for a WBI course, In turn, this means that, no matter what educational theory each element comes from, we simply assume that the element, with possible different weight, is helpful for achieving overall motivation. Also, the value of M can be somewhere between 0 and 1.

The actual coefficients will be evaluated and analysed to consider the impact of those criteria in the development of the webpages.

Institutionalizing Technology in Schools: Resolving Teacher Concerns

Glenda Rakes, The University of Louisiana, US
Holly Casey, The University of Louisiana, US

Institutionalizing Technology in Schools: Resolving Teacher Concerns

Technology is a fact of life in the twenty-first century. It is an ever-present reality facing people in all walks of life on a daily basis. The need for technology skills in the workplace and in everyday life has brought about new demands on P-12 teachers to prepare today's students to succeed in their life's pursuits. These demands have forced educators to acquire, use, and teach technology skills; in short, to integrate instructional technology into their teaching methodologies as well as into the content areas they teach. Many teachers have been overwhelmed by this change in instructional focus.

The ultimate goal is to move through the change process and integrate technology into teaching and learning to the extent that it becomes "normal" or institutionalized. Research by Fuller (1969) and Hall (1978) have shown that teachers' feelings and concerns have a direct bearing on their behavior. These concerns must addressed if real change is to be effected.

A question posed by researchers, administrators, and teachers concerns what results P-12 education is receiving as a result of the expenditures for instructional technology acquisitions and staff development (O'Riordan, 1999). With limited funding for technology staff development, it is crucial that training content and methodology meet the specific needs of the P-12 teachers who are being required to change their teaching by integrating instructional technology into their classes. After several years of these attempts, examining the direct responses of teachers' feelings toward this change process should provide some insight into how well these goals are being met.

The teachers in this study responded to the following question: What specific aspects of instructional technology have the greatest positive impact on your classroom teaching?

Procedures

The questionnaire was converted to hypertext markup language (html) and placed on the Internet. Extensive web searches located listservs and newsgroups focusing on P-12 teachers and identified email addresses for school district technology coordinators from all 50 states. The researcher emailed a message to the identified school district's technology coordinator/director, mailing list, and listserv manager, asking them to disseminate the URL for the online instrument to their teachers and members. The responses were emailed back to a specific server, and the data were transferred into a password-protected account.

Methodology

Responses to the open-ended question were coded and categorized using Merriam's (1991) standard qualitative methods. The analysis procedure was designed to identify key words and phrases. The qualitative data from the content analysis of the responses to this open-ended question provides a glimpse into the perceptions that these teachers hold regarding their feelings regarding the use of instructional technology.

Population

The target population for this study was P-12 teachers currently using instructional technology in some form in their classrooms. Five hundred six usable surveys were returned with each of the 50 states represented. Respondents represented PK through twelfth grade teachers with bachelors degree through doctorates with years of teaching experience ranging from less than one year to over 25 years. The respondents represented a wide variety of assignments from self-contained classrooms through specific subject areas including Language Arts, Social Studies, Mathematics, Fine Arts, Physical Education, Special Education, Foreign Language, Computer Science, Business, and Vocational Education.

Analysis

Five hundred six respondents shared their ideas, concerns, and comments regarding the overall impact that instructional technology has had on them as well as their students' response to technology. The responses to the open-ended question were often lengthy. The respondents' comments naturally grouped into reports of (a) increased student motivation, interest and creativity; (b) a sense of personal and professional empowerment, (c) lack of time, training opportunities, technical support, and equipment; and (d) their perceived roles as technology leaders and trainers for peers. Sample comments from respondents will be provided. The range of comments did not reflect any one demographic factor, interest group, or geographic location. The four distinct categories were well defined in the comments as shown in Table 1.

Table 1

Responses to Open-ended Question

Category	*n*	Percentage
Increased student motivation	212	42
Personal and professional empowerment	128	25
Lack of time, training, support, and equipment	108	21
Technology leadership role	58	12
Total	506	100

The largest number of responses (42%) concerned an obvious change in student motivation, interest and creativity. Many of the teachers referred to their students as being more motivated and more engaged in the learning process than prior to the introduction of instructional technology.

The increased creativity and interest described by these respondents were not limited to the students. A Rhode Island respondent added that when they are encouraged to use technology with their assignments the students are more interested and "that makes my job all the more exciting as well." According to one respondent from South Dakota, "Teaching is much more exciting when the students are so enthused [sic] about learning." Responses indicated that instructional technology integration has had an impact on the creativity and interest of teachers as well as their students.

Increased creativity and heightened interest in students was reported from all over the country in every grade level and subject area. Although some of the respondents made reference to specific software applications and P-12 Internet activities, most of their remarks centered on generic learning creativity reflected by the students, not specific activities and products associated with technology products or programs.

Even though respondents were specifically asked to describe positive aspects of teaching and technology, 21% of the respondents reported problems encountered trying to implement technology in their schools and classrooms. Many of the remarks were included with reports of some successes in spite of the teachers' lack of time, training, technology support, and equipment. Of the 108 responses in this area, 42 reports involved problems with technology training provided by the school or district; 29 respondents reported problems with equipment or lack of technology support; 19 teachers focused on lack of time for technology use or preparation; and the remaining 18 responses included complaints about personnel and scheduling matters. This feedback reinforces similar findings from several researchers (Albaugh, 1997; Becker, 1994; Furst-Bowe, 1996; Treagust & Rennie, 1993; Shearman, 1997) all of whom report that a lack of time for training, support, and equipment inversely impact the effective use of instructional technology in schools.

The majority of the responses about training problems concerned the lack of school or district technology training. Over half of the teachers commenting on the quality or lack of district-provided technology training, reported that they had obtained their technology training on their own.

The 29 teachers whose concerns over lack of equipment and technology support covered everything from outdated and broken hardware, to non-existent or non-responsive technology support in their schools and districts. Their remarks chiefly questioned how they could effectively use their training with no equipment for their students to use. Several teachers commented on the lack of fiscal support in their districts and states, and they added their concerns over no funding increases in the foreseeable future. The respondents who expressed their concerns about lack of time to prepare for and to use the technology feared they would lose the skills they developed in their training. Most of the teachers expressed regret that lack of time prevented them from effectively using technology with their students.

There were 58 teachers who reported increasing confidence and their increasing technology leadership roles in their schools and districts as a direct result of their technology training. These responses fell into two areas involving increased comfort and confidence resulting in innovation and integration of technology into individual classes and delivery of training and technology support to other teachers and administrators.

The group of 128 teachers who reported increased sense of personal and professional empowerment also reported the greatest change in their teaching due to technology training. These comments are similar to those reported by Sheingold and Hadley (1990) as teachers reported that instructional technology enhances their sense of productivity. These respondents described their use of instructional technology with their students and their colleagues. The teachers explained how and to what extent technology training impacted their teaching from increasing technology integration with curriculum delivery to total changes in teaching methodologies.

These teacher comment categories can be compared to the seven Stages of Concern as defined by Hall, George, & Rutherford (1977). These concerns occur in a natural sequence; movement through these stages is developmental. The stages, in order, are 1) awareness, 2) informational, 3) personal, 4) management, 5) consequence, 6) collaboration, and 7) refocusing. The stages are described in Table 2 and compared to the categories of teacher comments derived from teacher comments in this study.

Table 2

Stages of Concern /Comments Comparisons

Stage of Concern	Expression of Concern	Teacher Comment Categories
6. Refocusing	I have some ideas about something that would work even better. Is there a better way? (proactive)	Personal and professional empowerment
5. Collaboration	How can I relate what I am doing to what others are doing? How do others do this? What is the maximum potential of doing this?	Technology leadership roles
4. Consequence	How is my use of the innovation affecting learners? How can I refine it to have more of an impact?	Increased student motivation
3. Management	How can I fit it all in? How can I master this? I seem to be spending all of my time getting materials ready.	Lack of time, training, support, equipment
2. Personal	How will using this innovation affect or impact me? What is my role in this?	
1. Informational	How does this work? I would like to know more about it.	
0. Awareness	What is it? I am not really concerned about it. (reactive)	

From the perspective of Hall's concerns based theory, institutionalization of an innovation (making it "normal" in the environment) only occurs when most of the individuals within a population have resolved (lowered) their concerns on Stages 1, 2, and 3. In order for any innovation to become an integral part of an organization, strong Informational, Personal, and Management concerns must be resolved (Hall, George, & Rutherford, 1978). The results of this study provide some indication that institutionalization has not yet occurred. "If these early concerns remain intense, then the user is apt to modify the innovation or their use of the innovation, or perhaps discontinue use, in order to reduce the intensity of these concerns" (p. 13).

Many encouraging, positive reports of successful use of technology were reported by teachers across the country. However, even when specifically asked to describe positive aspects of their technology-related experiences, twenty-one percent of the respondents in this study volunteered strong, negative concerns that parallel Hall's (1976) Stage 3 (Management). With frequent focus on the needs of students, teacher concerns and needs are often lost. While care must be taken in generalizing the results from this sample, the results of this study provide some evidence that if technology is to become a normal part of classroom instruction, attention must be given to the persistent, personal concerns of teachers.

Comparison of Measures of Achievement and Interactive Technology Use in Distance Education

Sherri Restauri
Department of Distance Education
Jacksonville State University
United States
srestaur@jsucc.jsu.edu

Abstract: This study analyzed measures of achievement for students enrolled in distance education courses via assessment of final course grades. Various uses of interactive technologies in classes taught via Distance Education methods and traditional on-campus methods were also compared in this study. Further analysis of the type of interaction methods used and frequency of utilization was performed to determine effects of these various methods of interaction on the achievement of the distance student. Certain benefits and drawbacks of each of the various interaction methods analyzed in this study were found for both students and instructors. A positive correlation was found between the two criteria used to determine student success in this study in both Distance Education and "traditional" courses. Differences were observed in the use of interactive technologies between Distance Education and "traditional" courses.

Introduction

Providing coursework via the Internet and other technology has become the focus among instructors in both K-12, 2-year, and 4-year schools, colleges, and universities in the last few years, though distance education via such methods as correspondence courses has been around for decades. Various forces, including accreditation agencies, government officials, administrators, and even students and faculty, have challenged the effectiveness of these courses and programs. A range of approaches has been used to determine the effectiveness of these courses and programs. Overall, the most frequent approach is by means of a comparison of the courses taught via Distance Education to the same courses taught "traditionally" (on-campus). Many studies (Souder, 1993) present data in which courses offered through distance education methods have higher student course ratings than traditional, on-campus courses in such areas as achievement on examinations, while other studies (Egan, Sebastian, and Welch, 1991) present cases in which courses taught through distance education methods result in lower student ratings on particular course characteristics, such as class organization. Multiple factors have been analyzed in these comparisons to determine success or failure of the distance education program, including maintenance of funding, faculty development and support, faculty satisfaction, and numerous student variables. There is no question as to whether differences occur; rather, accepting that differences exist between distance education and traditional courses, it is the goal of those individuals participating in distance education to assure that these differences reflect a positive change, rather than a negative.

Student Achievement

Three major variables are typically associated with student achievement, or success in distance education courses (Phipps and Merisotis, 1999). The foremost of these variables is student grades, from which data are normally drawn from the students' final grades in a course. A second variable associated often with student achievement is student attitudes toward the distance education course. Some questions that are often asked of students, based on this variable, are "Was the course presentation successful?" or "Do you feel that you learned useful and applicable material through this method?" and finally, "Could you have learned this material better in a traditional course?" A third variable of student achievement deals with overall student satisfaction toward the course. Generally, these questions are phrased using a Likert scale, or something similar. A question from this variable may be, "On a scale of 1 (worst) to 10 (best), rate this method of education." Unfortunately, it is often left unnoted that many students overall satisfaction, attitudes, and final grades are unobtainable due to "dropping" the course. Also, many students may fail to make any contact or may make only infrequent contact with their instructors in some forms of distance education, and therefore may be given failing grades. Data obtained from situations such as this is not valid because it may be influenced by outside variables such as students' lack of familiarity with technology or outside environmental influences, rather than students' true achievement level.

Interaction

A recent study from the National Education Association (2000) stated that as high as 96% of faculty (n=402) teaching through distance education use some form of interactive technology for one-on-one communication with students, predominantly e-mail. One of the many significant findings from this report stated that "faculty with frequent student interaction…give their distance learning courses higher ratings in meeting the goals NEA has determined are essential to quality education." Various other types of interactive technology cited include telephone, chat rooms, threaded discussion groups, or face-to-face meetings. Multiple angles of distinction exist within these interactive technologies. One important distinction is between synchronous (real-time, such as chat) and asynchronous (delayed-response, such as email and threaded discussion) communication. Another important facet of these communication strategies is whom the communication is with: this may consist of student-instructor, student-student, or student-material.

Method

An analysis of interactive communication technology usage was performed on 17 online courses (n=6 graduate; n=11 undergraduate) offered during a full college term. Courses were analyzed for usage of three major communication tools available, including e-mail, a synchronous "Virtual Chat" (VC), and an asynchronous threaded "Discussion Board" (DB). Analysis was performed by evaluation of usage data from course platform available via system administrator access to these online courses. Data was also collected from instructors of traditional courses to determine frequency and use of interactive technology.

Further, two unique courses were being offered in multiple formats simultaneously during this term. One course (c1) was being offered both as a traditional on-campus course, and also separately as an online course. The second course (c2) was being offered through three separate formats simultaneously: traditional, online, and telecourse. (The telecourse was taught via videocassettes, distributed to students during an initial class meeting). Data was collected from these courses' online component, based on the type of interactive technology used, were gathered and compiled into the original 17 courses; further, final course grades for students in these courses were obtained and analyzed for between-group differences.

Data from an online (n=200) and a telecourse (n=11) survey were also collected anonymously and used for further analysis of the results. Students submitted the online survey via the Internet, and all entries were automatically collected into a database for further analysis. Telecourse surveys were completed anonymously in hard copy, and returned by mail to the data analyst. Data was then entered into the online database for compilation and analysis. Questions of interest from the survey for this study include a comparison of the appropriate course type (either online or telecourse) with traditional for "student/instructor interaction" and for "concept acquisition". Choices for these questions were either "better than traditional courses", "about the same as traditional courses", and "worse than traditional courses". A final question, "What effect did this course have on your contact with your instructor?" was also investigated. Answer choices for this question were either "positive", "neutral—neither positive nor negative" or "negative". All surveys were given to students during a time period within the last 3 weeks of class.

Results

Interactive Technology Usage

From the 17 online courses analyzed, 7 (42%) were seen to use DB. Of those using DB, number of topics (forums) created for the course varied from 3-28. Number of student responses (postings) to each forum varied from 1-146, with the average number of postings for each forum was 41. Postings were generally student-student, rather than instructor-student. However, forums must be initially created by instructors, so preliminary questions or postings were always initiated by the instructor. Thereafter, students suffered no restrictions as to the number of postings they were allowed to make per forum. Only 4 of the online courses used VC (24%). Of those courses using VC, the courses consisted of 8, 6, 6, and 5 VC meetings total. Each VC meeting lasted approximately one hour. Of the 17, only 2 courses (12%) used *both* DB and VC to communicate. VC sessions were generally instructor-led clarification periods in which the students were allowed to request help with specific problems they were encountering in the course. All courses analyzed for this study used e-mail to communicate, and instructors report a high number of e-mail from online students. Instructor-reported usage of interactive technology in traditional classes revealed that the majority of student contact instructors by either face-to-face or telephone, and only a very small percentage use email. A minute number of instructors reported using some form of interactive technology equivalent to email or discussion boards, while none reported using interactive technology equivalent to synchronous chat.

Achievement

Between the two courses offering simultaneous methods, largely varied results were found among courses in relation to students' final course grades. Of the first course, c1, an abnormal grade distribution was found to be present. Grades fell exclusively into either an "A" category or an "F" category in the online component. This data varied slightly in the traditional c1 course, yet the majority of grades still fell into the "A" category. Course c1 used e-mail and the DB communication function frequently within the online component, and used only email as a mode of interaction in the traditional component.

COURSE: C1	A	B	C	D	F	I/DROP
Online	74%	0	0	0	26	12%
Traditional	84%	4	2	4	7	2%

■ ***Table 1: Percentage of students' final grades and drops or incompletes in "c1"***

Course c2 offered a more normal distribution among grades in comparison to c1. Students grades were highest, consecutively, in telecourse, traditional course, and online. Students in the online component had a significantly lower number of "A's" than their counterparts in either the telecourse or the traditional course. Concurrently, higher class drops or incompletes were found in the online component than in the traditional or the telecourse component. The traditional component of c2 had slightly less than ½ the number of drops or incompletes than did the online component.

COURSE: C2	A	B	C	D	F	I/DROP
Online	3%	27	30	23	17	33%
Telecourse	28%	19	56	0	19	26%
Traditional	16%	34	25	13	13	18%

■ ***Table 2: Percentage of students' final grades and drops or incompletes in "c2"***

Further data from a survey completed by online students showed that 80% of students rated the course as having either "about the same" or "better" student/instructor interaction than traditional courses. Additionally, "concept acquisition" received 90% response for "about the same" or "better" than traditional courses. One question, "What effect did this online course have on your contact with your instructor?" received 56% response "positive", 36% "neutral—neither negative nor positive", and 7% "negative". Student comments pertinent to these results include:

> *I appreciate that distance learning is up to me and that my responsibility is to keep up with the course... As always, learning is up to the student, and I did learn!*
>
> *It was more convenient and I felt that I had better, as well as easier, access to my instructor...*
>
> *I liked the class, but felt like (professor) could have interacted more with students...*
>
> *I loved this class. The teacher was wonderful, the students were great, and we all interacted more so than I have in any other class. I would gladly do this again.*

Comments 1, 2, and 4 were from students who participated in a course using DB, VC, or both. Comment 3 is from a student participating in a course using only e-mail.

Data obtained from students participating in a telecourse revealed that 72% rated their course as "about the same" or "better" than traditional courses on student/instructor interaction. The same percentage, 72%, rated concept acquisition as "about the same" or "better" than traditional courses. For the above question, "What effect did the (telecourse) have on your contact with your instructor?", 36% of students responded "positive", 18% "neutral", and 45% "negative". One student stated:

Cassette courses are extremely instructor dependent. Very good this time, but I have had bad experiences in the past due to limited instructor and video availability.

Further student comments stated that many of the students did not even watch the videotapes, but studied textbooks only. Students were clearly not engaged with one another or with the instructor at the same level as in traditional courses, or in distance education courses utilizing interactive technologies.

Discussion

Currently, instructors are trained on how to construct courses, focusing mainly on the technical aspects rather than instructional design and communication issues. This trend is beginning to change at the university used in this study, but slowly and with quite a bit of opposition from individuals who, surprisingly, are supporters of distance education. Many instructors hold fears of having control tighten over their teaching methods, and therefore do not appear to be quite so open to new methods of communication. The pattern appears to be this: once instructors try one form of interactive communication aside from email, they quickly notice student responses take on a more positive tone. From this point forward, instructors are more likely to engage in interactive technologies such as threaded discussion boards and synchronous chats. Interaction is clearly a necessity for the majority of students to succeed in distance education courses, so advances must be made to enable and encourage these instructors to take advantage of the interactive technologies present.

Interaction is often the key in many traditional college-level courses that require independent thinking. In distance education, *every* course requires independent thinking, as evidenced by student comments from the anonymous survey. It is not surprising that the NEA (2000) stated faculty rated their distance learning courses higher and more compliant with quality standards when interactive technology is used. This seems to be an essential element not only for the instructors to keep track of the student's progress in the course, but for the student to receive feedback, both from his instructor, as well as from his classmates. Discussion board interactivity could be equated to a traditional course's class discussion. Many times these class discussions serve to clarify concepts for students, or help the instructor focus on topics that students are most interested or having the most trouble with in class. Outside of this typical environment, students continue to demand this feedback and cooperative learning experience. One recent and interesting study focused specifically on the effects of immediacy of response from the instructor in an online course on student's perceived concept acquisition (Baker, 2001). The results of Baker's study found a strong positive correlation between the perceptions of instructor immediacy of response to students with affective learning ($r=.73$, $p< .01$).

Another finding of the NEA (2000) showed that a very small percentage of distance education courses that were not web-based (online) used chat rooms (15%) or threaded discussion groups (22%), while a much more substantial percentage (62% for both) of web-based courses used chat rooms and threaded discussion groups. This data appears to correlate with the findings of this study, in that the online courses are more likely than other distance education methods to use these methods of interactive technology.

It is interesting to note that four of the seventeen online courses studied in this research used DB for student-instructor and student-student communication, but did not use the VC function. These classes left the VC function enabled, meaning the students were able to browse or "drop in" to the VC room, even though there was no session underway. An archival function present in the course platform for these online courses records each instance of a student entering the chat room, including any comments the students may make. It appears to be significant that courses with students using the DB but not VC function *always* had students drop-in to the VC rooms, and many times students would leave comments such as "hello, anyone here?" Though these students did not understand how to use the VC rooms, they were clearly open to or curious about these chat rooms. This is perhaps a case where the use of one interactive technology, the discussion board, launched them into looking for other methods of communication, similar to the pattern in which instructors jump from using only one interactive technology to many. Students appeared to go in search of other methods of interaction when they were participating in the DB, whereas those students not participating in DB had virtually no drop-ins into the VC area. Hence, is could be assumed that these students not exposed to a form of interactive communication other than e-mail were less likely to search for other ways to communicate with fellow students and with their instructor. This yields the idea that areas of interactive communication, such as with the VC and DB, should be open or enabled to the students without instructor-mediated conversation, perhaps as a student-student study session.

Also of interest are the grades in the c2 course, in which both the online and traditional components have approximately normal grade distributions. However, no form of interactive technology other than e-mail was used in this course. Students gave lower overall course ratings on c2 than on c1, but appeared to receive grades on a more "normal" scale than in course c1. It is possible that intervening variables such as teaching style, student familiarity with technology used, and many more could have produced these peculiar results. The grades of the c1 course show a bimodal distribution, with the majority (74%) of students receiving an "A" in the course. This leaves an astounding percentage (26%) of students to receive an "F' in the course. Comparing this "F" grade distribution in c1 to that of the traditional component of this course in which only 7% of students received an "F" grade, a major distinction is observed. Again, intervening variables could be at play, and these results must be taken cautiously. However, the results do indicate that several major between-course, and instructor-dependent factors may be influencing student success and satisfaction in distance education courses.

Conclusions

Student outcomes in distance education courses are the primary concern of most of the advocates and opponents of these non-traditional courses. Faculty, administration, students, and many others hold concern for equitable learning in distance education courses. It is essential to determine what the crucial elements are that must be present for students to obtain an excellent education. The move is underway to go from a number-focused to a more success-focused orientation in most higher education institutions, and soon, the rest will follow. The issues of interaction and student success will clearly continue to be on the forefront of this discovery.

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Exploring the Effectiveness of Two Models of Technology Integration in a Pre-Service Teacher Education Program

Debra Sprague
Instructional Technology
George Mason University
Fairfax, VA, USA
dspragu1@gmu.edu

C. Stephen White
Elementary Education
George Mason University
Fairfax, VA, USA
cwhite1@gmu.edu

Abstract

This research study examined whether or not integrating technology throughout a sequence of teacher preparation courses was an effective model for ensuring that pre-service teachers graduate with the knowledge and skills needed to integrate technology in their own teaching. The central question addressed in this investigation was: Is there a significant difference between the level of concerns related to technology integration for preservice interns who enrolled in an introduction to technology course and preservice interns who were exposed to technology integrated throughout all of their teacher preparation courses? The results of this study show that preservice teachers still resist the use of technology as a learning tool even after models of technology use are integrated across all of their teacher education courses. However, the results also demonstrate a shift from the preservice teachers focusing on concerns about how technology will impact their role as teachers to concerns about technology's impact on their students' learning.

Theoretical Framework

The inclusion of technology into elementary teacher preparation programs has become a necessary and important component in most, if not all, teacher education programs. Traditionally, schools of education have prepared their teacher educators to integrate technology through the use of a single technology course focused on skill development with some discussion about teaching with technology. (Topp, 1996). However, it is unreasonable to expect that novice teachers will have the skills and knowledge necessary to effectively integrate technology in their own classrooms after taking only one course (Jensen, 1992).

For the past ten years the integration of technology into teaching methods courses has been suggested as an effective model for helping teacher education candidates develop a vision of the role of computers in an integrated curriculum (Brownell & Brownell, 1991; Willis, 1997). According to Carroll (2000), it is important for teacher education faculty to model technology proficient instruction in courses where pre-service teachers are acquiring the subject matter expertise they will use in the classroom. With this model in mind, colleges of education are working to develop the technology skills and knowledge of their faculty (Thompson, Hansen, & Reinhart, 1996; Sprague, Kopfman, & de Levante Dorsey, 1998; O' Bannon, Matthew, & Thomas, 1998; Sprague & White, 2001). Despite these efforts, little research has been done to show that integrating technology into all teacher preparation courses is any more effective than the traditional technology course.

Teacher Preparation Program

During the 1998-99 academic year, a state-supported institution located in a highly diverse urban/suburban region near Washington, DC, redesigned its teacher preparation programs in response to changes in state licensure requirements. The redesign involved changing from early childhood (PK-grade3) and middle (grades 4-8) education licensure programs to an elementary (PK-6) licensure program. In the original early childhood and middle education programs the course, "Introduction to Educational Technology" was the only course in the programs that focused on technology and was taken at the beginning of the sequence of teaching methods courses. During the development of the elementary program, the program faculty decided to eliminate the Introduction to Educational Technology course and integrate technology throughout all courses.

Students admitted in the 1999-2000 Cohort were the last to go through the early childhood program. These students were required to take the Introduction to Educational Technology course that focused on providing students with technology skills and models for integrating technology in the PreK-3 classroom. However, students entered the course with different levels of technology skills. Those who were proficient with technology often indicated that the course moved too slowly while those who were less experienced with technology felt that the course moved too fast. In addition, for many of the students this was their only experience with technology throughout the program. Therefore, it was necessary to focus on teaching with the technology to encourage these students to use technology for more than drill-and-practice activities.

During the elementary program development effort the faculty expressed the belief that technology should be infused into the program and were committed to modeling the effective use of technology to support teaching and learning. Consequently, a portion of the content from the original Introduction to Educational Technology course was placed in two specific courses, an Introduction to Elementary Curriculum, the first course in the program sequence, and an Integrating Technology into Elementary Curriculum, the last course in the program sequence. Program faculty agreed to integrate technology into content area methods courses that were sequenced between the first and last courses. A faculty member who had expertise in integrating technology in K-12 curriculum (and had been responsible for the technology course that was eliminated) worked to ensure that technology skills needed to complete assignments across all of the teaching methods courses was provided in the first course. In the final course, Integrating Technology into Elementary Curriculum, students were exposed to theoretical frameworks such as, constructivism, integrated curriculum and cooperative learning for integrating technology into a variety of content areas. Students enrolled in 15 credit hours of method courses between these two courses. In these courses, students were exposed to technology appropriate for the specific content area. Students admitted in the 2000-2001 Cohort were the first students to enroll in the new Elementary Education Program.

Instrumentation

During the first week of classes, students in each Cohort were administered the Stages of Concern Questionnaire (SoCQ) (Hall, George, and Rutherford, 1998). This instrument consists of 35 statements related to perceptions about an innovation. The statements were modified to use "technology" instead of "innovation." Students were then administered the same instrument at the end of their program of study.

The SoCQ is based on a seven stage developmental model: (0) Awareness, (1) Informational, (2) Personal, (3) Management, (4) Consequence, (5) Collaboration, and (6) Refocusing. Respondents rate the degree to which each item reflects their feelings using an 8-point Likert scale that ranges from "Irrelevant" or "Not true of me now" (0) to "Very true of me now" (7). According to the model, as individuals move from unawareness or nonuse of technology into beginning or highly sophisticated use, their concerns shift from being most intense at Stages 0, 1, and 2 to most intense at Stages 3, and ultimately to most intense at Stages 4, 5, and 6.

To score the questionnaire, the statements were collapsed into the seven categories. The responses were converted to percentile scores. Each individual's highest percentile score was circled. If the highest score appeared twice, it was circled twice. The mean percentile scores for each of the seven stages were computed for each group's pre and post questionnaire. The results were graphed in order to obtain a profile for each group (Hall, George, Rutherford, 1998).

Results

Forty-two students were enrolled in the 1999 Cohort. Forty students completed the pre-questionnaire and post-questionnaire. The average age of this group was 35 years and there was one male student. In the 2000 Cohort, 48 students completed the pre-questionnaire and 37 students completed the post-questionnaire. The average age of this group was 30 years and there were three male students.

The highest stage of concern on the SoCQ pre-questionnaire for both the 1999 and 2000 Cohorts was Stage 1, Informational. A high score (Very true of me now) on such statements as "I have very limited knowledge about technology" and "I would like to know what the use of technology will require in the immediate future" reflected concerns at the Informational Level. (See Figures 1 and 2 for graphs of the results.) For both groups, the second highest level of concern was Stage 2, Personal. A high score on such statements as "I would like to have more information on time and energy commitments required by technology" and "I would like to know how my role will change when I am using technology" reflects concerns at the Personal Level. Responses on all other stages of concern were low. This profile is typical of a nonuser of technology.

On the post-questionnaire for the both the 1999 and 2000 Cohorts Stage 2, Personal was equal to Stage 1, Informational. The overall profiles still resembled that of non-users. In this instance, personal concerns (Stage 2) appear to override concerns about learning more about technology (Stage 1). That is, these groups are more concerned about their position and well-being than they are about learning more of a substantive nature about technology (Hall, George, Rutherford, 1998).

The highest stage of concern on the SoCQ post-questionnaire for the 2000 Cohort was Stage 6, Renewal. A high score (Very true of me now) on such statements as "I would like to revise my use of technology" and "I would like to modify our use of technology based on the experiences of our students" reflects concerns at the Renewal Level. When this occurs one can infer that the group has other ideas that they see as having more merit than the use of technology. Any high scores in Stage 6 in a non-user profile should be interpreted as a potential warning that there may be resistance to the use of technology (Hall, George, Rutherford, 1998).

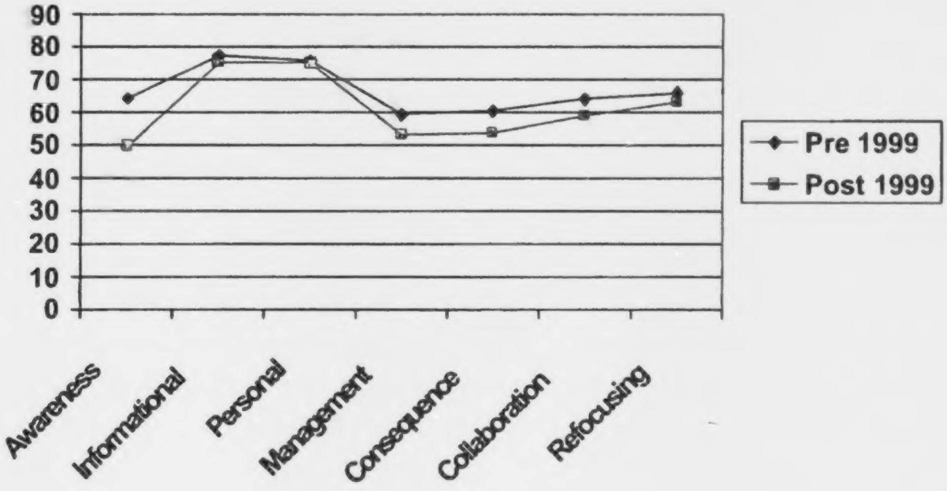

Figure 1: Pre and Post Scores on the SoCQ for the 1999 Cohort

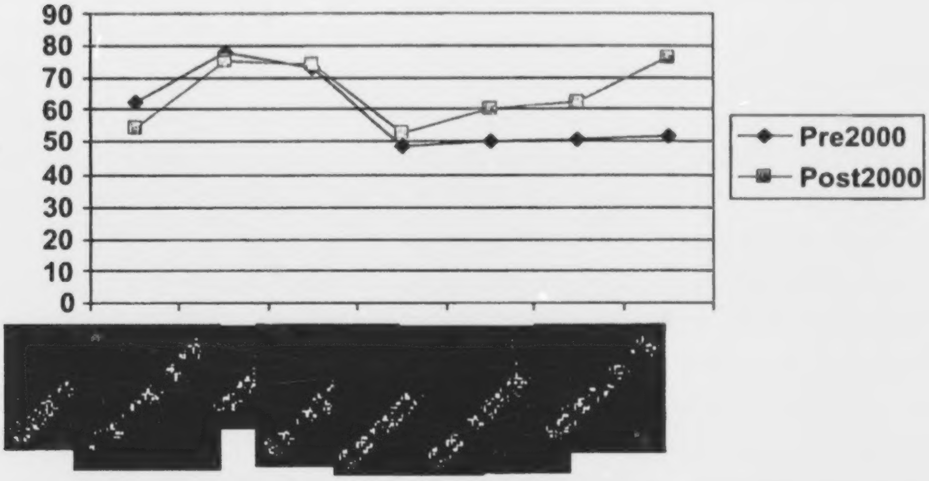

Figure 2: Pre and Post Scores on the SoCQ for the 2000 Cohort

Discussion

Although both posttest profiles are those of a non-user there are some interesting trends accruing in the 2000 Cohort, the group that experienced technology integrated across all of the courses. There is a rise in level of concern in the areas of Consequence and Collaboration. A high score (Very true of me now) on such statements as "I am concerned about how technology affects students" and "I am concerned about evaluating technology's impact on students" reflect concerns at the Consequence Level. The Collaboration Level contains such statements as "I would like to help other faculty in their use of technology" and "I would like to know what other faculty are doing with technology." High scores in these two areas show a shift from the preservice teachers focusing on concerns about how technology will impact their role as teachers to concerns about technology's impact on their students' learning. They are also showing a willingness to work with colleagues to improve the potential of technology. Such a trend demonstrates that these preservice teachers are beginning to make the shift from technology as a productivity tool to technology as a learning tool. They are starting to see the potential of technology to enhance the learning process. However, more time and opportunity to practice what they are taught in their education courses is needed to enable them to overcome their initial resistance to technology.

Research has shown that shifts from Awareness and Informational concerns to Consequence and Collaboration concerns can occur among inservice teachers who study the potential of technology in a four semester graduate level cohort program (Norton and Sprague, 1996). Inservice teachers have the opportunity to practice and experiment with the activities and models taught in their teacher education courses. They are able to understand which models are effective and which need modification. They see the value of constructivism and student-centered activities because they have the opportunity to try them in their classrooms. For preservice teachers to also have the chance to test these models, teacher education programs must work closely with K-12 schools to ensure preservice teachers have the opportunity to teach with technology in their field experiences (White and Sprague, 2002). Such opportunities could help preservice teachers move past their initial resistance to technology and accept it as a learning tool designed to enhance the learning experience.

Conclusion

On the surface, the results of this study seem to challenge the belief that the integration of technology into teaching methods courses is any more of an effective model for promoting the role of computers in an integrated curriculum than the traditional technology course. However, a closer examination of the data does reveal that preservice teachers who experience technology integrated across all courses do begin to make the shift from concerns

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focusing on how technology will impact their role as teachers to concerns about technology's impact on their students' learning. Opportunities to practice the models presented in their teacher education courses could enable them to overcome their resistance and embrace technology and its potential to enhance the learning experience. Therefore, teacher education programs must work closely with K-12 schools to ensure preservice teachers have the opportunity to teach with technology during their field experiences.

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The Use of Qualitative Methods in Program Evaluation: Elephants can be Elegant

Judy Stahlman, Cleveland State University, US
Kathleen Benghiat, Cleveland State University, US
Stacy Zitek, Cleveland State University, US

Guba in 1978 described the benefits of moving away from the use of quantitative methodology in the field of program evaluation, and replacing this approach with qualitative methods to greatly enhance the information shared with decision-makers. Since that time, many professionals in the field have embraced the use of qualitative methods, however, because these designs personalize the data collection process for the respondents, they present both unique benefits and challenges.

The purpose of this paper session is to present information on the qualitative methods being used to evaluate the Modeling Instruction with Modern Information and Communication technologies Project (MIMIC) that is funded through the federal PT3 grant program and housed in the College of Education at Cleveland State University. The goal of MIMIC is to increase the integration of technology into pre-service teacher preparation courses, thus ultimately enhancing the use of technology by future teachers. Current K-12 teachers, proficient in the use of technology in the classroom, serve as mentors to university faculty and support them in learning new ways to use hardware and software as educational tools. Although there was a need to monitor this project's activities through quantitative methods, each of the MIMIC mentor/mentee teams had an interesting story to tell about their experiences that could only be captured using a qualitative approach.

MIMIC's qualitative data collection system will be described, consisting primarily of monthly logs and personal reflective journals. Presenters will provide an overview of the procedures followed to implement the system and discuss modifications that were made based on insights gained during the first full year of implementation. The benefits of qualitative data collection will be examined as well as the challenges faced in using this type of methodology for program evaluation.

Throughout the presentation and paper, benefits of qualitative data collection will be highlighted through the sharing and description of samples of the rich descriptive data from the MIMIC Project. These samples show the struggles and triumphs of faculty members and their classroom teacher mentors as they search out the most effective educational technologies to teach specific content and then work to integrate those technologies into teacher education courses. As noted, however, benefits did not come without challenges as the MIMIC evaluation team attempted to manage the timely flow of data from a diverse, creative, busy group of individuals. The authors will share how these challenges were met in ways that ultimately enhanced and supported the data collection process, and provided timely formative feedback to the MIMIC staff. Those attending the session will have an opportunity to read "the story of MIMIC" in a handout that shows how qualitative data can indeed provide unique insight into how technology project goals are being met.

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Children's Use of the Internet at Home

Yu-mei Wang, University of Guam, US

Perspective

How do school children use the Internet at home? The answer to this question is critical since an increasing number of young children are accessing the Internet on a daily basis. Growing up with the Internet, children nowadays constitute a constant presence in cyberspace. Statistical data show that young children who are on-line are more likely to log on at home than at school. In the year 2000, it was estimated that more than 55 million households owned personal computers. Almost 20 percent of all digital media users were children.

The Internet provides rich information resources and has the potential for transforming children's learning. While the Internet opens new horizons for learning, it, at the same, poses extraordinary challenges to Internet users, especially to young users. The information on the Internet is unfiltered. The absence of information filters, such as editors and peer reviewers, shifts responsibilities of evaluating information to Internet users. In addition, the information on the Internet appears in multimedia formats including graphics, sound, animation, video clips as well as text, which further complicates the user's process of judging the authenticity and credibility of that information.

Presently, there is little research about how children interact with Internet resources. Although the Internet can be a wonderland for children's learning, it can be a messy, confusing, and dangerous ground. It is imperative that we have a better understanding about how young children use the Internet so as to develop effective strategies to guide their exploration in cyberspace. "Without sound research, there is a tendency to react to the headlines and hype of the moment - and that tack may not result in wise school policymaking and parental oversight."

The Study

This study is designed to investigate how sixth graders in a school of the United States used the Internet resources at home; their perceptions about Internet resources and related issues such as parental supervision and guidance they received for their Internet uses; the search strategies they used, and the teachers' role regarding children's Internet use.

Research Instrument

A survey questionnaire was developed and reviewed by a panel of experienced school teachers and experts in the field. The survey questionnaire was then revised based on the panel's comments and suggestions.

Data Collection

The sample population consisted of all the sixth graders in a school in the United States. The survey was administered in late September 2001. All the sixth graders in the school participated in the survey. Altogether 404 surveys were collected, among which, 171 children indicated that they were Internet users and accessed the Internet at home.

Data Analysis

Data was analyzed by using SPSS (Statistics Package for Social Science). The descriptive method was used for preliminary data analysis. Descriptive research is often used to report the characteristics of the studied sample at one point in time. As Gall and Borg (1996) pointed out: "Descriptive studies in education, while simple in design and execution, can yield important knowledge" (p. 376). Frequencies were calculated to generate baseline data on how school children interacted with the Internet resources.

Results

Gender was balanced among the Internet users in the survey with 85 (50%) male children and 86 (50%) female children. Frequency distribution showed that the highest Internet use was to play games (56%), followed by accessing information for school work (47%); downloading materials unrelated to school work (32%); engaging in other activities such as reading for entertainment and doing shopping (29%). Children reported that they accessed the websites recommended by their family members such as bother, sister and cousin (45%); friends (44%); parents (43%) and teachers (19%).

Children turned to the Web for resources because it was fun to search for information on the Web (73%). Their major information search strategy was to use search engines by typing in keywords (68%). Approximately 56% of children perceived that the information on the Web is most likely accurate while 16% of the children disagreed and 28% of the children were undecided. These children would use a piece of information if the web page looked attractive (64%). While 40% of the children indicated that inappropriate materials (naked pictures, information on how to make bombs, etc.) made them feel curious, 52% of the children noted that inappropriate materials on the Web bothered them.

While 60% of the children believed that their parents had adequate knowledge to advise them in the use of the Internet, only 22% of the children reported that their parents frequently supervised their Internet use. About 33% of the children noted that their parents discussed with them their concerns related to using the Internet. Children had low confidence in their teachers' knowledge to guide them in the use of the Internet (35%). Only 11% children reported that their teachers discussed their concerns with them related to Internet use. Approximately 80% of the children agreed that the Internet provides important resources for learning and should be integrated into the curriculum.

Implication of the Study

This study generated useful information and provided insights on how young children interact with Internet resources. Although the highest use of the Internet was to play games, there was a positive indication that quite a number of these young children were taking advantage of the wonderful resources on the Internet for their school work. These children supported the integration of the Internet into the curriculum and understood that the Internet can play a great role in developing their intellectual skills. This positive trend needs to be supported and encouraged. Teachers and parents can recommend children educational and age-appropriate resources to maximize the children's learning opportunities on the Internet.

Although these children's understanding of the importance of Internet resources to their education indicates a level of sophistication for their age, they were naive in their judgment of the quality of Internet resources. A large number of these children perceived that the information on the Web was most likely accurate. These children indicated that they would accept a piece of information if the website looked attractive, thus confusing visually appealing web pages with the quality of the content. It is a great challenge for schools and parents to educate young Internet users to become critical readers and to acquire skills on how to evaluate Internet resources.

The most troubling finding of this study was the low parental and teacher involvement in supervising and guiding the children's Internet use. Although the majority of children trusted that their parents had adequate knowledge to provide guidance, most parents never or rarely supervised their on-line children. Parents have a major role to play in protecting their children from the potential exposure to inappropriate materials on the Internet. Inappropriate materials on the Internet can be harmful for young children. Parents can surf together with their children, model the appropriate use of the Internet, discuss with their children the responsible use of the Internet, or consider installing filtering programs to help sift through information.

Schools need to share its role in guiding children's Internet use. This study found that teachers played a disappointingly limited role in this regard in the eyes of children. It might be that teachers themselves did not have adequate knowledge about the Internet. Schools should offer workshops to teachers to train them to become effective Internet users. In addition, schools should organize workshops for parents to help them develop strategies to guide their children's use of the Internet. More importantly, schools need to educate children to become their own guardians in the use of the Internet.

Technology Resistance and Barriers: "Baby Steps" to Online Courses

Tony R. Young
Department of Psychology
Louisiana Tech University
United States
tyoung@latech.edu

Lamar V. Wilkinson
Department of Psychology
Louisiana Tech University
United States
lamar@latech.edu

Walter C. Buboltz
Department of Psychology
Louisiana Tech University
United States
buboltz@latech.edu

Abstract: A simple, step-by-step approach to overcoming barriers to online course development and technology use in education is outlined. The "Baby Steps" approach is effective dealing with several of the barriers to technology use.

Introduction

Administrators in university educational settings must face and deal with faculty resistance to information technology usage in the teaching profession. Faculty reasons or explanations for resistance toward technology usage in classroom teaching or online course development are considered valid issues or criticisms: much time is required upgrading classes with technology, technology equipment is not always available or reliable; some course content is not always suited for newer technologies, etc. However, many of the reasons for not using informational technologies have their root in emotional and/or psychological habits. This paper will address some of the barriers that prevent faculty from incorporating technology into the classroom. By making use the structure of Blackboard, an online course management software system, a systemic approach to dealing with individuals will learn how to use technology in the classroom and online course development.

Many people have difficulties using new technologies. For some the stress of using new technologies and computers, specifically, has caused apprehension and fear. This fear of technology has been termed, "technophobia". In investigations of technophobia, Weil and Rosen (1987) found three techno-types: (1) Eager Adopters, (2) Hesitant "Prove its" and (3) Resisters. This article will focus on the resisters/technophobics. Resisters/technophobics avoid technology, want nothing to do with it, and may fear any machine or gadget they touch. As a result of this behavior, they feel embarrassed, intimidated, or shamed due to their lack of knowledge. The natural and expected reaction to fear is to avoid the feared stimulus, in this case technology, and avoidance will reduce fear in the immediate time frame but increase the fear in the long run. The more they resist and avoid technology, the more fearful and anxious they become towards technology. This avoidance method becomes a vicious technology-fear cycle. The fear of technology or technophobia is one barrier that leads to resistance toward using technology in the classroom.

Another factor that leads to resistance to technological use is the human tendency to view the unknown as "of one piece." We have termed this tendency "monolithia", an etymological fraternal twin of "monolithic," which means, "consisting of a single stone." The English language gets this word through French and Latin from Greek. The dictionary definition of "monolithic" that best fits the usage for this paper is "constitutes a massive undifferentiated and often rigid whole." Many times university faculty have a tendency to view online courses and educational technology as monolithic. Faculty perceive technology and its use as a single, insurmountable task rather than a step by step, or piece by piece, learning process. Fear is heightened, and resistance to technology is accentuated.

Faculty members being required to use technology in the classroom and seeing technology as monolithic may exhibit procrastination as well as technophobia. Procrastination or task avoidance involves putting some task off until later. Procrastination is usually interwoven with the need to be perfect, also known as perfectionism, which further prohibits the learning and use of technology. Individuals put tasks off until such time that they can do them perfectly. The psychological dynamic in operation is often anxiety or fear. For example, if the task is completed, they may be evaluated on the task. The individual will be forced to realistically find out how well they did in the task. This process is difficult for some people to handle. So we may avoid tasks outright or strive to be so perfect that it is put off or worked on until in our minds it is perfect. Naturally, this often results in the task never being completed. Fritz Perls (1992) termed this anxiety "stage fright." An actor does not know after performing whether the audience's response will lead to applause or rotten tomatoes being thrown at the actor.

Technophobia, monolithia, and procrastination are all related to habits of mind and emotion. Monolithia is a thinking problem, whereas technophobia and procrastination involve the emotion of fear. The fourth and fifth barriers to using technology in the classroom are low motivation and reactance. Psychological reactance is defined as the tendency to oppose any action or suggestion on the part of another that would restrict our behavioral freedom. Or put more colloquially, "no one likes being told what to do." Humans exhibit varying levels of reactance. Low motivation and reactance are less related to emotion and more related to individual behavioral patterns. When dealing with faculty exhibiting low motivation and reactance to technology it may be more difficult to change these behavioral patterns. Low motivation is evident when an individual does not have enough mental or physical energy and/or drive to complete a task. In the case of an individual who has both mental and physical energy and/or drive to complete a task and does not do so, this is commonly referred to as "laziness". Reactance tendency is very common among individuals; however some individuals exhibit a stronger reactance tendency than others. An important realization about these five barriers is that very rarely do they occur in isolation; usually some combination of the barriers occurs.

Understanding basic psychological principles can help faculty overcome the barriers that may be preventing them from using technology in the classroom. Joseph Wolpe (1958) postulated that anxiety or fear could not be present in a person at the same time as relaxation and serenity. Fear is the autonomic nervous system arousal that is a preparation for fighting or fleeing – the "fight or flight" response. This notion that fear and relaxation cannot occur simultaneously Wolpe termed "reciprocal inhibition". In effect, fear inhibits relaxation and vice versa. This is hardly a surprise. But out of this idea he developed a clinical technique for reducing fear, which he called "systematic desensitization". The individual, whose fears brought them for help, constructs a "fear hierarchy", with the help of therapist, which consists of images or stimuli that are graded in terms of the fear they evoke. Generally, the hierarchy consists of items that gradually lead to, and are in some sense related to, the most feared of the items down to least feared item. The individual is asked to imagine the least fearful of the hierarchy until they feel fear, then begin a relaxation exercise until the fear is gone. By the process of working up the fear hierarchy the individual finds that they can relax even while thinking of the most feared of the hierarchical items. A later development related to systematic desensitization is "*in vivo* desensitization," in which a person learns to relax in the presence of the fear producing stimuli rather than using images of feared stimuli. Through these techniques fear of technology can be reduced, and individuals can start to learn to use technology without the experience of fear.

In addition, a technique similar to systematic desensitization can be very effective helping people better manage their time. Alan Lakein (1989), the well-known time management specialist, writes that people can use the "Swiss cheese" technique when working on a task. This approach involves working on small pieces of a task or project (baby steps) until the whole is completed.

To help individuals resolve the barriers that prevent them from mastering and using technology in the classroom and/or putting classes online, we have devised an approach we term "Baby Steps", which is a step-by-step method using Blackboard. Blackboard is an online course management system that is widely used and available commercially. We could just as well use WebCT or another software package. Blackboard is the system in use on our campus. The step-by-step hierarchy found below includes putting course syllabi online, links to websites relevant to the course, e-mail usage for class members, build tests online, online grade book, using the discussion board, and using the virtual classroom. The hierarchy of tasks moves from the simple and quick to the more complicated and time consuming. Blackboard's software application is a simple but potentially very powerful method for teaching and desensitizing faculty to technology use. In addition, Blackboard illustrates many other technological learning tools for working in different areas of computer technology. This learning experience can result in reducing or resolving barriers concerning computer technology.

The step-by-step approach addresses each of the barriers that we have identified as important in educational settings. It can reduce anxiety regarding technology use, help people get past seeing technology use as monolithic, reduce resistance in poorly motivated or reactant individuals, and reduce procrastination because so little is asked at any point.

Hierarchy

First the faculty member must logon to Blackboard then click on "control panel." The tasks in each step below are accessed from this page.

1. Put the course syllabus online.

This step requires only 3 clicks and the completion of 5 fields if the syllabus is on a disc. There *is* a browse action required, but this is relatively painless.

2. Add links to interesting websites related to course content.

This step is slightly more time consuming than Step One. It requires that a faculty member know of interesting and pertinent sites and that the URL of that site be typed or copied into a field on a Blackboard form.

3. Email the class members using the email function.

Maybe this one ought to be Number 2, it is so simple. The faculty member clicks on the link, *Send E-mail*, on the Control Panel then types the mail message. Then clicks *Send* and *OK*. This feature of Blackboard is very handy for informing students about a change in class schedule and is one of the most immediately rewarding features of the software package.

4. Post assignments.

This task is virtually identical to putting the syllabus up.

5. Customize the course page's buttons.

This is definitely not for beginners. Various colors and patterns are chosen to heighten the attractiveness of each course's site.

6. Put up the course calendar.

This perhaps requires more work than any step but building tests, but students having a clear understanding of what is required and when it is required reward the effort.

7. Build tests online.

This is getting to the tricky and only bright faculty should attempt this task without supervision. The up side is that tests given online are auto-graded and recorded in the gradebook.

8. Use the online gradebook.

This task would by necessity be completed after an assessment was built and given, and it requires a lot of work, but that work is rewarded by relieving the faculty member of the laborious task of entering grades by hand (and averaging them by hand).

9. Use the discussion board.

This feature is used to have an online discussion, not in real-time

10. Use the virtual classroom.

This is the tough part. This feature is basically a chat room in which the faculty leads a discussion. The Room also has a whiteboard of sorts on which students and faculty can draw. 95% of traditional students today know how to do this. And faculty probably can learn.

Procedure

Faculty members complete the first few steps at faculty meetings held in a computer lab. There they can receive the help they may need from more adept colleagues. People tend to be less afraid in a group, as well. Each step is rewarded with praise and thanks. The praise and thanks, consequences of putting items online, serve as reward for the behaviors of the faculty. The positive natural consequences of using the technology take effect nearly immediately by reduced work load on faculty and improved coordination of educational activities.

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SECTION EDITOR:
Linda Easley Roach, Northwestern State University of Louisiana

The Science Section of SITE 2002 offers a variety of presentations in several formats including full papers, short papers, an interactive session, a workshop, a demonstration, and video presentation.

Among full papers presented, hear results from Tiffany Koszalka's study investigating the relationships among the use of different types of resources during instructional experiences in middle school science and career interests. Tom Frizzell will provide in formation about using the scanning electron microscope to augment content and pedagogy preparation of preservice teachers. Umesh Thakkar also utilizes scientific instrumentation technology to facilitate learning. Hear how teachers and teacher educators are integrating Bugscope into their lessons. Another paper, describing a collaboration among university faculty, local teachers, and students, describes the Riverlink project and its use of data collection and analysis to facilitate science learning.

Short papers include a description of a course, "Our Physical World: Science for Elementary Teachers" by Charles Hartshorne from the University of Florida, and how is uses technology-enhanced learning environments to support science instruction to elementary teachers. Also hear Marietta Langlois descript a program through which inservice teachers can get professional development that combines mathematics and science content with inquiry based pedagogy.

Come to an interactive session to see how Bill Macintyre uses *Starry Night*, a computer planetarium program. He will demonstrate how 2 or 3 students can work co-operatively on a single computer to achieve mastery of the spatial aspects of astronomy.

In Lisa Bienvenue's workshop, you will learn to use several freely available web-based science and mathematics visualization and modeling tools to help you teach Biology, Earth Science, Mathematics, Chemistry, and Environmental Science.

From Patricia Donohue's session, you will take home our easy step-by-step guide called Natureshift Exploration Model. You will learn how to apply the NS Exploration Model to your classroom, to build learning experiences that will help your students pick an individual path to their own learning.

See A Gathering of BUGS- Bringing Up Girls in Science. Mark Mortensen will present a videotape showing how his 4th and 5th grade girls learn science in an after-school program at the University of North Texas.

Linda Easley Roach teaches science methods to senior preservice teachers at Northwestern State University in Louisiana. She is also the University Contact Person for all Alternate Paths to Certification for NSU.

Incorporating Technology in Early Childhood Science Activities

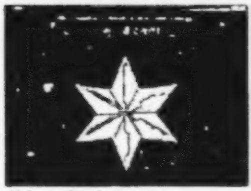
Michael Joseph Bell, West Chester University, US

Science activities for young children should focus on the world around them. Life and earth science, properties of objects, physical science and biological science should be highlighted, for young children to understand scientific concepts in terms of their daily lives. Incorporating technology in early childhood science requires teachers to (1) integrate technology through methods that comp liment science curricula and uphold the principles of developmental and authentic early education, (2) use materials and equipment that augment and support young children's perceptions of their world for the purposes of gaining accurate information, and (3) support child-centered methods of organizing information and understandings.

This paper will focus on inquiry-based methods of incorporating technology into early childhood science activities. Considerations for developmentally appropriate and authentic science experiences for young children will be discussed, as well as the effective use of technology to broaden each child's skill development in gathering and organizing information about their world. Early childhood educators should view their role in science activities from the perspectives of facilitator with the goal of expanding young children's skill development through child-centered science activities that promote autonomy, independent decision-making, and scientific curiosity.

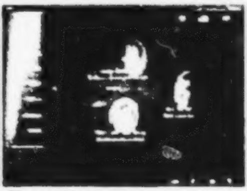
Color & Light: Design and Evaluation of a multimedia-case for elementary Teacher-Education

Peter Blijleven
Ellen van den Berg
University of Twente / Faculty of Educational Science and Technology / Department of Curriculum
p.j.blijleven@edte.utwente.nl

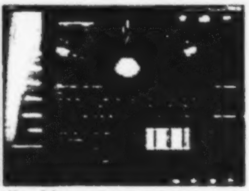


1) introduction-page

2) video-page



3) comments-page



4) subject matter-page

Introduction

This paper presents the design and evaluation of the MUST multimedia-case 'Color & Light'. This case has been developed within the framework of the MUST-project (MUltimedia in Science & Technology). The MUST-project is a joint venture on behalf of three Teacher Education Colleges, the National Institute for Curriculum Development and the University of Twente in the Netherlands. The MUST-team aims at developing and researching multimedia-cases and support tools for the professional development of preservice-teachers in Dutch elementary science education (Van den Berg, Jansen, & Blijleven, 2000).

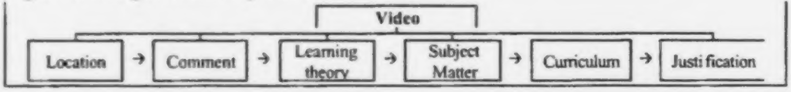
Cases, Case-based Instruction and Multimedia-cases

A case is a realistic description of subsequent activities carried out by professionals. Multimedia applications add the power of computer technology to approaches of case-based instruction, because multimedia can stimulate more than one sense at a time and in doing so, may get and hold more attention (Jonassen & Reeves, 1996, p. 703).

Design of the MUST Multimedia-case 'Color & Light'

'Color & Light' is developed on the basis of an 'evolutionary prototyping' approach. This approach combines input from theory and practice through the cyclic process of analysis, design, development and formative evaluation of prototypes (Smith, 1991). The structure (see Figure 1) of the first MUST-case 'Liquids in Testtubes' is used as a framework for the development of each MUST-case. The subsequent components of each case were designed on the basis of curriculum deliberate processes in the MUST-team. Formative evaluations are an integral of the MUST design approach (developmemtal research: Van den Akker, 1999).

Figure 1: Design structure of a MUST-multimedia-case



The interface of 'Color and Light'

The interface-structure of every MUST-case is the same. Each page can be divided into two main parts, namely: (1) the *navigation-part*, which contains buttons (hyperlinks) for the navigation through the case and (2) the *main-part*, wherein the information to be studied is presented. The navigation part has also another function. Its color and background-illustration 'tells' the user what the subject matter of the involved multimedia-case is about. The navigation-part of 'Color & Light' consists of a colorful bar with an image of a rainbow, representing the topics 'color' and 'light'. Next, the different components of a MUST are presented.

Video

The core-component of a MUST-case consists of non-scripted edited videos of an elementary science lessons, representing both a realistic and relevant context for preservice-teachers. The clips are edited in a way, that provides the opportunity to analyze the presented lesson(s) critically (cf. Merseth, 1996). The video-page of 'Color & Light' consists of three videos. In the first video this series of lessons is introduced by means of an narrative about two children buying new clothes and a class discussion about this narrative. This lesson is an

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example of how a teacher can activate pupils' concepts (about 'color' and 'light'). The second and third lesson are hands-on experiments with different colors of paint and felt-tipped pens. Aim of these two lessons is to give pupils the opportunity to check and if necessary adjust their concepts about 'color' and 'light' phenomena.

Location

The location-page of a MUST -case gives the student background information about the school, the class and the video-teacher. Aim of this component is to give students the opportunity to interpret and judge the teacher's actions and to compare the 'video-school' with their own student-teaching schools. The class-section consists of background information about the pupils. This section starts with a clickable photo of the class. By clicking on one of the pupils, the user gets detailed information about the selected pupil (e.g. who is this pupil, what does this pupil think of: the school, the series of 'color' and 'light' lessons and science in general). The class-section contains also scans of the assignments, pupils carried out during the hands-on experiments. Preservice-teachers can view these assignments to check what the pupils learned from the series of lessons.

Comments

This component includes comments on the video-lessons by the video-teacher, experts and preservice-teachers. Aim of these comments is to let students experience that certain lessons, in this case a lesson about 'Color & Light, can be considered from different perspectives. These different perspectives add, according to Shulman (1992 p.12), complexity and richness to a case that gloss rather than simplify or trivialize a case.

Subject matter

The subject matter-page is meant for preservice-teachers, who are uncertain about their own subject matter knowledge. This page offer preservice-teachers the possibility to refresh or increase their subject matter knowledge. In the 'Color & Light' production, the subject matter is presented by means of small animations and simulations of 'mixing colors', 'refraction of light' and the working of a prism. A major advantage of using animations and simulations is that they let students experience 'color' and 'light' phenomena in an active way.

Other Hyperlinks

On the curriculum-page, the user can find information about how the case is related to the content areas for elementary science and to the national standards in the Netherlands. The 'learning theoretical background' page consists of information about different ways to open pupil's concepts about 'color' and 'light'. Aim of this component is to make students aware, that there are more ways to open pupil's concepts, than the method presented in the video-lessons. A brief justification of the rationale and the decisions made during the design and development of the multimedia-case are presented on the justification-page of the cd-rom (For a more elaborate description of the design of a MUST multimedia-case, see Van den Berg & Visscher-Voerman, 2000).

Formative evaluations of the MUST Multimedia-case 'Color & Light'

In the forthcoming months, several formative evaluations will be conducted. First, the "technical usability" is investigated by means of expert appraisal and a test with preservice-teachers. More important, are two try-outs in which the effectiveness of the case is subject of study. The first try-out is focused on the actual learning processes of preservice teachers working with the case. The second try-out aims at gaining insight in the transfer effect of the cases and therefore concentrates on the realtionship between the case and student teaching.

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Standards-Based Design of Technology-Integrated Science Courses

Melissa S. Dieckmann
Department of Earth Sciences
Eastern Kentucky University
United States
Melissa.Dieckmann@eku.edu

Jerry D. Cook
Department of Physics and Astronomy
Eastern Kentucky University
United States
Jerry.Cook@eku.edu

Nina S. Coyer
Interpreter Training Program
Eastern Kentucky University
United States
Nina.Coyer@eku.edu

Kristy L. Isaacs
Teacher Education Program
Eastern Kentucky University
United States
allsmilesk@hotmail.com

Abstract: National and international assessments of K-12 science literacy indicate that most U.S. students have inadequate knowledge of science, and statewide exams from Kentucky confirm this trend for the Commonwealth. This disturbing trend has precipitated the design of a series of four inquiry-based science courses geared toward K-8 pre-service teachers. These courses are unique compared to other general education science courses at EKU in several respects: (1) they are designed using Kentucky Department of Education's guidelines for Standards-Based Units of Study; (2) they use inquiry-based learning following Newton's Rules of Reasoning in Philosophy; (3) they use collaborative teams to create a group learning environment; (4) they introduce technology as an integral tool to enhance science learning; and (5) pedagogy issues are integral to the course structure. Analysis of student content knowledge and attitude toward science demonstrates that these courses increase student learning in science and improve student attitude about teaching science.

Introduction

Results from the Third International Mathematics and Science Study (TIMSS) administered in 1996 (NCES, 1999) and 1999 (Martin et. al., 2000) demonstrate that U.S. students continue to perform poorly in science knowledge and skills compared to their counterparts in other developed nations. This trend is mirrored in science performance data from Kentucky, which shows that only 5% of elementary students in 1999-2000 were considered proficient in science, while only 1% of middle school students obtained science proficiency during the same academic year (Kentucky Department of Education (KDE), 2000). Results from the 2000 National Assessment of Educational Progress indicate that a statistical correlation exists between science performance and science teacher preparation (NCES, 2002). Preliminary statistical analysis of K-12 student performance in Kentucky shows a similar correlation between the science course requirements for K-12 teacher education programs and performance of students taught by these teacher education graduates. One solution to this problem is to ensure that teacher education programs include science requirements that demonstrate best teaching practices in the sciences and that contain the core content that will be taught in the K-12 classroom. Current teacher education programs at Eastern Kentucky University (EKU) and elsewhere in Kentucky are quite successful at preparing secondary education teachers for the science classroom (KDE, 2000), but requirements in the elementary and middle school teacher education programs at EKU have been more fragmented and contain few credit hours (maximum of 12 credit hours for elementary teacher education without science emphasis) of science content.

An analysis of current science courses offered in the elementary and middle school teacher education programs at EKU demonstrates that no possible combination of 9-12 credit hours of science courses available to education majors will meet all the science content standards required in the K-8 curriculum. Additionally, these courses often enroll 50+ students per section. Under these circumstances, professors are often unable or unwilling to use current best practices in teaching science. For example, few science professors use inquiry-based learning or allow students to work in groups to solve problems. In many cases the classroom's physical layout does not allow students to move desks, so they are not able to easily form into comfortable working groups within the confines of the classroom. Additionally, the science courses either use technology that is sufficiently expensive that it will not be available in the K-8 classroom or they use little technology outside the realm of laboratory equipment. Therefore, current science requirements in the K-8 teacher education programs at Eastern Kentucky University ensure that most future teachers will not be able to meet the content standards nor the technology standards required for quality teaching in the science classroom. With funding from the U.S. Department of Education's PT^3 program, science and education professors at Eastern Kentucky University have designed a series of technology-infused courses that, taken as a package, will ensure that future teachers are exposed to the content and technology standards required for quality teaching in the science classroom. The design process for Earth Science for Teachers will be used to demonstrate the unique qualities of this type of science course and to show the imp acts of inquiry-based science courses on teacher content knowledge.

Standards-Based Design

Traditional general education science courses are unsuited to the preparation of good science teachers due to incomplete coverage of K-12 core content in these courses. A survey of science courses and faculty at EKU indicates two reasons for this incomplete coverage: disconnectedness between the objectives of the course/instructor and needs of the pre-service teacher, and unawareness of core content by science content faculty. Of the 23 introductory science courses (100 or 200 level) available to pre-service teachers, 13 of these courses serve as an introductory course toward a major in the discipline or as service courses for other major disciplines. Therefore, the courses are designed to address a particular subset of disciplinary content with the assumption that students will take further courses in the discipline, but pre-service K-8 teachers are not required to take additional courses in the discipline and often do not have adequate flexibility in their schedules to allow for free electives in the sciences. On the other hand, upper level general education courses and introductory general education courses not linked to majors are specifically designed for non-majors, and therefore are not restricted by any content requirements. As a result, these courses are often designed to showcase topics of interest to the instructor with little regard for the needs of pre-service teachers. This subset of courses could be revised to meet the needs of K-8 pre-service teachers, but a survey of science faculty determined that 80% of EKU faculty in the science departments were unaware that specific core content concepts to be taught in the classroom are mandated, and many of those who were aware of the core content standards were only able to demonstrate a nebulous understanding of the core content standards (e.g., students need to know about rocks).

The science courses for teachers created during this project were designed using Kentucky Department of Education guidelines for development of a unit of study (1998). Kentucky's learning goals and academic expectations (KDE, 1995) and core content for assessment (KDE, 1999) relevant to science were identified and partitioned among the four science courses to ensure that all concepts and skills/processes required for K-8 science teachers would be addressed in the package of four courses. Each design team identified essential questions based on the core content on which to focus the learning in the course. The essential questions then guided the design of activities and investigations needed to answer each essential question.

The goal of using standards-based teaching in the courses is to ensure greater quality of science content knowledge in K-8 teachers. To determine the impact of standards-based teaching on the content knowledge of pre-service teachers, the 4th, 8th, and 12th grade TIMSS exam was administered online (www.getsmarter.org) to students in Earth Science for Teachers at the beginning and end of the semester. Each exam is a mixture of six broad science topics: biology, chemistry, earth science, physics, measurement, and scientific inquiry. Students did not receive the exact same set of questions during the pre-testing and post-testing phase, but there is a common and consistent test bank for each grade level. At each testing phase, the following data were collected:

the score of each student, the number of times that each question was answered, and the number of correct and incorrect responses to each question. Questions were sorted based on grade level, science content, and whether the content was covered during the Earth Science for Teachers course. Data were statistically analyzed using the Student's t-test for normally distributed data and the Signed Rank test for non-normally distributed data. The null hypothesis was that there was no change in the proportion of correct responses before and after the course. The alternative hypothesis was that the proportion of correct student responses increased after taking the course. The statistical analyses indicate that there is insufficient evidence that students showed improvement in test performance on material based on grade level or subject matter. The exception is that, using a 90% confidence level, students did show improvement in biology ($p = 0.0117$) and earth science ($p = 0.0977$) when all grade levels are analyzed together. It was determined, however, that an improvement in student test performance occurred after taking the course on questions assessing material covered during the Earth Science for Teachers course ($p = 0.0149$), but there was no improvement on test questions whose content was not covered in the course ($p = 0.2085$). In other words, students learned science core content covered in Earth Science for Teachers by taking the standards-based course.

The most obvious benefit of designing a course based on the core content standards is to improve the students' content knowledge and skills on topics they will be required to teach in the K-8 classroom. However, this method of design also allows the course to address pedagogical issues in the science. The standards-based design encourages the development of inquiry-based activities rather than lecture-driven instruction, encourages collaborative learning environments in the classroom, and encourages interdisciplinary connections as appropriate (KDE, 1998, p. 3).

Inquiry-Based, Collaborative Learning

The content and teaching methods of science faculty in higher education serve as the focal point upon which pre-service teachers base their beliefs, attitudes and behaviors towards teaching science (Tosun, 2000). After completing college-level science courses, pre-service teachers overwhelmingly have negative feelings towards science courses, using words/phrases such as "meaningless", "impossible", and "boring" to describe the courses they completed. Koballa and Crawley (1985) determined that pre-service teachers who dislike science ultimately avoid teaching science, which merely serves to continue the cycle of science phobia. This is partially related to students' self-efficacy. Tosun's study indicated that "a lack of confidence due to low achievement in science courses was evident" (2000, p. 376). Traditional science courses use lecture as the primary teaching method, and science is presented as a series of facts and truths transferred in an authoritarian manner. Students are passive learners and do not become an active part of the scientific discovery process. A course that allows students to enter the learning cycle at the discovery stage and encourages repeated success in the classroom makes a student more confident of his/her own teaching skills (Tosun, 2000). The inquiry-based courses are designed for students to work collaboratively in groups throughout the semester, which encourages students to learn from their peers. Students are also active learners who gain confidence in the process of scientific investigation and in themselves as investigators by using Newton's Rules of Reasoning in Philosophy (Motte & Cajori, 1962, p. 398). Students who completed Physics for Teachers show an improvement in attitude and confidence about teaching science as determined through pre- and post-testing of attitudes. Additionally, student comments on course evaluations indicate that students find the inquiry-based learning non-threatening and relevant to their courses. Finally, students commented that they were able to use many learning styles that helped them to understand the material better. Overall, students feel that they know more science, find science more enjoyable, and feel more confident about teaching science after taking the inquiry-based courses.

Technology Integration

Recent results from the 2002 National Assessment of Education Progress indicate that student performance is improved with the use of technology in the classroom (NCES, 2002). Technology is an integral part of the scientific process, but due to large class size, lack of laboratory time/facilities, and the focus on lecture-driven teaching methods, many pre-service teachers are not exposed to technology integrated into science courses until their science methods course. However, Cronin-Jones and Shaw (1992) demonstrated that beliefs about science teaching held by pre-service teachers were not significantly impacted by their experiences in a science methods course. Therefore, technology integration into science content courses is crucial to preparing pre-service teachers who are capable of using technology appropriately in the K-8 classroom and who understand the importance of technology to scientific investigation and learning. In cases where technology already exists in a science course, it is often used primarily for classroom management, or the technology is significantly advanced compared to that found in the K-8 science classroom. To ensure that pre-service teachers use technology as an integral part of learning and to demonstrate technology available to K-8 teachers, a technology integration plan was developed for the courses in parallel with the content design. This plan requires the designer to identify objectives for the learning activity and to identify how the technology used will help to meet that objective. The technology is used to help answer the essential questions, and is therefore presented as a crucial and integral part of the learning process. Students who completed Earth Science for Teachers during Intersession 2001 indicated on a student survey that they enjoyed the exposure to the software programs during the course (5 out of 12 respondents), and encouraged more technology integration into the course (4 out of 12 respondents).

Pedagogy in Content Courses

Science content knowledge is crucial to the effectiveness of science teaching in the K-8 classroom (NCES, 2002). However, proficient knowledge of science content is not sufficient to ensure that K-8 students will receive a quality science education. Madison County, Kentucky, employs a high number of EKU graduates who successfully completed science courses in their college curriculum, but state assessment scores in science for this county are significantly lower than other subject areas. A survey was sent to all elementary teachers in Madison County requesting feedback regarding potential reasons for the low science scores. In 10 of the 16 responses (62.5%), current in-service teachers replied that science was not being taught effectively (or not being taught at all) because teachers were uncomfortable with the design and implementation of inquiry-based science teaching at this level. For example, one respondent indicates that pre-service teachers "need instruction and materials that will be used and implemented within an elementary classroom, not to be doing excessive papers and reviews". Others indicate that pre-service science instruction "is not focused on classroom instruction techniques or appropriate lesson plan preparation".

The course requirements and structure in the inquiry-based courses rely heavily on the development, use and adaptation of lesson plans from a variety of grade levels. Additionally, student surveys administered at the end of the semester indicate that students find it helpful that the instructors model appropriate activities with appropriate equipment, and that students have opportunities to develop lesson plans for use in their classroom. For example, one student indicated that "the class is an excellent model, and I plan to use everything we did in class in my own classroom". Subsets of these courses have been offered to in-service teachers, and the feedback from in-service teachers, who are most capable of determining the usefulness of the pedagogy presented in the course, was positive. Student surveys were administered in the Earth Science for Teachers course on the last day of class. In-service teachers were asked to answer the following question: "Overall, how would you rate the value of this class?" On a scale of 1-9, with one being significantly below average and 9 being significantly above average, the course received 8.2 ± 0.8. An open response question asked students to "describe any teaching methods which helped you understand the course content". Two-thirds of the students (sample size = 12) indicated that the multiple hands-on, inquiry-based activities were most helpful, and one-third of the students also indicated group discussion of questions was helpful. One student responded, "I already knew the content, but I like the inquiry approach. More teachers will teach this way if they are taught this way." Another student indicates "I think that what I have gained most from this class is the 'how to' teach these concepts to my students. I have always struggled with finding the appropriate labs to teach/reinforce concepts, and this class has given me lots of good ideas along with another approach to teaching science." This evidence suggests that these inquiry-based science courses provide significant support for pedagogical needs of in-service and pre-service teachers.

Conclusion

Quality preparation of future science teachers is the key to improving science education in the K-8 classroom. However, traditional, lecture-based science courses have not been effective at improving content knowledge, improving teacher attitude about science and its importance in the curriculum, infusing technology into the curriculum to enhance learning, nor modeling best pedagogical practices. Preliminary results from research on the design and implementation of standards-based, inquiry-driven courses indicates that the implementation of these courses increased student content knowledge, improved student attitude, integrated technology into the classroom in a relevant and appropriate manner, and provided materials and models for teaching inquiry-based science in the classroom that students found useful and appropriate. Student surveys and statistical analysis of content knowledge assessment support the hypothesis that using inquiry-based, technology-infused science courses to teach pre-service teachers improves student attitude and competence regarding science teaching.

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Learning Virtually – by Design

Patricia J. Donohue
Dakota Science Center
Natureshift Linking Learning to Life Project

From this session, take home our easy step-by-step guide for using online technology to engage your students[1] interest in learning and thinking constructively. The Natureshift (NS) "Exploration Model" makes students think and we are also proving it because students are showing us that it's true. From this session, you will take home our easy step-by-step guide for applying the NS Exploration Model to your classroom, building learning experiences that will help your students pick an individual path to their own learning. Apply this simple technique in your classroom and you will have two guarantees as a result: 1. Students will be engaged and 2. Students will process for you what they learned. You even get a little extra - your students will apply new technology creatively and appropriately in their thinking.

After five years and $5 million building our Exploration Model and testing it with teachers as well as informal educators, our project is beginning to find evidence of learning. We suspect the learning we see in students might prove to be long-term, but that cannot be known until long-term studies assess what we achieved. Nevertheless, we know student thought processes are engaged. We know students show evidence not only of content acquisition but also of higher order thinking. A NS Exploration Project is by nature summative and forces the application of higher order thinking by design. A project engages students because its challenge is authentic to their lives. Learners of any age will pursue their own curiosity about genuine concerns in their world. The result is that a student project will reveal the full extent of what has been learned. The project is constructed from the building blocks of knowledge acquired through the Exploration journey. Because it requires the use of new technologies, students can now teach others what they know and what they have learned more engagingly and more thoroughly. S.A. Barab, et al. in their recent publication "Constructing Virtual Worlds: Tracing the Historical Development of Learner Practices" (Cognition and Instruction, Nov. 2001) confirm the power of local resources and collaborative learning on student constructed knowledge using virtual technologies (pp 47-90).

What is this model and what does it do? It will engage your students' interest. It will guide him or her along a path of self-inquiry in search of new knowledge. Half of that path will take the student on a Web Quest after research information. The other half of that path requires students to quest after this new knowledge in the world around them, at home, at school, in the community. When the student has completed an Exploration, he or she constructs meaning from what was studied, applies it in a self-designed project, and teaches others what was learned. Along this learning path students are given opportunity to employ technology to their tasks. They learn by actively doing. They succeed by having fun. They investigate their lives by satisfying their natural curiosity. You will find it hard yourself to have as much fun again playing with a learning model in your classroom.

On-line Microscopes & Inquiry-based Science Instruction: Improving Technology in Teacher Education

Thomas Frizelle
Curriculum & Instruction
Iowa State University
United States of America
tfrizell@iastate.edu

Constance Hargrave, Ph. D.
Curriculum & Instruction
Iowa State University
United States of America
cph@iastate.edu

Abstract: The purpose of this paper is to present a project in which on-line access to a scanning electron microscope (SEM) is used to enhance the science and technology content and pedagogy preparation of preservice teachers. By integrating an on-line SEM into teacher education courses, new teachers emerge from our teacher education program with advanced technological and pedagogical skills to effectively integrate technology into science curricula.

In this paper, we will discuss the incorporation of inquiry-based scanning electron microscope (SEM) activities in three teacher education courses: a science teaching methods course and two instructional technology courses. The use of the on-line SEM and the inquiry-based instructional approaches used in this project are consistent with the National Educational Technology Standards and Science Education Standards. Moreover, this project demonstrates the complexity and benefits of coupling technology and content to significantly enhance science teacher preparation.

At Iowa State University, the integration of the SEM into the education courses occurs at the sophomore, junior and senior levels. At the sophomore level, preservice teachers are first exposed to the SEM in the course Introduction to Instructional Technology. A requirement for all education majors, this course is designed to develop students' basic skills with information technology and to introduce pedagogical considerations in the use of technology in learning. Students learn about the SEM in a large lecture and engage in hands-on activities in the small laboratory setting. Finally, the students explore instructional strategies essential for implementing web-based lessons.

At the junior level, education students who choose to minor in educational computing (approximately 12% of education majors) receive a more in-depth experience with the SEM in the course Using Computers in the Classroom. The sole purpose of this course is to develop students' ability to design and implement technology-based learning environments for K-12 students. In this course, the preservice teachers develop proficiency in using the on-line SEM and design and implement science lessons that effectively incorporate the SEM. In addition, students in this course critique the on-line SEM interface and provide feedback to the developers to refine the webpage.

In the semester prior to student teaching, all elementary education majors (N = 1,000) enroll in the senior level course entitled The Teaching of Science. The purpose of this course is to prepare future teachers to teach science to children in grades K-6. In this course, emphasis is placed on developmental implications, teaching processes, and discovery/inquiry approaches to science instruction. Students in this course develop a working knowledge of the on-line SEM and explore its potential to support K-12 students' science learning. In addition, some of the pre-service teachers have extended their knowledge of the SEM and served as mentors to the inservice teachers wanting to incorporate the SEM in the classroom. In this manner, these students develop proficiency in the operation of the on-line SEM, assist in-service teachers in designing lessons into which SEM activities are appropriate, and experience the classroom use of the on-line SEM with K-12 students.

In each course where the SEM was incorporated, the complexity of technology integration was experienced. To varying degrees contingent on the course and preservice teachers' developmental levels, technology integration beyond teaching about the SEM, was difficult for the students to conceptualize. Although they viewed the SEM as a valuable educational tool, the preservice teachers had difficulty identifying and developing ways to integrate the SEM into the curriculum. In addition, many preservice teachers possessed misconceptions about the capabilities of the SEM. The students often related the SEM to past experiences with light microscopes. As a result, the curriculum integration ideas they developed for the SEM were inappropriate. There were also specific access concerns related to the technology when using the SEM via the internet and in the classroom.

Using the SEM in teacher preparation courses had a number of experiential and pedagogical benefits. The SEM provided an opportunity for future science teachers to use real-world science tools that they can realistically use in their future classrooms. Via the on-line SEM, the preservice teachers engaged in real-world scientific inquiry with experts in the field. Most important, the use of the SEM in the teacher preparation courses created learning environments where preservice teachers were empowered to think critically about science content and authentically engage in the scientific process.

While this project has achieved its goal of enhancing the science and technology content and pedagogy preparation of preservice teachers, it has also generated more questions than it has answered. Integration of the SEM into teacher education courses has provided a vehicle by which we can better understand scientific inquiry-based technology use and it's implications for K-12 classrooms. Further research in this area will be necessary to determine how best to utilize the SEM technology into teacher education courses in order to improve K-12 science education.

Teaching Science to Elementary Teachers: Exploring 'Our Physical World' Through Science and Technology.

C. Richard Hartshorne
School of Teaching and Learning
University of Florida
rhartshorne@coe.ufl.edu

F. Eugene Dunnam
Department of Physics
University of Florida
dunnam@phys.ufl.edu

Recent research data provide evidence of a strong focus on the development and fostering of Math and English skills at the elementary level. Unfortunately, other areas of study have not received necessary attention (Goodstein, 2001). At the University of Florida, the School of Teaching and Learning teamed with the College of Liberal Arts and Sciences to address this situation. With the assistance of a PT3 grant, we have designed a course entitled *Our Physical World: Science for Elementary Teachers*. The course discusses basic physical science for elementary teachers, emphasizing applications from everyday life. The scope of the course is similar to many college-level science courses. However, while most courses focus solely on the acquisition of science content knowledge, *Our Physical World* also focuses on the acquisition of pedagogical content knowledge in science (Duggan-Haas, Enfield, & Ashman, 2000). Topics addressed in the course begin with the scientific method and span the entire spectrum of the physical sciences, even discussing Einstein and relativity. The purpose of this course is twofold. First, the course provides tomorrow's teachers with appropriate science content knowledge. Second, the course models appropriate methods of integrating meaningful science learning into the elementary classroom.

In order to attain these goals, *Our Physical World* was designed and created as a web-based learning environment. There were three major reasons for creating this environment. The first reason was accessibility of the information. While initially intended for students of the course, we thought that the information presented, both in the course and on the website, might be useful to other elementary teachers. The second reason was adaptability. With a web-based learning environment, activities and information can easily be updated and modified. The final reason was ease of communication. On the website, individuals will be able to suggest activities that they have found useful, and provide feedback to the creators of the website.

There are four major components to the website: a course information area, a relational database, a search mechanism, and an administrative area. The first component of the course is the "Course Information". This area contains important information for students enrolled in *Our Physical World*. Items such as scheduled events, syllabus information, readings, assignments, and experiments are listed here.

A second major component of the course is the relational database. Upon entering the learning environment, teachers are provided with various activities designed to promote meaningful science learning. This database is part of the course website, but potentially could be accessed by elementary teachers elsewhere. Eventually, the database might be expanded to cover other science areas, such as the biological and chemical sciences. The premise of the database is that elementary teachers can search for activities by choosing various criteria. The search criteria include the following: topic, grade level, keyword, activity type, amount of materials necessary, and Sunshine State Standards (Brogan, 1995). Any, or all, of the search criteria may be used when searching for various activities. The search areas of topic, grade level, and keyword, while general, are useful in narrowing down any search for activities. Activity types will include simulations, laboratory experiments, web-quests, tutorial, classroom demonstrations, and others. One of the more interesting areas of search criteria is the "amount of materials necessary". Upon leaving elementary education programs, students go to different schools, with each of the schools possessing different resources. The "amount of materials necessary" field is broken down into four levels, addressing the varying level of resources. Theses levels are low, medium, high, and computer based. While each of these levels is relative, simply examining a few of the activities for each of the levels would make the criteria for each very clear.

A third component is the search mechanism. This search option was added, after the initial conception of the database, in order to assist Florida teachers relate science instruction to the appropriate standards. This tool allows students to search content by the Sunshine State Standards. Sunshine State Standards as a search criterion will obviously be of most utility to Florida teachers.

The final element of the website is an administrative area. In this area, administrators are able to add, delete, or modify any of the activities or search criteria. Also, there is an area for individuals using the site to suggest activities by completing information about the suggested activity on a form. These activities are then reviewed by the main site administrator, and, based on quality, either added or not.

With further development we hope that this database will prove to be a valuable science instruction resource for teachers everywhere. While only students registered for the course will be able to view the modeling of various activities, it is the opinion of the creators that the resource alone would be extremely useful. As mentioned previously, the database may eventually stand on its own, outside of *Our Physical World*, and may be expanded to contain other areas of the sciences, and possibly videos of the course activities being modeled. With these additions, the goal of improving the instruction of all sciences at the elementary level may be attained.

Resources

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Relationships between the use of web resources and student interests in science: Support for technology integration decision-making

Tiffany A. Koszalka
Instructional Design, Development and Evaluation
Syracuse University
United States
takoszal@syr.edu

Abstract: This study was designed to investigate the relationships among the use of web resources during middle school science and student science career interests. The results indicated that there were significant predictive relationships between the regular use of web resources and science career interest. Findings suggested that regular use of web resources predicted science career interest scores differently for boys and girls. The regular use of web resources was not predictive of boys' career interests, only predictive of girls' interests in science careers. The use of web resources also had a mediating effect on other characteristics that are generally associated with developing interests in science. Understanding these relationships can help strengthen the processes of designing science education and support decision-making related to securing educational resources that may inspire students to pursue science.

Introduction

The U.S. invests millions of dollars each year on developing and securing new technology-based resources to inspire students to pursue science. To assure these investments are meeting the goals of the educational system it is important to understand the relationships among the types of resources used during science and levels of student interest in science. However, identifying the relationships among resources and interest requires consideration of the complex and multi-leveled environment of the classroom. This study investigated questions about these relationships. Is regularly using web resources during science predictive of middle school students' interest in science? Is the predictive nature of using web resources the same for boys and girls? Is the use of web resources related to differences in science predisposition factors among students?

Career Interest Development

Career development research generally has focused on identifying relationship among family factors such as parents' education and career (Helwig, 1998) and specific school-based career interventions (Hill, et al., 1990) thought to affect children's formation of career aspirations and their eventual participation in adult careers. Gallagher's (1994) work demonstrated that instructional experiences in middle school were predictive of persistence in the study of science in later years. However, no research could be found that investigated the relationships among use of specific educational resources and student science career interests. Interest, an acquired attention or enthusiasm for a particular field, is a learned characteristic and has been shown to be the key factor in making career choices (Hill, et al., 1990, Neimeyer & Metzler, 1987; Vondracek, Lerner, & Schulenberg, 1986; Super, 1984). Emergent interests in a career domain leads to intentions or goals for further activity exposure, which increases the likelihood of subsequent task selection and practice (Lent, Brown, & Hackett, 1994; Flum & Blustein, 2000). Career interest development begins in pre-adolescence, before the fifth grade, when patterns of career aspirations have a tendency to reflect development of the individual's sense of industry (Erikson, 1963; Havighurst, 1964) and interests in line with those careers held by family members or based on direct suggestions from parents or significant family members (Helwig, 1998; Trice, 1992). When children enter into the early stages of adolescence and begin to explore relationships and activities outside the family, including experiences in formal education, they often begin to develop career interests independent of family members. In addition to formal and informal learning experiences, much research has shown that adolescents' development of science career interests is also related to several predisposition factors including the adolescent's 1) perceptions of science – can I see myself as a scientist, 2) perceptions of friends' and teachers' interests in science – are my peers and mentors interested in science, 3) participation in science activities at home and outside of school, 4) use of computer technology in the home, and 5) gender (Boone & Butler Kahle, 1998; Borget & Gilroy, 1994; Gallagher, 1994; Hill et al., 1990; Rocheleau, 1995; Yager & Yager, 1985). Thus, adolescents may be predisposed to pursuing science careers based on relationships with family and friends, formal educational experiences, and career exploration activities during adolescents that support the selection and de-selection of career domains that the individual will eventually choose to pursue (Gottfredson, 1981; Gati 1986). Career interests are therefore learned based on a variety of individual, background, and social factors and further developed as a child proceeds through adolescence. Furthermore, Lent, et al. (1994) suggested that psychological development of career interest is linked to formal academic experiences.

Factors that may affect career interest development

As the Internet becomes more commonly used in classrooms, opportunities to further explore career activities, tools, and people are more available. Recent studies have found that when web resources were introduced into the classroom students interacted in more complex tasks, developed greater technical skills, and used more outside information (Hardin & Ziebarth, 1995; Owston, 1997; Rice, McBride, & John, 1998) than before the Internet was available. Thus, web resources provided vast and easily accessible information and human resources that promoted exploration of and interaction with additional information resources. Adolescent may be able to develop more informed self-perceptions of working within a specific career while interacting with web resources, e.g., participating in exploration and feedback processes. These perceptions may in turn influence science career interest (Blustein et al., 1994). Another factor found to be important in career interest development was gender. Often family experiences (Hanson, 2000) and perceptions of career-related opportunities (Roeser, Eccles, & Sameroff, 2000) strongly influence girls' career choices. Providing rich environments that include web resources, could influence girls choices because science is perceived as a more traditionally 'male' career (Hanson, 2000; Andre, Whigham & Hendrickson, 1999), and thus girls' interests will be more contextually influenced by exposing them to the vastness of science careers and those female role models who excel in science careers. Girls also tend to be more oriented towards social relationships (Swanson, 1997; Gurian, 2001) and may thus be particularly swayed by human contact and collaborative activities generally associated with the collaborative use of web resources in school settings. Since girls tend to work together more collaboratively when using technology and use computers more for learning activities where boys were found to use computers alone and for purposes of gaming, web resources may have more influence on shaping girls career interests (Swanson, 1997).

The Study

A one-time cross-sectional observational method was used to collect data from more than 600 middle school students and their teachers in a diverse group of 23 science classrooms from in three states (Koszalka, 1999). All classrooms were required to have school access to web resources, although there was no requirement that teachers had to use these resources. The middle school students who participated were intact groups from the science classrooms taught by the participating teachers. The dependent variable was Science Career Interest. The science career interest measurement scale was continuous with possible scores ranging from 0 to 36. The higher the score, the more interest the student has in pursuing science-related careers. The student-level independent variable measures were predisposition factors: 1) perception of science, 2) perception of others' interest in science, 3) parental and home factors, 4) interest in science-related activities outside of school, 5) computer technology use in the home, and 6) gender. Teachers were asked to provide information on classroom-level factors, e.g., the types of resources used regularly in the classroom.

Science Career Interest was measured by administering the Investigative (science) career interest summary scale of the Self-Directed Search Career Explorer (SDS), a career-counseling tool for middle school children. As in previous career interest exploratory analyses (Borget & Gilroy, 1994), only the scales for science careers were used so that a relative measure of interest in science careers could be obtained for each participating student. To classify the classroom into resources use types, the teachers were asked to respond to six questions regarding the use of different types of resources during science activities. Responses provided an indication of resource use patterns and were used to classify classrooms into a one of four resources use types.

The career instruments were administered to middle school students at the beginning of a science class at the end of the school year. At the same time, teachers completed the teacher survey, collected the completed surveys and informed consent forms, and sent them to the researchers. Descriptive data were computed using SPSS version 8.0 for Windows. Hierarchical linear models (HLM) were used to examine the associations among classroom-level factors, student-level predisposition factors, and science career interest using two-level hierarchical linear models. This analysis could assess how science career interest differed depending upon classroom variables and on the individual characteristics they brought to the situation, i.e., predisposition factors and gender.

Findings

A total of 677 surveys, from 23 teachers in 9 schools were administered and returned. Fifty-eight surveys were either returned without signed parental consent forms or with incomplete data and were removed from the sample. The remaining 619 surveys were used in the data analysis that included 51% girls ($n=304$) and 49% boys ($n=297$). Eighteen students in the sample did not identify their gender. Mean scores were calculated for all boys' and girl's interest in science careers in general and for groups of boys and girls who exhibited each characteristic associated with different levels of predisposition to pursue science. The HLM analyses demonstrated that use of web resources overall was not predictive of boy's science career interests ($t = 2.077$, $p < .061$). Girls' science career interest was predicted by the regular use of web resources ($t = 4.323$, $p < .000$). (See Tab. 1)

Fixed Effects	Estimated Coefficient	Standard Error	T-Ratio	P-Value
BOYS				
Science Career Interest Mean	23.73	0.52	45.060	0.000
Use Web Resources	2.80	1.28	2.077	0.061
Perception of Others slope	0.72	0.27	2.624	0.017
Perception of Others Interests X web slope	-0.42	0.32	-2.298	0.029
Perception of Science slope	0.59	0.09	6.664	0.000
Perception of Science X web slope	0.29	0.10	2.911	0.009
Notes: N = 297, Intercept Reliability Estimate = .700				
GIRLS				
Science Career Interest Mean	23.31	0.46	50.305	0.000
Use Web Resources	4.93	1.14	4.323	0.000
Outside Science Activities slope	0.17	0.24	0.743	0.466
Outside Science Activities X web slope	0.41	0.29	4.700	0.000
Perception of Science slope	0.51	0.09	5.202	0.000
Perception of Science X web slope	0.33	0.12	2.849	0.010
Notes: N = 304, Intercept Reliability Estimate = .651				

Table 1: Student-Level Effects for Boys and Girls

The relationships among science career interests and predisposition factors were different in classrooms where web resources were and were not used regularly. As boys' ($t = 6.664$, $p < .000$) and girls' ($t = 5.202$, $p < .000$) perception of science increased, so did their interest in science careers. For both boys and girls a significant interaction was found between their perception of science and classroom use of the web. The interaction slopes indicated that there were stronger relationships between perceptions of science and science career interest for both boys ($t = 2.911$, $p < .009$) and girls ($t = 2.849$, $p < .010$) when web resources were used in the classroom than when web resources were not used. Perceptions of others' interest in science was positively related to boys' science career interest ($t = 2.624$, $p < .017$). The interaction between perceptions of others' interest in science and use of web resources in science class in boys resulted in a significant negative relationship ($t = -2.298$, $p < 0.020$). The level of interest in science-related outside activities was not significantly related to science career interest for girls ($t = 0.743$, $p < .466$) on its own. However, the interaction between interest in science-related outside activities and use of web resources in science class for girls resulted in a significant positive relationship ($t = 4.700$, $p < 0.000$). Home technology use and parent/home support to pursue science did not have a predictive relationship for science career interest in either boys or girls, nor were the strengths of their relationships different in the students who used web resources, hence they were dropped from the model.

Discussion

Developing interest in specific career domains, such as science, is a consequence of many learning interactions with the people, information, and objects of the practice (Lave and Wenger, 1991). Conceptually, previous research provided indications that working with science practitioners and exploring science information was important to the development of interests in science careers (Vondracek, 1993; Helwig, 1998; Hill et al., 1990). The use of web resources during science can provide adolescents with opportunities for exploring science by providing access to additional social and supportive information. Thus, the significant relationships found support a conceptual hypothesis that increasing the richness of the types of information through web resources during science was related to higher levels of science career interest. In addition, this study provided some interesting findings related to the relationship among the use of web resources and girls interests in science careers. The findings suggested that the use of web resources might have acted as an influencing agent supporting girls developing interests in science because they potentially exposed them to rich examples of science in practice. They may also have provided motivational and interactive experiences as well as another venue for social interaction and learning through collaborative activities with fellow students.

The results of this study also suggested that the relationships between science career interest and predisposition factors were different in classrooms where students regularly used web resources and classrooms where students did not use web resources. For example, all boys' interests in science were predicted based on their perceptions of other's interests in science. If their friends 'liked' science, they were much more likely to 'like' science themselves. When comparing students in classrooms that used web resources and those who did not, the relationship was different. Perceptions of others' interests was not as strong a predictor potentially indicating that sources on information available on the web became more important in informing interest than perceptions' of others in the adolescent's life. Thus, factors such as the use of web resources in classrooms may play a significant mediating role in shaping a student's interests in science careers.

Understanding relationships between the use of web resources and students' science career interests can provide a basis for developing and securing resources that have been empirically shown to be related to higher interest in science careers. If these results hold up in replication studies, there are implications that may support academic decision-making and policy. Given a goal of inspiring students to pursue science careers, policy makers may find this type of research supportive of decisions to allocate financial commitments for enhancing computer equipment, facilitating curriculum development that brings science learning and science communities together, providing teachers with the time and training to integrate web resources into their teaching. These findings shed new light on understanding the complex relationships between the use of resources in the classroom and multiple factors that affect the development of science career interest. Without an understanding of the relationships between the use of resources in the classroom and student science career interest there is a risk that large investments in educational resources will go unmatched in student outcomes. The results of this study demonstrated that the regular use of web resources in middle school science classrooms were predictive of girls' interests, but not boys' interests in science careers. The use of web resources also seemed to have a mediating effect on the relationship among predisposition factors to pursue science and science career interest. Understanding such relationships can inform decision- and policy-making in regard to providing access to, and support of, web technology use in the classroom.

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The Regents Scholars Program - Creating a Statewide Collaboration to Enhance Mathematics and Science Education

Marietta Langlois, Ph.D.
Coordinator, Regents Scholars Program
Wright State University
marietta.langlois@wright.edu

Sheryl Hansen
Director, Professional Development
Ohio Learning Network
shansen@oln.org

Abstract: The Regents Scholars Program is a unique and distinguished academic experience for in-service teachers. This statewide program draws upon the expertise of university faculty across Ohio to offer professional development that combines mathematics or science content with inquiry-based pedagogy. Teachers will have the opportunity to work with Arts & Science and Education faculty at 13 participating universities in a combination of distance and face-to-face learning experiences. The implementation plan for this project emphasizes faculty development, course development and establishing a collaborative degree structure. The Regents Scholars Program anticipates enrolling students in the fall of 2003.

Introduction

The Regents Scholars Program is a unique and distinguished academic experience for in-service teachers. This statewide program draws upon the expertise of university faculty across Ohio to offer professional development that combines mathematics or science content with inquiry-based pedagogy. Teachers will have the opportunity to work with Arts & Science and Education faculty at 13 participating universities in a combination of distance and face-to-face learning experiences. After completing 35 semester hours and a capstone project, teachers earn a Master's degree in mathematics or science education. The Regents Scholars Program anticipates enrolling students in the fall of 2003.

Two key features of the Regents Scholars Program are quality and the use of technology. By collaborating and sharing resources, participating universities will be able to offer their "best" to create a truly unique educational experience of distinct faculty, coursework and learning experiences. Technology permits the program to extend beyond one campus. E-mail, interactive television and the Internet also allows for learners to interact with counterparts from across the state and to collaborate with college faculty.

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Program Development

The implementation plan for this project emphasizes faculty development, course development and establishing a collaborative degree structure. Faculty development strategies include listservs, a web site and online and face-to-face training sessions. Listservs and the web site are used to share information such as useful web sites, training opportunities and meeting minutes. Funds were also allotted for faculty to enroll in web-based mathematics and science education classes as well as course design and facilitation classes.

Course development strategies include faculty stipends, online course standards and establishing a Regents Scholars Content Excellence Seal for courses that meet the standards. Because of the unique challenges created by inquiry-based pedagogy, few online mathematics and science education courses existed in Ohio. Thus, faculty were offered a $3,000 incentive to put an existing course online. Course guidelines were also developed to reflect the National Research Council, National Council of Teachers of Mathematics and Ohio Academic Content Standards. Lastly, to capitalize on existing, outstanding learning opportunities, the Regents Scholars Content Excellence Seal was developed. Courses that are awarded the seal are eligible electives in a student's program of study.

The collaborative degree structure emphasizes home institutions, cohorts, cross registration and face-to-face summer institutes. Students will be assigned to home institutions. The home institution serves as the university of record and enrolls the student, keeps the transcript and awards the degree. Cohorts will also be initiated at the face-to-face summer institutes and maintained through a Regents Scholars Program web site that promotes reflection, collaboration and support.

Participating Universities

Universities participating in the program include Bowling Green State University, Cleveland State University, Kent State University, Miami University, Ohio University, Shawnee State University, The Ohio State University, University of Akron, University of Cincinnati, University of Dayton, The University of Toledo, Wright State University and Youngstown State University. Sponsoring organizations include Ohio Board of Regents, Ohio Learning Network, Ohio Department of Education and Ohio Resource Center.

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Negotiative Concept Mapping

Gregory R. MacKinnon, PhD
School of Education
Acadia University
Wolfville, Nova Scotia, Canada, B0P 1X0
gregory.mackinnon@acadiau.ca

Abstract: This paper shares the results of an action research project in a science teacher education classroom. The setting is a laptop university and students have access to Inspiration software as well as networking software (ICU) that allows instructors/students for "real time" viewing of individual student group concept mapping exercises.

Most instructors aspire to creating classroom settings that promote higher-order thinking. A considerable amount of work has been done around the creation of so-called constructivist learning environments (Greening, 1998). As an example, problem-based learning has gained popularity not only because problem solving is practised but because the learning is contextualised. Gagne (1985) posits that problem solving elicits two types of learning namely: the learning of a specific "higher-order rule" that allows the student to address similar problems and secondly a set of general problem solving skills or "cognitive strategies". According to Gagne (1985) "cognitive strategies are a special type of intellectual skills used by the learner to regulate the various stages of information processing". Young (1997) links these information processes and cognitive strategies, see (Table 1).

Information Processes	Cognitive Strategies
Attending & Selective Perceiving	Highlighting, Underlining, Outlining, Adjunct Questions
Rehearsal	Paraphrasing, Chunking, Imagery
Encoding	Concept Mapping, Analogies
Retrieval	Mnemonics, Imagery
Executive Control	Metacognitive Strategies

Table 1: Cognitive Strategies Associated With Information Processes

The Power of Graphic Organisers

Of particular relevance to my own action research is the encoding process. Teachers have effectively used webs as graphic organizers in the process of determining student' s prior knowledge. Semantic networking (Fisher, 1990; Jonassen, 1996; Jonassen, Peck & Wilson; 1999) resembles webbing except that all the links between ideas are labelled with a relational phrase. The concept map, as defined by Novak and Gowin (1984) has emerged as a most powerful graphic organizer. In the strictest definition, the concept map extends the semantic networking labelling and has the additional feature of representing concepts in a hierarchal distribution.

Though a variety of webs and maps have been around for some time, it is only in the last decade that software has been developed specifically to create these graphic organisers. Some examples include: SemNet®, Learning Tool®, TextVision®, CMap® and most recently Inspiration®.

A MindTool Approach

With these pieces of software it becomes very easy to map out ideas. Whereas hand-drawing maps in the past could be relatively time-consuming, these facile software approaches open the door to extend the learning through software-enabled constructivist exercises. Computer–generated graphic organisers represent a class of applications that Jonassen (1996) would refer to as "mindtools". "A Mindtool is a way of using a computer application program to engage learners in constructive , higher-order, critical thinking about the subjects they are studying" (Jonassen, 1996, p.iv).

A concept mapping program for instance may be used in three distinctly different teacher–student exercises: (1) the teacher may have students construct a concept map at the onset of a unit in an effort to access prior knowledge, (2) a teacher may engage students in preparing a pre and post concept map (reference) for a unit of study and (3) a teacher may work with the students in an ongoing exercise that gradually builds the map as the unit content emerges.

Action Research in Science Education

For some time I have posed my teacher interns with the task of preparing a concept map for curriculum units they are likely to encounter in their public school teaching. Acadia University has been a laptop institution (Hemming & MacKinnon, 1998) since 1996. This year as part of the network software accessible to all students and professors, Inspiration and ICU became available. Inspiration is a most popular mapping tool (www.inspiration.com) while ICU is a "home-grown" networking tool (a take-off on ICQ). ICU allows the instructor to link with any obliging student on the network and access (and control) their screen. With a classroom digital projector and laptop docking station, this has allowed for an interesting Mindtool approach.

In three independent science education classes of approximately thirty students I led the following exercise. After a short tutorial on Inspiration in the second class meeting, I asked students to construct a concept map of the content we had analysed thus far. On a weekly basis, students would work in groups to update and modify their concept maps. Because I could access their screens at any time and in turn project their screen for the entire class to observe, it became a unique opportunity to unpack their thinking around the hierarchy of concepts and corresponding relational links. In essence as a class we were able to "negotiate the concept map" in real time.

The Impact of Negotiative Concept Mapping

In ten (one-hour) open–ended qualitative interviews following the completion of the course, there were several emergent themes.

Students found the negotiative concept mapping (NCM) to be a great means of reviewing the work from past meetings. Students suggested that the interactive nature of constructing the NCM in real time allowed them to better understand the nuances and complexities of relationships between concepts. In several instances students alluded to defending their choice of conceptual hierarchy and how it helped them to build confidence in the content. Unanimous reference was made to the quality of discussion that NCM promoted in class. At the close of the course students were asked to submit an essay that summarised their growth in the course. Students were astounded at the practical utility of having constructed a concept of the entire course and found this to be invaluable in assimilating their learning in the course. They repeatedly made reference to the ability to see how all aspects of the course were linked from beginning to end and the inherent "sense-making" that this imparted.

All indications are that this "mindtool" approach utilising Inspiration and ICU, shows great promise for classroom instruction. The facile communication allows the professor and teacher intern to interact in a constructive setting in a way that was never before possible.

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Using the Spreadsheets to Enhance the Learning of Science at Foundation Year Chemistry.

Stimela Simon Mathabatha
Department of Chemistry
University of the North Foundation (UNIFY)
South Africa
e – mail: setimelam@unin.unorth.ac.za

Abstract
At heart, real understanding in science is essentially qualitative yet is often expressed in mathematical relations. Most advanced science students therefore spend a great deal of time and effort doing calculations. These calculations pose two kinds of demands namely-• some of the mathematical models involved are complex and/or • there is a need for repetitive analysis of large amounts of data and both of these can serve to focus students' attention on mechanical mathematics at the expense of their understanding of the underlying scientific principles. These difficulties reduce the level of cognitive 'chunking'. This a serious hindrance to students' learning and the need is for a tool or tools that can be used to raise the level of chunking so that pupils can focus on the underlying scientific concepts. Ideally such a system would be capable of being used by both pupils to model simple systems in which they can express their understanding of the science involved and by their teachers to construct more complex models for the pupils to explore. This paper examines a variety of ways in which one tool, a spreadsheet, has been used to promote learning in an important concept area, that of chemical equilibrium at a University Foundation Year (UNIFY) chemistry and its implications to classroom practice for teacher educators.

Introduction

Spreadsheets have a number of attributes, which make them suitable for use as a computational tool in the school science classroom and laboratory. For example, they can be used in either of two complementary modes. In the first, students use the tool to express their own ideas, usually by testing a *variety of models* (of their own construction) using *fixed data*, while in the second, students explore models which express the thinking of others, usually by feeding *variable data* into a *fixed model*. The latter category commonly involves exploring the accepted scientific models although it also encompasses students exploring expressions of each other's ideas. The differences between these modes of use are similar to the **expressive/exploratory** distinction described by Brosnan (1989). Schibeci (1989) provide further useful discussions of these ways of using spreadsheets models in science learning environment..

The nature of students' difficulties with equilibrium

Chemical equilibrium is a core chemical concept, an understanding of which is essential for most qualitative and quantitative work in chemistry and thus its study forms a central part of advanced chemistry courses. These courses tend to stress the quantitative aspects of the topic - fulfilling the necessity of teaching students to use the appropriate equations. Studying equilibrium therefore involves both difficult and/or repetitive calculations. In their different ways these provide barriers to conceptual understanding. The topic thus provides a good focus for exploring the different kinds of barriers both these types of arithmetical demand pose to conceptual understanding (Stevens, 1991).

Participants and Context

The participants in this study were UNIFY students at the university of the North, South Africa. Sixty (60) potential student participants were selected from 150 UNIFY students according to their willingness to participate in the research. The sixty students were chosen to achieve a balance of gender, science ability and socio economic background. The participants' background is such that they have been exposed to inadequate teaching, lack of laboratory and computer facilities, little attention to skills and lack of exposure. All these resulted in rote learning by the students, lack of interest / negative attitude and very little or no understanding. The UNIFY intervention provides the students an opportunity to access Computer Assisted Learning (CAL). This initiative is on its developmental stage as there is no proper CAL programme in place. As a way of introducing CAL, the spreadsheets have been used in the chemistry lessons to enhance their learning of some chemical concepts, especially that of equilibrium. A questionnaire was used to find out the students' initial conceptions about equilibrium. A set of spreadsheet activities were designed and undertaken with the students in a computer lab during chemistry lessons. Some interviews were conducted during this sessions.

Addressing the Students' Difficulties

One of the main problems that UNIFY students have in coming to a full understanding of chemical equilibrium is that of the ratio of equilibrium concentrations. Students often believe that at equilibrium the composition of the reacting species is equal to, or at least in the ratio of, the balanced chemical equation for the reaction, e.g. that for the reaction, $2HI(g) \Leftrightarrow H_2(g) + I_2(g)$. One solution to this problem is for a teacher to enter data sets of equilibrium concentrations on a worksheet and allow the pupils to write their own equilibrium law expressions and see the consequences. Knowing the balanced chemical equations the students are free to try any analytic relation they choose on one data set until they find one or ones that give constant values. The other problems students have that can be addressed using the spreadsheets are; the effect of changing concentrations, pressure and temperature on equilibrium.

Implications for Teacher Educators

The use of spreadsheets demand more time from the educator to design adequate integrated teaching and learning materials for the students. It helped in the improvement of the classroom teaching and assessment, as it demanded the design of effective alternative assessment tools. It also motivated the students and enhanced their creative and critical thinking skills. The participants' overall performance in chemistry significantly improved compared to those who learned through traditional methods.

Conclusion

The examples briefly described above cover a range of conceptual, arithmetic and programming difficulties and are intended to illustrate some of the variety of ways spreadsheets can be used to address the variety of mathematical problems faced by students of science. The key point is that the computational tool is being used to allow students to see the quantitative consequences of differing qualitative conceptions. The apparently paradoxical conclusion of this is that a computational tool's most important attribute may be the help it gives in changing qualitative understandings. For the purpose of validation of the instruments, the study will be undertaken again next year with large samples of students from similar programmes.

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Anchoring Instruction in a Web-based Adventure Game: How does it work?

Leslie M. Miller, Janette Moreno, Donna Smith, Janice Mayes
Rice University
Center for Technology in Teaching and Learning
United States
lmm@rice.edu

Abstract: How does one capture best practice from the paradigms of situated learning and anchored instruction and combine that with the powerfully engaging multimedia gaming environments that are popular with adolescents? Is it possible to design a game with substantive science content that is intrinsically motivating for middle school students? These types of questions were the driving force behind the creation of a web adventure series, THE RECONSTRUCTORS™.

The web site (http://reconstructors.rice.edu) is part of a project funded by the National Institute on Drug Abuse. The content focus of this effort is the history and biological impact of a class of drugs known as opioids. The benefits and challenges of using this type of approach for teaching sophisticated science concepts to middle school students is described in this paper.

Pedagogical Foundations

The Internet's unique capabilities offer a certain seductive aspect that engages people of all ages. Not all of the Internet's applications could be said to have high educational value. Yet, from our own research on adolescents' media habits and preference, we find that "playing games" is high on the priority list of how they use computers (Miller, Schweingruber& Brandenburg, 2001). On the educational side of the equation, however, the Internet provides support for new instructional approaches, such as cooperative learning with other learners at a distance, demonstrations, online references, powerful simulations, tips, tutorials, and wizards (Carliner, 1998). Our efforts are directed toward blending the excitement of games with compelling science content to "create interesting, realistic contexts that encourage the active construction of knowledge by learners" (CTGV, 1993, p. 52). The work of John Bransford and the Cognition & Technology Group at Vanderbilt (CTGV) pioneered the way for exploiting the power of technology to achieve serious instructional goals. In their interactive videodisc program, Jasper Woodbury Problem Solving Series, mathematical concepts were emphasized (CTGV, 1990).

The pedagogical strategies of situated learning (Brown, Collins and Duguid, 1989) or anchored instruction (CTVG, 1993) can provide the prerequisite framework on which to build multimedia environments that have significant learning outcomes. The task of blending best practice in education with the bells and whistles of multimedia is challenging. Perhaps that is why it is more common to find multimedia, particularly on the web that is rich in technique, but shallow in content. The use of technology for technology's sake rather than wrapping technology around tried and true learning principles is a common pitfall.

Much of what is available on the web is a compendium of information with little structure or scaffolds on which students might build their own knowledge. Some observers have charged that this has led to 'lazy' learning models, "where the student is simply confronted with a vast resource and left unguided" (Weller, 2000, p.9). This type of exploratory learning can sometimes have an effect opposite from that which was intended. It can cause disorientation, difficulty in navigating from point to point, and cognitive overload (Wild et al., 1994). To overcome these challenges, several researchers have proposed the use of narrative as a means of providing structure to multimedia materials (Laurillard, 1998; Laurillard et al., 2000; Plowman, 1998). The use of narrative in combination with multimedia has several advantages:

- It sets a context or situates a problem that is to be solved.
- It grounds the use of text, graphics, animation, voice/music and interactivity with a certain mood or theme.
- It allows the layering of learning objectives so that an array of objectives as described by Bloom's Taxonomy (Bloom, 1956) can be woven into the story or problem.
- It exploits theories of constructivism that suggest narrative is a powerful instructional tool (Bruner, 1996).

Interactive Multimedia Options

The term "interactive multimedia" can mean a wide range of things. One of the first tasks of an instructional designer is to determine who is the audience and what will best reach them. The delivery options range from producing multimedia CD-ROMs or DVDs to interactive web sites that offer animation, video, and audio by a variety of authoring tools. After consideration of multiple alternatives, the decision to use the web with Macromedia's Flash for the delivery of **The Reconstructors™** was made. The reasons behind this choice were several:

- It eliminates the distribution issues associated with CD-ROMs and DVDs. If one wants to attract an audience in the school, home or other public Internet access environments, then web delivery has a ubiquity that far surpasses the distribution of a disc. The ability to have the site linked from other sites cannot be underestimated;
- Macromedia Flash allows for the expansion of screen size unlike other authoring tools that have a fixed window in which to view the production;
- Flash allows for relatively small files sizes that can be downloaded in segments to address the needs of those with slow bandwidth connections;
- All of the elements of sound, animation, and interactivity that engage learners can be incorporated with Flash; and
- The most significant advantage of Macromedia Flash files is the rapidity with which changes can be made to the site. Based upon feedback from users collected via e-mail, problems can be remedied, or suggestions for improvements can be made almost immediately.

The disadvantages that militate against the use of this authoring and distribution strategy are mainly related to the reliability of schools' connectivity and the use of firewalls that prevent student access. In these instances, we have provided the web site on a CD-ROM for classrooms and this has worked effectively. Another minor disadvantage is the necessity to download the Flash plug-in by those who are not operating with a relatively recent browser.

Weaving Narrative with Learning Objectives

Given that an authoring tool and distribution strategy were determined, the process of moving from learning objectives to final product is non-trivial. Several basic questions had to be addressed:

- What methods, techniques and structuring devices should be used to support students in understanding the science content and demonstrating their knowledge of it?
- What type of narrative is of interest to middle school students?
- What type of story setting and characters should be created that would best match the instructional goals?

- What motivational aids should be included?
- How should the science concepts be presented?

A first obvious step is to articulate what conceptual targets you want encompassed within the adventure game. In our particular endeavor, once we had delineated all the fundamental, as well as the sophisticated neuroscience concepts that were germane to understanding opioids, it became clear that this would have to be an adventure game unfolding in "episodes" or learning chunks. Chunking the concepts also provided an obvious way to support the learner with scaffolds. The interactivity allows one to check at each point whether the learner has acquired the concepts and/or provide feedback. In a gaming environment, these checkpoints, when passed allow the player to "move to the next level." This provides the motivation and captivation typical of adventure games, but adds the educational dimension by focusing on substantive content.

Travel into the FUTURE
Solve Medicinal Mysteries
from the PAST
THE RECONSTRUCTORS
™
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Figure 1. The Reconstructors™ logo features three of the main characters

Adventure games also typically take place in a distinctive story environment or "computer world." In these worlds, the player navigates by clicking or by "picking up " or manipulating objects. Games like Myst, have pioneered this genre. Middle school teachers allowed us time with their students to survey them and follow up with focus groups. The results of surveying over 500 students on their preferences are reported elsewhere (Miller, 2000). We presented our ideas for a setting, a story, and rough sketches of characters to a smaller number of students in focus groups. Through this dialogue the following computer world and corresponding "problem-solving" scenario emerged with the attention to building a narrative that could draw the player through the set of episodes (Figure 2).

THE PROBLEM

It is the year 2252, ten years after the Great Plague that ran through earth's population killing millions and causing the collapse of civilization. Now the earth has entered a new Dark Age, a time when much of the knowledge from the past has been lost.

You are a member of an elite group known as THE RECONSTRUCTORS and you help the People by recovering lost medical knowledge. Your skills are urgently needed because pain-relieving drugs are almost non-existent now. Stories and documents refer to powerful pain-relieving medicine from the past.

Your mission is to reconstruct the knowledge and uncover this medicinal mystery.
All depends on you!

Figure 2. The Reconstructors™ Adventure Mission Statement

A student enters a futuristic world in which he or she assumes the role of a "Reconstructor" charged with re-discovering medical knowledge from the past. The five episodes – Plaguing Problem, Ancient Alarm, Analgesic Anxiety, Mystery of Morpheus, and Alpha and Omega – carry the concepts and narrative forward. Over the course of the episodes, players "solve the problem" while learning about concepts such as neurotransmission, the neurobiology and history underlying drug addiction, pain management, and analgesia.

The actual design process moved to a flow chart of the narrative with interactivity and learning objectives denoted to ensure that the narrative both incorporated the agreed upon concepts and had sufficient interactivity to engage the learner. The creation of storyboards depicting each screen followed. It was this final step that was then turned over to the Flash programmer. An example of a segment of a storyboard follows (See Figure 3).

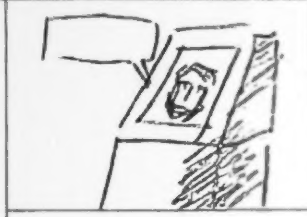
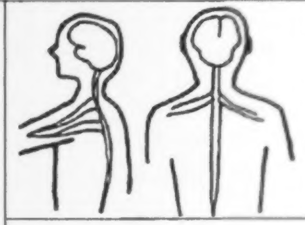
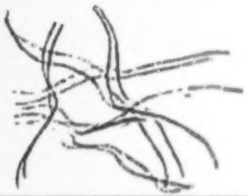
15.		To whoever finds this record, my time is running out. The plague is killing me, and I don't want my data on the nervous system and what each part does to be lost. This system is the key to making smart robots and so much more. Without it, we would not be able to think and move or feel pleasure and pain.
		Interactivity: Button Advance
16.		**Parts of the Nervous System:** Brain Spinal Cord Peripheral Nerves Neurons
		Interactivity: At the top of the screen is the title: Parts of the Nervous System. Underneath this are the 4 parts that are hotlinks. Each time the player clicks on a part of the nervous system, that part lights up in the nervous system diagram (on the left hand side of the screen) and information about it appears on the right hand side of the screen. When the player clicks on neurons it hotlinks to Fred's Nerve2 Neuron sequence
17.		Neurons: link to Fred's Nerve to Neuron Sequence.
		Interactivity: Button advance

Figure 3. Storyboard Segment from "Mystery of Morpheus"

The comments received from end-users suggest that the web site has drawn the attention of students of all ages to investigate topics that may not normally be tremendous attention grabbers. Yet, crafted within the game environment and built around solid educational strategies, the site has proven efficacious in both gaining screen time and teaching difficult topics. Another paper presents the results of pre and posttest field test results with middle school students. Significant gains were made in specific knowledge concepts for students of all socio-economic status groups and for both genders. (Miller, Schweingruber, Oliver, Mayes and Smith, 2002).

Summary

Bruner's (1996) advocacy of narrative as an effective pedagogical approach in science education coupled with the "problem-solving" characteristics of CTVG early work in multimedia were used to produce a web adventure series with substantive science content within an engaging computer world. This process and the decision points helped to generate an adventure series that has been commended by several

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educational organizations. To our initial question, can the power of the game environment be harnessed for educational ends; the answer is a definite yes.

The instructional design steps were:

- Determine scope and specific science concepts.
- Devise "problem" or adventure through dialogue with students.
- Create flowchart of web adventure.
- Produce screen-by-screen storyboard.
- Obtain teacher input.
- Program the resulting product.
- Evaluate outcomes.

The success of the initial series has spawned the creation of a second series, MedMyst, which explores the topic of infectious diseases. (See http://medmyst.rice.edu.) The same procedures described in this paper were employed. Again targeted at middle school students, this web adventure may also find its way into classrooms across the world via the Internet.

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Math and Science Education using Spreadsheets and Modeling.

Simon Mochon
Department of Mathematical Education
Center for Research and Advanced Studies, Mexico
smochona@conacyt.mx

Abstract: In this article we present examples of a series of spreadsheets designed to support teaching math and science at the junior and high school levels. Each spreadsheet has an accompanying worksheet which guides the student in the exploration of the topic contained in the spreadsheet. These materials were born as an extension to two parallel projects. One, has the aim of teaching math with technologies. The other, has the purpose of using mathematical based explanations to support the teaching of the sciences (chemistry, biology and physics). To illustrate the whole package of activities, we will also include part of a worksheet corresponding to one of the spreadsheets presented.

Modeling as a learning strategy and Spreadsheet Modeling

There are two different objectives in the classroom connected to the modeling process. One is to learn to construct mathematical models. The other is to take advantage of this activity to learn some of the topics in the science or math curriculum.

A book that gives a wide view of different attempts to use modeling software in education is the one edited by Harvey Mellar and others (Mellar et al, 1994). The theme of this book is well summarized in the first paragraph of the Introduction, "Modeling and Education" by Harvey Mellar and Joan Bliss:

> *"This book is about modeling in education. It is about providing children with computer tools to enable them to create their own worlds, to express their own representations of their world, and also to explore other people's representations. It is about learning with artificial worlds".*

According to these authors, the purpose of modeling in education is to create "artificial worlds" as images of real phenomena to allow the students to reason and learn with them. This group distinguishes between two different types of learning activities associated with modeling, "exploratory" and "expressive". Exploratory activities are ones in which learners explore models provided by someone else, for example a teacher. Expressive activities are ones which learners construct models according to their own ideas.

Our own experience has shown that modeling in the classroom is really a combination of both kinds, since, to begin with, the computer tool already restricts the way a students can design the model. Actually, for the learning to be effective, it is recommended to let the student express their own views but with some guidance through worksheets.

In our early research (Sutherland et al, 1996), we introduced the spreadsheet as an innovation into students' science classroom (physics, chemistry and biology). We designed worksheets which presented the students a particular scientific situation and guided the students to construct the spreadsheet and analyze the results. In the elaboration of the worksheets we follow a didactic approach known by some authors (diSessa, 1993) as "bottom to top". We started the worksheets with very specific cases and gradually move into a more general analysis of the phenomenon.

Due to its structure, the spreadsheet facilitates the modeling process. But probably one of the most important features of constructing a model on a spreadsheet, is that the labeling of parameters, columns and graphs, allows the user to maintain links with the situation being modeled.

When working in mathematical modeling or in problem solving activities, we move back and forth between the abstract mathematical representation and the physical world. The spreadsheets provide what we can call an "intermediate state". This, in a way, is a link between the abstract and concrete worlds. This artificial world has characteristics of both worlds, so there is no need to go back and forth between them during the analysis and we can stay most of the time in this "in between state".

For the last six years, the Ministry of Education of Mexico has being sponsoring, a national program to teach math and science with technologies at the secondary level (Mochon, 2000 and 2001). Parallel to this educational project, there is an ongoing research project that has as its main purpose to investigate the impact of this technological implementation in students' learning, teaching practices and curricular transformation.

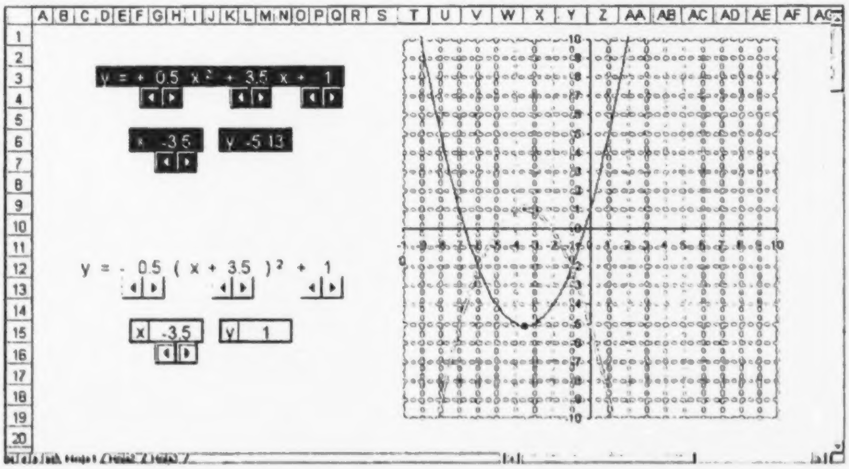
The materials presented in this article were developed as an extension to this educational project. They are both of the expressive and the exploratory type (with the guidance of worksheets). The first of the next two sections shows some of the spreadsheets for the math class. The second shows some of the spreadsheets for use in the science classes (chemistry, biology and physics) which stress the math content of the topic to achieve a deeper understanding of the scientific concepts.

Part of the research that was conducted during these years was to pilot the activities in the classrooms and to improve them accordingly. The spreadsheets presented in this paper are the latest versions of the activities.

Teaching math with spreadsheets

A deeper conceptual understanding of math requires the coordination of several representations like the symbolic, the graphic and the numeric and their connection to real contexts to provide meaning. This can be accomplished using the spreadsheet as a tool with its several representations and embedding the topics (as much as possible) in real situations (mathematical modeling approach). The materials presented in this section have these characteristics.

For example, the following spreadsheet shows an exploratory activity on the topic of quadratic equations (the graphs moves according to the values of the constants in the equations which can be changed by controls).



Notice that there are two different forms of the quadratic equation, one in red and one in yellow. The use of this spreadsheet is assisted by the following two worksheets.

Activity :
Exploring graphically quadratic functions (1).
(uses Excel file "QuadraticExplor")

In this activity you will explore graphically quadratic functions in two of their standard algebraic forms, finding the effect of each coefficient.

Getting acquainted with the spreadsheet: Open the spreadsheet "QuadraticExplor"

On the left side of the screen you will see two quadratic equations (one in red and one in yellow) written in different forms. Each of the three constants in them has a control so you can change the equations as you wish. Do this and observe how the graphs on the right move accordingly.

Below each equation you can find represented a point satisfying that equation. You can change their x value with the controls associated with them. Do this and observe how the corresponding point moves along the graph.

Project #1:

Investigate the family of parabolas:

$$y = x^2 + c$$

Describe the family: ________________ ...

What does the constant c represents? ________________ ...

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Project #2:

Investigate the family of parabolas:

$$y = a\,x^2$$

Describe the family: __________________ ...

What is the difference between the parabolas with "a" positive and negative? __________________ ...

Project #3:

Investigate the family of parabolas:

$$y = (x + r)^2$$

Is there a change of shape or only a change in position? __________________ ...

Describe the family: __________________ ...

What exactly does the value of r represent? __________________ ...

Project #4:

For the second equation, given in the form: $y = a\,(x + r)^2 + s$ *, find out the effect on the graph when each of its constants is changed.*

Project #5:

For the first equation, given in the form: $y = a\,x^2 + b\,x + c$ *, find out the effect on the graph when each of its coefficients is changed.*

Exploring graphically quadratic functions (2).

(uses Excel file "QuadraticExplor")

In this activity you will explore graphically quadratic functions considering the three cases that might occur related to their zeros and showing the equivalence between two of their standard algebraic forms.

Getting acquainted with the spreadsheet: Open the spreadsheet "QuadraticExplor"

(see previous activity)

Project #6:

Write the first equation on the screen as: $y = x^2 - 6\,x + 5$

Using its graphical representation, find the location of the zeros of the above function: $x =$ ____ *and* $x =$ ____

Change the equation to: $y = x^2 - 6\,x + 8$*. Now the zeros are:* $x =$ ____ *and* $x =$ ____

Change the equation to: $y = x^2 - 6\,x + 9$*. Now the only zero is:* $x =$ ____

Finally change the equation to: $y = x^2 - 6\,x + 10$*. What happened with the zeros of this function?* ______ ...

Analyze now the family of parabolas: $y = x^2 + 4\,x + c$ *to find out for what values of c there are two zeros, one zero or no zeros. State your findings here:* __________________ ...

Give some general conclusions about the zeros of quadratic functions: __________________ ...

Project #7:

Write the first equation on the screen as:

$$y = 2\,x^2 + 4\,x + 1$$

Change now the constants of the second equation until you make its graph coincide with the first one. Write below the equation you found:

$y =$ __________________

Verify algebraically below that these two equations are equivalent.

Now write the second equation as:

$$y = (x - 3)^2 - 2$$

Change now the constants of the first equation until you make its graph coincide with the second one. Write below the equation you found:

$y =$ __________________

Verify algebraically below that these two equations are equivalent.

The spreadsheets developed in this fashion cover a wide range of topics within the subjects of arithmetic, algebra, geometry, probability and statistics and higher math like calculus and differential equations. Their main objective is to use the graphical representation as a center piece since visualization helps the student better understand the math concepts.

To give one more example of these exploratory activities in mathematics, the following spreadsheet contains the graphic representation of the binomial and normal distributions. Each of these distributions has two parameters that can be changed with controls, seeing the effect immediately in the graphs. This graphical representation is very useful to compare the two distributions and determine in what circumstances the normal distribution can be a "good" approximation of the binomial distribution.

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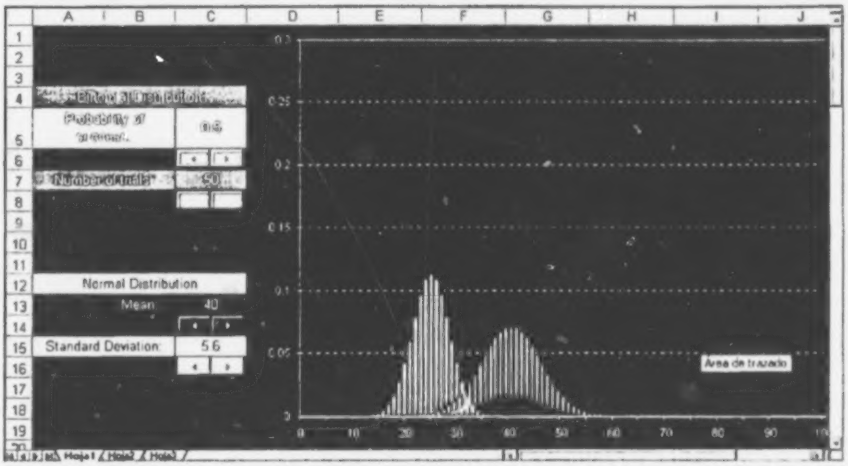

Binomial Distribution
Probability of success
Number of trials
50
Normal Distribution
Mean
40
Standard Deviation
5.6
0.3
0.25
0.2
0.15
0.1
0.05
0
0
10
20
30
40
50
60
70
80
90
100
Área de trazado
Hoja1
Hoja2
Hoja3

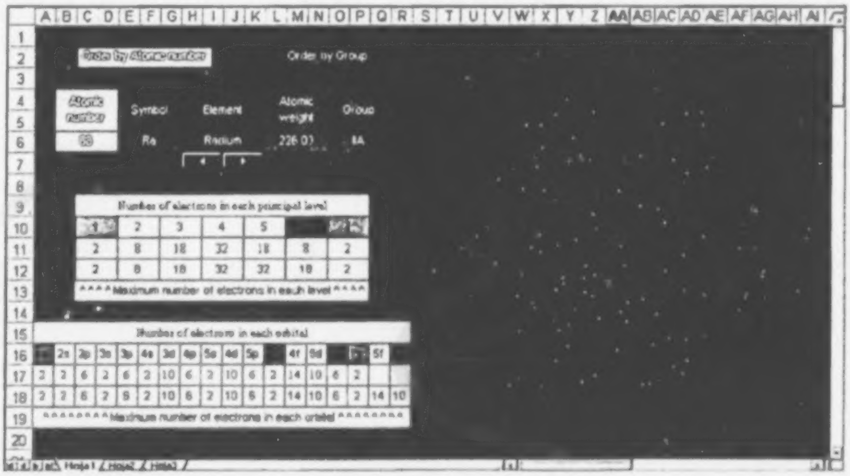
Teaching science with spreadsheets

We can predict natural phenomena because it follows some ordered behavior. Behind this order, we find a few principles that can be formulated mathematically. A deeper understanding of science requires the use of these principles as mental tools.

Thus, the materials presented in this section are based on the idea that the students can achieve a better understanding of some scientific phenomena if they are imbedded in proper mathematical formulations that will give them a more precise structure and the possibility of quantification. The activities in here have the aim of complementing the normal presentation of subjects done by the science teachers in their classrooms.

The applications of this spreadsheet are almost endless and depend on the particular objective of the teacher (some worksheets are already developed to use with this spreadsheet).

The next spreadsheet shows the electronic structure of atoms. In the right side of it, the element can be chosen with a control (the elements can be ordered by atomic number or by groups). The program gives all the information about the number of electrons in each orbital. In the right side of the screen appears a model of the atoms with each of the electrons represented in a color corresponding to the level it belongs. Again, the visual image is very helpful (each electron moves randomly around its orbit when pressing the F9 key).


Order by Atomic number
Order by Group
Hoja1
Hoja2
Hoja3

Atomic number	Symbol	Element	Atomic weight	Group
88	Ra	Radium	226.03	IIA

Number of electrons in each principal level

1	2	3	4	5	[illegible]	[illegible]
2	8	18	32	18	8	2
2	8	18	32	32	18	2

^^^^ Maximum number of electrons in each level ^^^^

Number of electrons in each orbital

[illegible]	2s	2p	3s	3p	4s	3d	4p	5s	4d	5p	[illegible]	4f	5d	[illegible]	[illegible]	5f	[illegible]
2	2	6	2	6	2	10	6	2	10	6	2	14	10	6	2		
2	2	6	2	6	2	10	6	2	10	6	2	14	10	6	2	14	10

^^^^^^^^ Maximum number of electrons in each orbital ^^^^^^^^

Finally, the last spreadsheet shown below is a simulation of the system spring+mass. The user can fix the values of the mass, the spring constant and the damping constant. Also, he can decide on the initial position and

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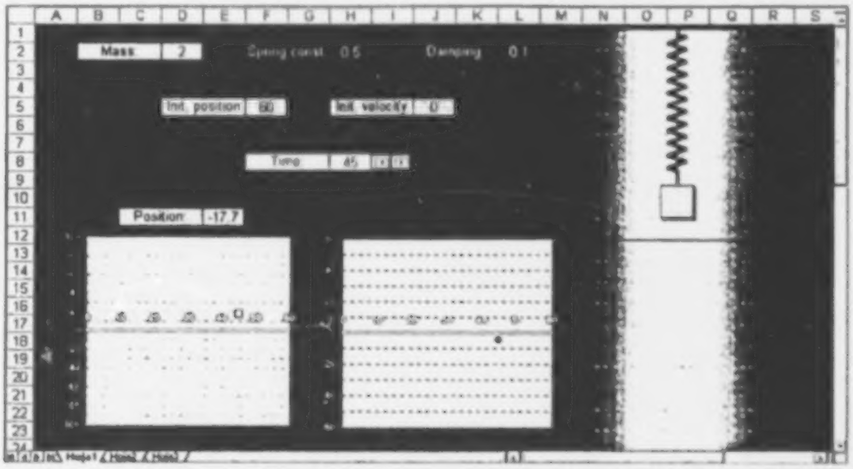
velocity of the mass. With the control associated with the time, the simulation can be moved forward and the graphs will show the position and velocity of the spring (the spring on the right moves up and down accordingly).



Mass 2
Spring const 0.5
Damping 0.1
Init. position 60
Init. velocity 0
Time 45
Position -17.7

Conclusions

As we could see from the examples given in this article, the spreadsheet is a very versatile tool to design all kind of exploratory activities in math and science. It has the important characteristic that we can combine together the numerical and graphical representations of the situation being presented. In addition, the controls in it give a dynamic component which is very effective for visualization purposes (obviously, this feature can not be shown in the static pictures presented in this paper).

An added extra feature of the spreadsheet is that through all the labels in tables and graphs, the spreadsheet keeps a close contact with the phenomenon being modeled or the problem being solved. This is very important when the spreadsheet is used for educational purposes.

Another crucial idea hidden in the modeling of the spreadsheet is that recursive relationships are the main mode to express formulas in it. This suggests that we should bring into the classrooms of math and science, more consistently, this type of recursive math.

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A Gathering of BUGS

Mark Mortensen, PhD
Dept. of Technology and Cognition, University of North Texas, markmort@unt.edu

Abstract: The purpose of this video will be the presentation of first year, after-school activities of participants in the Bringing Up Girls in Science (BUGS) grant project. The video will observe the 4th & 5th grade participants in the science lab, interview the participants and interview the lab instructors.

Science and Mathematics Teachers Perceptions' of Graphing Calculators and Change

Scott W. Slough
Department of Natural Sciences
University of Houston-Downtown
Houston, TX USA
sloughs@dt.uh.edu

Gregory E. Chamblee
Department of Middle Grades and Secondary Education
Georgia Southern University
Statesboro, GA USA
gchamblee@gsvms2.cc.gasou.edu

Abstract: The purpose of this study was to determine mathematics and science teachers' initial perceptions of change prior to their participation in a year-long professional development program that emphasized integration of the math and science utilizing graphing calculators. The results indicate that as a group, the teachers (1) exhibited high information stage concerns and collaboration stage concerns; and (2) are more aware of the graphing calculator and its potential than previous groups. Mathematics teachers were more familiar with utilizing graphing calculators while science teachers were more familiar with utilizing computers. Mathematics teachers reported higher technological proficiency, but their stage concerns were not statistically different from the science teachers.

Mathematics and science educators include the use of technology as a common goal in their most recently developed standards. The National Council of Teachers of Mathematics *Principles and Standards for School Mathematics* (NCTM, 2000) suggests a framework for the types of technology-based activities and content that should be taught. Similarly, the National Research Council's *National Science Education Standards* include suggestions for science education reform in technology-based content and professional development (NRC, 1996). Further, both documents point toward significant increase in the integration of math and science. Reading between-the-lines, technology is encouraged as a tool that can facilitate such integration.

Graphing calculators show promise for integrating mathematics and science. There is a growing body of recent research into the use of graphing calculators in the teaching of algebra (Beckman, Senk, & Thompson, 1999; Dunham & Dick, 1994; Embse & Yoder, 1998; Milou, 1999;); in both chemistry and physics (Adie, 1998; Roser & McCluskey, 1999; Taylor, 1995); and even the integration mathematics and science (Tharp et. al.).

The State of Texas has developed the Texas Knowledge and Skills (TEKS) (http://www.tea.state.tx.us/teks/). The TEKS clearly extend the national reform documents by specifically indicating the use of graphing calculators in algebra:

> Students use a variety of representations (concrete, numerical, algorithmic, graphical), tools, and technology, including, but not limited to, powerful and accessible hand-held calculators and computers with graphing capabilities and model mathematical situations to solve meaningful problems (§111.32. Algebra I (One Credit) #5).

Beyond the explicit statement that graphing calculators be used in the teaching and learning of mathematics, the new Texas Assessment of Knowledge and Skills (TAKS) (http://www.tea.state.tx.us/student.assessment/taks/index.html) **requires** the use of graphing calculators on the state-mandated tests at the ninth, tenth, and eleventh grades for math and at the eleventh grade for science.

Theoretical Framework

The implementation of technology will require change in the classroom. One model that has been utilized to inform the decision-making process when innovations are introduced is the Concerns-Based Adoption Model (CBAM). CBAM states that successful implementation of an innovation is a process not an event (Hall & Hord, 1987; Fullan, 1991; Friel & Gann, 1993), developmental in nature (Hall & Hord, 1987), and a highly personal experience for each teacher (Hall & Hord, 1987). Hall, George & Rutherford (1986) define concerns as the feelings, thoughts, and reactions that individuals have about an innovation or a new program that touches their lives. To measure these concerns, Hall, Wallace & Dossett (1973) developed the Stages of Concern Questionnaire (SoCQ). Initial research on the instrument construction verified the existence of seven stages in the concerns process: awareness, informational, personal, management, collaboration, and refocusing, with internal reliability for individual scales ranging from r=0.64 to r=0.83 (Hall, George & Rutherford, 1986).

Participants

The participants in this study are high school math and science teachers from a single large urban school district in Texas participating in a year-long professional development program that is ultimately aimed at improving math and science achievement. Within the professional development program, the teachers are divided into two sub-groups. The two subgroups are Algebra I (ALG I) with Integrated Physics and Chemistry (IPC) and Algebra II (ALG II) with Chemistry I (CHEM). The teachers are paired because the vast majority of students who are enrolled in ALG I will also be enrolled in IPC and because there is significant overlap in the knowledge and skills that are taught in each course. There is less overlap with students for the ALG II and CHEM group, but curricular overlap is strong enough to warrant the pairing. The teachers are recruited through their building principal and science department chairs and must participate as pairs, one from math and one from science.

The focus of the professional development is on increased communication and collaboration between math and science teachers within the district and specifically in individual schools, with a heavy emphasis on technology. Graphing calculators (TI-83s), Calculator-Based Laboratories (CBLs), and Calculator-Based Rangers (CBRs) with multiple probes were provided to all teachers at the beginning of the program to be used in all subsequent workshops. Each teacher will ultimately receive a minimum of 125 hours of professional development that culminates in a two-week summer institute. Upon the completion of the 125 hours, each teacher will receive a set of ten calculators, CBLs, and CBRs, an overhead panel for display purposes, and up to four additional probes for use in their classrooms.

Methods

Research questions

1. Are there significant differences between the holistic stage concerns profiles for mathematics and science teachers?
2. Are there significant differences between the stage score profiles for mathematics and science teachers?
3. Do the demographic profiles differ for mathematics and science teachers?

Data was collected from a total of forty-three secondary mathematics and science teachers during their respective introductory sessions in September 2001. There were 21 science teachers and 22 mathematics teachers.

All participants were administered the Stages of Concern Questionnaire (SoCQ) on the first day of the in-service. The SoCQ is a thirty-five item Likert-scale instrument that contains seven levels of responses. The responses range from 0 = irrelevant to me, 1 = not true to me now, to 7 = very true to me now. A demographic survey also was administered at this time. The survey collected two types of information: background and technology-using history. Background information collected included gender, years teaching, highest degree earned and age. Technology-using information collected included self-rating of the ability to integrate graphing calculators and computers in the classroom, in-service training received, and number of years integrating a graphing calculator and computer in the classroom.

Mean stage scores and total concerns score were calculated for mathematics and science teachers. To determine overall concerns levels, two analyses were performed. First, mean stage scores were converted to percentile ranks based on the norms presented by Hall, George & Rutherford (1986). Second, a peak stage score analysis was calculated for each group. Peak stage scores are defined as the stage at which an individual has his or her highest percentile rank score on the seven concern stages (Hall, George & Rutherford, 1986). Finally, analyses of variance (ANOVAs) were performed on mean stage scores and total concerns score to determine subgroup differences. Since there are seven stages of concern, the significant p-level for mean stage score ANOVAs was $p=0.007$ ($p=0.05/7$). Total score ANOVAs used a significant p-level of $p=0.05$.

Results

Mathematics teachers had the highest percentile concerns at the awareness and information stages and their lowest percentile concerns at the management and consequence stages (Awareness=81, Information=80, Personal=76, Management=47, Consequence=48, Collaboration=68, and Refocusing=42). Science teachers had the highest percentile concerns at the information stage and their lowest percentile concerns at the management and refocusing stages (Awareness=84, Information=91, Personal=85, Management=56, Consequence=63, Collaboration=80, and Refocusing=57). Overall, the percentile scores demonstrate that both groups are very aware of graphing calculators and their uses and want to learn more about how this technology impacts their classroom. The profile also demonstrates that the groups were users of the technology in the classroom but still desiring information on how to best integrate the technology to impact student achievement.

No significant differences ($p<0.007$) were found between the two groups of teachers. Thus, while percentile scores varied slightly as to highest and lowest percentile concerns, all participants entered the in-service with similar expectations.

Demographic analysis found that (1) participants were predominantly female (>60% for each group), (2) most chemistry teachers had a masters degree or higher while most mathematics teachers had only a bachelor's degree, (3) years of teaching experience was related to course taught (more years taught the higher the level class), (4) most mathematics teachers had never integrated computers in instruction while most science teachers had integrated computers in their instruction, (5) almost all mathematics teachers had integrated graphing calculators in the classroom while science teachers had used graphing calculators in instruction, and (6) science teachers self-rated themselves as novice users of graphing calculator and intermediate (almost experts) at using computers in the classroom while mathematics teacher considered themselves novices at integrating computers in the classroom and intermediate (almost experts) at using graphing calculators in the classroom.

Summary

Both groups entered this in-service very aware of the technology being discussed in the in-service and wanting to learn more about applications of the technology in the classroom (high information stage concerns). Needs focused primarily in the areas of how will this curricular change impact me and my teaching (high personal stage concerns) and how can I work with others to help bring about this curricular transition (collaboration stage). This early awareness of graphing calculators and interest in the integration process is atypical for those entering previous math, science, and technology professional development programs (Chamblee, 1996; Chamblee & Slough (in press); Slough 1998;). This warrants further investigation.

Demographical data present distinctly different groups. This fact agrees with current research in this area (Chamblee, 1996; Chamblee & Slough (in press); Slough 1998;). Science teachers were more familiar with integrating computer applications in the classroom while mathematics teachers were more familiar with integrating graphing technology in the classroom. This finding is consistent with emphases in both disciplines. Also, math teachers rated their technical proficiency high with regard to the graphing calculator and the science teachers rated themselves as novices. Yet, there was no statistically significant difference between the groups mean stage concerns. At first, this may appear to be problematic with regard to either the self-reporting or the CBAM model. When, in fact, mere technological proficiency does not make one immune to the same stages of concern. This warrants further investigation.

Similar research questions were utilized to analyze the differences between the ALG I, ALG II, IPC, and CHEM teachers who participated in the professional development program. Due to the limited space, the results are discussed in a separate paper (Chamblee and Slough (in press B)).

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Integrating Remote Scientific Instrumentation in the Curriculum to Support Inquiry: Case Studies in K-12 and Teacher Education

Umesh Thakkar, Glenn A. Fried, Benjamin A. Grosser, Scott J. Robinson, Daniel E. Weber
University of Illinois at Urbana-Champaign
Urbana, IL 61801

Michele A. Korb
Marquette University
Milwaukee, WI 53233

Judy A. Lee
Blocker Middle School
Texas City, TX 77590

Abstract: This short paper describes our ongoing plans to gain in-depth understanding of how teachers and teacher educators are integrating remote scientific instrumentation technology to facilitate inquiry in classrooms by participating in the Bugscope project.

Introduction

As K-12 schools and colleges of education respond to efforts to reform science, mathematics, and technology education, changes are occurring in learning, teaching, and research activities in classrooms (e.g., National Commission on Mathematics and Science Teaching, 2000). Bugscope[1] is an example of such changes. Bugscope allows students, teachers, and teacher educators to study insects and other arthropods through remote access and control of an environmental scanning electron microscope (ESEM). The ESEM is an advanced electron microscope that allows high resolution examination of specimens in their natural states; for example, wet, oily, dirty, non-conductive samples. To participate, teachers and teacher educators submit an online application. Included in their application is a brief proposal where they describe specific classroom plans to use Bugscope. Classrooms mail in insect specimens in advance, and these are prepared and inserted into the microscope. Then, using a World Wide Web (web) browser from their classroom computers, students, teachers, and teacher educators remotely operate the microscope to examine their specimens. Each classroom has opportunities to participate in Bugscope any number of times, and there is no cost for classrooms to participate. A goal of Bugscope is to provide sustainable remote microscope access to K-12 and teacher education classrooms nationwide at a rate of 50 classrooms per year.

Background

Although remote instrumentation is today an exotic and expensive technology, it is becoming part of daily practice in science. This suggests two things (Bruce et al., 1997). First, students, teachers, and teacher educators need to learn more about it because this kind access and control is becoming an integral part of doing science. Second, it is likely to become much more commonplace and less costly in future. The particular instruments and scientific domains may differ, but understanding of the principles underlying this mode of learning through projects like Bugscope is generalizable. Despite the importance of remote instrumentation, few projects have used it for K-12 and teacher education instruction. Two examples are mentioned here. One project is Chickscope[2], which allowed students and teachers from ten classrooms ranging from kindergarten to high school, including an after-school science club and a home school, to study the 21-day chicken embryo development using a remotely controlled magnetic resonance imaging instrument. Another project is MicroObservatory[3], which allows high school students and teachers to control a network of five automated telescopes over the Internet. However, such projects are not applicable across K-12 and in teacher education classrooms. Also, rarely do such projects allow sustainable, real-time remote access and control capabilities to classrooms across the nation, as does Bugscope.

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[1] http://bugscope.beckman.uiuc.edu
[2] http://chickscope.beckman.uiuc.edu
[3] http://mo-www.harvard.edu/MicroObservatory

Challenges of Inquiry-based Learning and Teaching

Recent reports concur that inquiry-based projects successfully facilitate learning. One report has suggested that inquiry-based instruction "allows students to engage in practices of scientists and to construct their own scientific knowledge through investigation rather than memorization" (Linn et al., 2000, p. 2). Another has called for an emphasis on inquiry in teaching and learning across K-12 (National Research Council, 2000). Such reports highlight importance of improving teacher preparation programs through use of information technology. However, getting teachers and teacher educators interested and familiar with inquiry and providing support for them, can be challenging (Thakkar et al., 2001).

Since March 1999, more than 60 classroom sessions in more than 25 US states have participated in the Bugscope project. A report documented that Bugscope serves the purpose of stimulating an interest in the scientific research enterprise among students and teachers across the nation (Thakkar et al., 2000). Yet additional challenges remain. For instance, how does Bugscope contribute to the growth of teachers and teacher educators in understanding the possibilities of remote scientific instrumentation for learning, teaching, and research? How does remote scientific instrumentation technology support student, teacher, and teacher educator collaborations and expand participation in science (especially for underrepresented groups). In general, how do we build a community for inquiry learning?

In order to address such challenges, we are collaborating with Bugscope participants, such as Korb and Lee (co-authors), to develop case studies across K-12 and teacher education classrooms. We plan to use a variety of data (such as classroom proposals, teacher surveys, image acquisitions, session logs, and electronic communications). For instance, Korb wrote in the proposal to use Bugscope in her secondary and elementary science methods course: "*I am interested in modeling the use of technology to these future educators. ... I also feel that having some control over the process of inquiry and discovery when using the Internet is extremely valuable for young students to construct their own knowledge. ... How exciting to be able to choose a specimen, send it to be processed for EM imaging and then explore particular driving questions. ... I will use the process and the final images to show preservice teachers how to further investigate insect and animal life cycles, anatomy, animal diversity and contribution to ecosystems.*"

These collaborations will help to provide a deeper understanding of the impact of remote scientific instrumentation in learning and teaching. Additionally, it will provide an understanding of how this technology is shaped by different classrooms in different ways.

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Measuring and Identifying Trees with the Help of Technology

Marvin N. Tolman
Professor, Department of Teacher Education
Brigham Young University, USA
Marv_Tolman@byu.edu

Eula E. Monroe
Professor, Department of Teacher Education
Brigham Young University, USA
Eula_Monroe@byu.edu

Michelle P. Orme
Graduate Student, Department of Teacher Education
Brigham Young University, USA
mrpend@juno.com

Abstract

Digital cameras, spreadsheets, and selected websites enable teachers of elementary and middle school students to "take only pictures, leave only footprints" as they tackle the problem of measuring and identifying trees. In the task described in this paper, teachers experience the integration of the national science, mathematics, and technology standards. They develop a unit of measurement, then measure indirectly, using informal notions of similar triangles. They hone observation and classification skills using an online dichotomous key.

An important focus of our work in teacher education is the authentic use of technology in learning the content and processes of science and mathematics. Tasks that support elementary and middle school preservice and inservice teachers in their development of content and pedagogical knowledge while making appropriate use of technology are not readily available. A team of five individuals—two science educators, a mathematics educator, a graduate student, and a public school classroom teacher—collaborated to develop a task entitled "Measuring and Identifying Trees with the Help of Technology." This task is available at http://msed.byu.edu/pt3/tree.html. We believe it contributes to the following goals for the use of technology in teacher education.

1. Supporting teachers as they learn important science and mathematics concepts and processes (e.g., observation and classification skills; development of a consistent unit of measurement; and use of ratio, proportion, and similar triangles in indirect measurement).
2. Modeling the authentic use of technology in a learning task. For us, authentic use of technology means that the task is much richer for the learner than it would be without the use of technology.

This task is organized as follows:

1. Establish the need for learning to measure the height of a tree or another tall object through indirect measurement.
2. Develop the concept of *pace* as a nonstandard unit of measurement; then, using a spreadsheet and finding the mean for paces of individuals within the group, develop the length of a consistent pace for that group.

3. Applying informally the concepts of ratio, proportion, and similar triangles, measure the height of a tree using a stick as a side of the triangle and the length of a consistent pace as the measure of length.

4. Observe characteristics of the tree in addition to its height (bark, leaves, twigs, seedpods, coloration, etc.); gather data through field notes and use of the digital camera (no collection of artifacts permissible except through virtual means).

5. Using field notes and photographs, consult a dichotomous key on the Intemet to determine the possible identity of the tree. The following websites should prove helpful:

   http://www.cnr.vt.edu/dendro/dendrology/syllabus/key/key1.htm —This site helps you identify trees using the characteristics of leaves.

   http://www.cnr.vt.edu/dendro/dendrology/syllabus/twigkey/key1.htm —This site helps you identify trees using the characteristics of twigs.

   http://www.enature.com/guides/select_trees.asp —This site will help you identify a tree by leaf type or other attributes, or you can enter a tree name for information about the tree.

   http://www.noble.org/imagegallery/woodies.html —This site provides images and information on selected trees and shrubs.

Ideally, the first stages of this task should occur in an outdoor environment, especially the measurement of the heights of trees. In the absence of trees with foliage, however, the experience of measuring trees can be replicated through the projection of photographs of selected trees on overhead screens around the room.

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SECTION EDITOR:

Cathy R. Seymour, Northwestern State University of Louisiana

Though recognized as a legitimate and positive aspect of teaching and learning, simulations are being more widely used by authors for the 2001 SITE annual than in previous years. However, the wide variation in defining "simulation" in education has continued to contribute to the small number of studies in this area. The range in availability of hardware, courseware, and software in international locations where some of these investigations were done certainly has contributed to the variation in sophistication of data treatment. Additionally, though the global economy and international testing have moved countries closer in terms of educational goals, differences in educational philosophies have certainly contributed to the issues addressed and undertaken by this year's contributors.

With only nine submissions, the variety of definition is again seen as a strength of this technology driven teaching strategy The way educators have chosen to define and then implement technology in the classrooms of their districts and countries is as varied as the geographic locations of the schools. Regardless of the complexity or simplicity of the technology available or the cognitive entry level of the personnel proposed for using the innovation, readers can certainly find a situation or discipline that mirrors their own. Reports of technology use for teacher-preparation as well as use with the P-12 students also increase variation.

Papers submitted range from virtual classrooms in qualitative physics to reflective teaching and critical thinking simulations. Perhaps papers dealing with lesson planning and how simulations can serve as safe-havens for "practice" of skills learning in the pre-service teacher preparation classroom either individually or in groups show the technology version of "practice makes perfect." Specific studies of how technology can be used to increase the "liveliness" in classrooms for today's technology savvy students may say it best through the use of video, audio and animation.

Simulations have the ability to advance the experiential knowledge of the students using them regardless of age, stage, or location. For this, the studies promoting the use of technology in simulation should be commended.

3-D VIRTUAL CLASSROOM TECHNOLOGY

Kimberly Arseneau Miller
Department of Reading, Special Education, and Instructional Technology
Towson University
USA

Angela Glod
Department of Reading, Special Education, and Instructional Technology
Towson University
USA

Abstract: Travel to another country? Perform experiments without expense? All of this is now possible for the average student who has access to a computer in a virtual classroom. The implications for virtual 3-D technology in an online or traditional classroom are practically limitless. Online instructors consistently struggle with the task of creating a sense of community among students who often feel isolated or removed due to the lack of face-to-face interaction. Traditional classroom instructors often struggle with the task of creating real-life learning situations due to financial or distance barriers. Activeworlds is a software company that has developed 3-D technology that makes it possible for educators to create the virtual classroom that they desire. This presentation will be an overview of the 3-D virtual classroom as an emerging component of online and computer-assisted learning. Both an online class lesson and a real classroom activity using virtual 3-D technology will be demonstrated.

REFERENCES:

www.activeworlds.com

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Mandy Tatum
VP, Educational Universe
Activeworlds

Simulated Lesson Design Studios

Willis Copeland, University of California, Santa Barbara, US

Teacher education programs have traditionally found it difficult to provide their credential students with the opportunity to practice complex skills such as lesson planing in ways that offer both detailed and constructive feedback and sufficient opportunity for student reflective response to practice. That is, it is easy to communicate to students the mechanics of lesson planning but much more difficult to engage students in repeated opportunities to plan lessons under conditions that allow them to examine closely the products of their planning with the benefit of focused feedback.

Preparing Credential Students to be Lesson Planners

The PT3 Program at UC Santa Barbara is working to develop an approach to provide our credential students with opportunities to practice, in controlled settings and with appropriate feedback, the designing of learning experiences (lessons and units) that make appropriate use of technology. We are designing what we call "Simulated Lesson Design Studios" into which our students could "enter" as individuals or as small working teams. Each SLDS will be specific to a grade level and content area and will contain the necessary tools and resources to allow our credential students to create a lesson or unit for a specified classroom of pupils. Each SLDS is contained on a CD-ROM and features a user interface built on the metaphor of a workshop with workbenches, tools and drawers of materials. "Tools", located on various "workbenches" in the SLDS are used to create such things as learning objectives, assessments, needed materials lists, and lesson delivery sequences and to assemble these components into a printable "lesson/unit plan" file. Other "workbenches" contain electronic tools useful, for example, in creating computer-generated graphics and multimedia components.

Resources, found in "materials drawers" in the SLDS include background for the teacher concerning the lesson's content, a list of California Content Standards, a selection of available print materials for pupils that might be pertinent to the lesson, potentially helpful websites, computer applications that might be appropriate for pupils, videotape resources that might be used in the lesson, technology resources that are available in the school and thus could be planned for in the lesson, background information on pupils in the class for which the experience is being designed and even samples of activities that have been designed by other teachers and that might be incorporated into the complete lessons/units that the students are designing. Credential students would have to decide which tools and resources to use, and in what order. It would never be appropriate to use them all. There would not be "one best" way to proceed and different students working in the same workshop would very likely create discernibly different products.

We are in the process of creating a number of these Simulated Lesson Design Studios. Our students will then be assigned, outside of class time, to enter an SLDS and create learning experiences that make creative and appropriate uses of technology. Meeting in class sessions after such creative work is finished, the students' products can be presented, examined and compared. Because all students will have had access to the same tools and resources and will have designed for the same class of pupils, differences in the resulting products can be compared and, as is typical of all good design studio work, individual students' creative thinking and understanding of possibilities can be expanded.

Our development work has now turned to disciplined inquiry focused on both the process by which students engage in the task of lesson design, review and reflection and the results of engaging in this process in terms of students' planning ability.

Interactive Session

We propose to offer an interactive session at SITE 2002 in which attendees can 1) work with sample Simulated Lesson Design Studios as would credential students, 2) hear about the results of our observational studies of credential students at work in SLDS's, and 3) engage in a discussion of various pedagogical strategies that might be used with credential students and the possible advantages and disadvantages of these approaches. Attendees will be invited to explore questions such as the following: Would SLDS's be better used by individuals or by small working groups of credential students? What might be the expected characteristics of lesson plans that these students might produce from within a SLDS? How could students' reflection on and learning from an experience in an SLDS be best facilitated? At what stage in a credential student's professional development would work in SLDS's be most appropriate? How many separate sessions in an SLDS be necessary for real leaning? How woulda university faculty member most appropriately evaluate a credential student's work in an SLDS?

LIGHTS, CAMERA, INTERACTION: PRESENTATION PROGRAMS and the INTERACTIVE VISUAL EXPERIENCE

Beverly J. Hagen, Ph.D., University of Nebraska at Omaha, School of Social Work, USA,
bhagen@home.com

Most college students have grown up with television and video games either as an enrichment of their lives or as a babysitter. After having been exposed to a myriad of visual stimulation experiences throughout the years, many students are dependent upon seeing, or interacting when involved in various learning opportunities.

Teacher education courses are particularly fertile ground for visual experiential opportunities in the field of practice. The synthesis of theory and experiences through presentations employing not only words, but videos or other images illustrating concepts has the potential to hold the students' interest as well as stimulate energy.

I will describe in this paper how to use a computer presentation program to increase the liveliness of learning experiences through video, audio, and animations. Group process, a major component of teacher education will be the focus of the video.

A digitalized video vignette portraying a situation in which both the teacher and the students in the classroom try to draw the non-responsive student into a discussion will be used as the demonstration. The teachers in training will be asked to share their interpretations of the class's interaction on the video, and their comments will be categorized and prioritized in a manner that will help them both understand and be a part of the process. Encouragement of critical thinking, along with sharing ideas with their peers in the class, increases the possibilities for both extension of knowledge and experiential learning. Seeing how others draw conclusions in vivo is, in itself, a valuable group experience.

The slide show is set up in the following manner:

1. A short verbal description (approximately 3 slides) of the goals of the slide presentation. This includes animations and photos.
2. A slide with 40 seconds of digitalized video with a vignette illustrating the behavior of a student reluctant to participate in class and the response of the class to her.
3. A succession of slides that stimulate the discussion process by introducing various questions to encourage students' synthesis of the situation. Suggestions provided by students re: teacher and student intervention will be displayed on the slides, prioritized and integrated into the broader learning goals of the course.

In my experience, using presentation programs that illustrate specific points through videos or photos along with encouraging students to become part of the presentation process is most effective in increasing student interest, sharing ideas as a class, and integrating theory and practice.

To avoid the pitfalls of irrelevance or lack of participation of students, the points illustrated should be clear and concise. The video or other media must illustrate the class or student problem well and provide opportunities for creativity in interpretation and critical thinking. The instructor, of course, should be experienced and well prepared, and the students must be equipped to participate through reading or other assignments or experiences pertaining to the material to be demonstrated.

Although problems taping and digitizing material may prove a barrier in some institutions, creative solutions are often available through University Television, cable TV stations that are required to do public service, or "home made" video vignettes subsequently digitized through campus media services. It may not be as slick as some day time soaps, but live action examples coupled with student participation and problem solving has the potential to combine theory and practice in an interesting and energizing manner.

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Web-based Simulations on Chemistry and Physics Lab Activities

Han-Chin Liu
Curriculum and Instruction
Iowa State University
United States
liuhc@iastate.edu

Abstract: This demonstration presents online simulations built with Macromedia Flash 5.0. The simulations provide interactive interface for undergraduate students to change variables of an online chemistry lab to test theories and phonomena that are not easy to observe or accomplich pricisely in real world lab environment. The simulations seek to provide students with conceptual understanding of scieltific phenomena. Another advantage of using the simulations is that the online accessability of the simulations breaks the limit of different platforms in different computer operation systems. Therefore, students can access the simualtions with browsers in whatever system they are using.

Introducation

When learning scientific theories, students may lack experience in the phenomena that scientific theories seek to explain. Traditional lectures and textbooks typically present abstract symbolic representations of scientific concepts or principles without providing sufficient experience with the phenomena associated with the scientific concept and principles. In addition, some of the phenomena that scientific theories seek to explain are difficult for students to experience. According to Paivio 's (1971, 1986) dual coding theory, information encoded in both visual and verbal formats is better remembered than information which is encoded in only one of these two formats. Today's computer technology can provide dynamic graphics, visuals, and simulation experiences. They can help students relate abstract contents such as mass, velocity, and acceleration to real experiences. Animated visuals can also provide explicit demonstrations that are not easy to be observed simply by naked eyes.

Tools for development

Macromedia Flash 5.0 is a powerful tool in building web-based animations and interactive simulations. Using web-based simulations in learning breaks the limits of time, locations, and computer platforms. Students can explore the content with internet-ready computers without the restrictions of time, locations, and operation systems. The small file size of the Flash simulations also reduces the time for downloading. The program provides features for building graphics and making simple animations. With the feature that allow developers to program for the characters in the simulation, it gives space for developers to manipulate their creativity.

Cntent of The Simulations

This proposed demonstration includes two projects. One is a series of web-based simulations of Newtonian mechanics. Users can test their knowledge of Newton's laws of motion by changing any of the variables such as friction, mass, and the direction of gravity. This series of simulations seek to help students explore the context that is not easy for them to experience in their daily life. By exploring the motion in the siumlated contexts that allow students to change the magnitude and direction of friction, gravity, and the mass of an object, students' alternative conception could be cchanged by the simulations. Therefore, they can build their scientific undersatnding of Newton's laws of motion. The other is a series of on-line chemistry lab simulations used in the introductory chemistry courses for the APL (Active Learning Package) project at Iowa State University. The chemistry simulations are used to provide college students a chance to experience lab situations by changing the variables such as volume of solutions, mass of compounds, and molarity of solutions on the interface of the web pages. The accompanied animations of microscopic level chemical reactions are aimed to make chemical phenomena explicit and to help improve student understanding.

Objectives

My objectives of building the above simulations is to develop a package to further investigate the effect of using computer simulations and also to help students learn science. While demonstrating the simulations, I would like to share with educators and instructional designers how to effectively use web-based simulations in instruction. I also expect to receive feedback from people who are interested in using simulations and animations in education. With insightful feekback, I will be able to modify existing projects and develope future projects for further research with deeper considerations.

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A Qualitative Examination of Student Responses to Test Questions After Simulation Software Use

Kimberly Nyles-Roque
College of Education
Iowa State University
United States
roque@iastate.edu

Abstract: In this study, student explanations for their answer choices on a Physics post-test dealing with motion were examined. During the qualitative examination of the data two trends emerged. First, students often fail to identify all forces involved in a problem. Second, students often fail to comprehend that multiple forces may act simultaneously.

Introduction

It is frequently observed that learning to apply Newton's 1st Law is a difficult task for beginning Physics students (Mahoney, 1994; Wanderee, Mintzes, & Novak, 1994). Andre and others (Andre, Hasselhuhn, Kreiter, Baldwin, Leo, Miller, Mroch, Duschen, Werner, & Akpan, 2000) have conducted two studies to examine the use of simulation software in addressing this learning gap. The first study used a more exploratory version of the software. It was found in this study that males who used the simulation software before reading the text benefit more from its use than did females (Andre, et al. 2000). The second study used a more directive piece of software and evidence was obtained that indicated that both males and females benefited from its use. Qualitative data was gathered during the first study in the form of student explanations of their choice of answer on the post-test. The present study examines the qualitative data set not previously analyzed during the first study.

This study was conducted to extend previous research concerning the use of physics simulation software to teach Newton's 1st Law of Motion to beginning physics students (Andre, et al, 2000). As part of Andre et al's first study, students were asked to explain their answers to conceptual questions dealing with motion. This study explores the nature of the reasoning and conceptions of motion displayed in student explanations of their answers. Specifically, the nature of errors in conception or reasoning were explored

The Study

The design of this study was primarily qualitative in nature. In the original 1993 study students were asked to explain their answer selection on a 46 question, multiple-choice Physics test. These explanations were entered into a spreadsheet program and then coded using the following categories: Correct Response, Explained Answer, Diagram Used, Formula Stated, and Use of Newton's 1st Law. It was possible for a single answer to be coded in multiple categories.

Research questions examined during the initial qualitative evaluation were as follows.

1. Did students express the application of Newton's 1st Law in their explanations?
2. If so, did they apply this law correctly?
3. If Newton's 1st Law was not applied correctly to the problem what mistakes did the students make?

It should be noted at this point that the qualitative results are somewhat limited in scope due to several factors. First, the qualitative examination of the data was not conducted until some eight years after the initial study took place. This made it impossible to triangulate results by interviewing subjects for clarification. Second, many students did not provide explanations of their answer selection for every test question or did not provide explanations that indicated in any manner their thought processes. Third, no information was available to the researcher that indicated the student's previous Physics experience. Fourth, as in any qualitative analysis the science/teaching/software design background of the researcher did guide the direction of the research questions being examined.

Discussion

Two significant trends emerged when examining the explanations of students who answered questions incorrectly. First, these students frequently failed to identify all of the forces involved in the problem. Second, many students misinterpreted Newton's 1st Law in such a manner that they believed one force stops as soon as another starts. The concept of multiple forces at work simultaneously was not attained. It should be noted that the use of multiple forces was not required by every question on the posttest; consequently, these two trends were not observed in every question.

The first trend is perhaps the most significant as it indicates that an average of 56% of students who incorrectly answered a test question, failed to identify all the forces involved in the problem. The following two student quotes were in response to a problem that involved a bullet being fired at a target. At the exact moment the bullet is fired the target is dropped. Students are asked it the bullet will hit the target.

- … the power and speed of the bullet will travel mostly straight while the target falls
- The target is lowered and the bullet will still be going straight

In these examples the students have failed to identify the force of gravity as it is applied to the bullet. Both the bullet and the target will fall at the same rate, so the bullet will hit the target.

The tendency of students to fail to recognize multiple forces at work simultaneously can be illustrated by the examination of their responses to a problem that involves a ball being kicked off the edge of a cliff. Students are asked to describe the path that the ball will take as it falls. The following are three quotes from students that typify this error.

- It must travel out a little before gravity takes it over
- The ball goes straight for awhile from the force then gravity overcomes and pulls it down
- After its inertia is gone it will fall. Thus the straight line and then the angled fall

In these examples students fail to realize that gravity is affecting the ball simultaneously to the kick. Although this trend was only present in an average of 41% of incorrectly answered questions, the trend remains significant in teaching.

Implications

The strength of the trends that emerged from this study indicates weaknesses in both the simulation software used and the instructional setting of the software use. Although students are acquiring a sense of Newton's 1st Law they are not developing the ancillary skills necessary to consistently apply it correctly. The concepts of identifying forces and simultaneous forces need to be more explicitly addressed either in the software or during classroom instruction.

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Integrating Virtual Reality (VR) into Classroom Curriculum

Kenny Ott
Adult and Career Education
Valdosta State University
United States
kott@valdosta.edu

Abstract: This paper discusses the potential use of Virtual Reality (VR) integration into classroom curriculum. Utilizing VR has been difficult for many educators because of resource and financial limitations. Although VR has been in existence for many years, recent technological advances have impacted its practicality and usability in the classroom environment. This paper provides an overview of VR and specifically how VR can be integrated into classroom curriculum. In addition, several Internet sites located on the World Wide Web are discussed that show the potential of VR integration. Virtual reality can be an exciting addition into educational curriculum.

Introduction

The term Virtual Reality can be defined in many ways. VR can be identified as a completely immersive environment or a simple three-dimensional (3-D) animated object. The development cost may start at hundred's of dollars and reach into the million's. Dunning (1998) identified that the cost can vary from very expensive computer-assisted virtual environments (CAVEs) to VR technology that are viewed inexpensively on a personal computer. CAVE products were originally developed by the military and other governmental agencies to provide realistic training. The cost and resource requirements for CAVE products have the potential to easily reach into the hundred's of thousand's or even million's of dollars. In addition, the video gaming industry has been creating CAVEs and immersive VR environments that provide realistic environments. Development of the games produced by this industry is very expensive. Thousands and thousands of dollars are sometimes spent to produce the simple graphics required for some of these virtual scenes.

VR in Classroom Curriculum

Unfortunately, developers of classroom curriculum have found it difficult to create immersive educational environments due to production cost limitations (Dunning, 1998). Advancements in VR techniques have rapidly developed over the last few years. Recent technological advancements have made it affordable and practical to implement new technologies in the classroom (Rodriguez, 2001). New software packages have lessened the cost limitation and increased the usability.

Briggs (1996) identified that VR has several applications in the educational environment. He defined VR as a computer-generated, 3-D simulation in which a student can interact and have the feel of immersion in another environment. Using VR students are able to see distant galaxies or explore complexities of the anatomy. History students can explore ancient historical sites and take a virtual tour of a present day site that would be too expensive and time consuming to visit. English students could take a virtual tour of an ancient Shakespearean playhouse. The possibilities are truly endless.

By experiencing a virtual environment, the experience may be more engaging than simply reading a text or sitting in a classroom listening to an instructor. Students can learn by experiencing an immersive environment that has already been built or discovered. A student may be able to experience something in a virtual environment before dealing with a real life situation (Dunning, 1998).

Winn and Jackson (1999) developed several propositions about VR in educational environments. Some of these propositions are: (1) Virtual Environments (VEs) are less expensive than costly simulators, (2) VEs can be safer than some real-world environments, (3) VEs allow quasi-natural interaction with environments or objects, (4) VEs provide environments where students can learn, (5) VEs are very useful when they simulate concepts that are normally not assessable to the senses, (6) when changes in 3-D perspectives increase learning VEs are very effective, (7) VEs support constructivist concepts (8) participants in VEs actually experience a sense of presence, (9) VEs allows for situating education in a real world context, and (10) collaboration in VEs are an available option. The above propositions are important when considering integrating VR into classroom curriculum.

Immersive Imaging Technologies in VR

One form of VR is the interactive photographic process, sometimes termed "immersive imaging". It is photographic immersive imaging technology that allows the student the opportunity to manipulate photorealistic images. These developments are beneficial because they articulate three-dimensional photographic imagery instead of three-dimensional computer generated imagery. These images allow students to view and manipulate environments or objects from many viewpoints. The VR images can be viewed in a linear and non-linear manner (Trelease, Nieder, Dorup, & Hansen, 2000). By manipulating the image, with the cursor, one may rotate on object and pan in or out, up and down or left to right. Two types of immersive imaging are panorama and object movies (Comer, 1999).

Taking multiple photographs of an object develops object movies. These overlapping photographs of the object are blended together and process using a software package. By moving the cursor a student can manipulate an object and examine it from several different angles. A panoramic movie allows the student to view an environment from 360 degrees horizontally and 180 degrees vertically.

The equipment needed to develop object and panoramic movies can be relatively minimal and inexpensive. Almost any camera can be used to accomplish the photographs. One may use an inexpensive disposable single use camera or a very expensive digital still camera. A tripod with a leveling device, for a panoramic movie a panoramic head is very beneficial. A major item in VR development is of course the software package for gathering, blending, stitching, compressing, and exporting the object or panoramic movie. For object movies a backdrop should be used, such as a piece of black material to provide consistent background color. In addition, a turntable will be used to place an object on to take the pictures. The object will be rotated and photographed from different angles to develop the image. This would be accomplished by rotating the object 12 times every 30 degrees to obtain a 360-degree image. There are numerous companies that have developed expensive turntables, but a turntable such as a Lazy Susan will accomplish the task.

Authoring Tools in VR

Several new software packages are presently available to develop VR. Some of the more popular programs are: Picture Works Technology (Spin Panorama, Spin PhotoObject and VRTour); Live Picture's Reality Studio (Photo Vista and Object Modeler); Enroute Imaging's QuickStitch 360; and QuickTime VR (QTVR) Worx (Panoworx, ObjectWorx, and SceneWorx). QTVR Worx is a comprehensive software package developed for photorealistic visualization of environments or objects. QTVR, developed by Apple, was one of the first authoring VR tools on the market for use on a personal computer. And has developed a compete package that includes everything needed to integrate QTVR into classroom curriculum.

QTVR Worx has been in existence for several years but has recently developed an educators' special edition that includes the VR Worx 2.0 and the VR Toolbox QTVR Curriculum. This edition is specifically designed for educators. This unified set of programs and curriculum includes student handbooks and a teacher's manual. A workbook, included in the package, describes everything a classroom teacher needs to know to integrate virtual reality into the classroom curriculum.

Examples of Immersive Imaging

Several examples of panoramas and object VR movies can be examined on the World Wide Web. The QuickTime VR gallery provided several unique examples of VR movies (www.qtvr.com). An interesting site that simply shows how VR could be used to explore a facility is at the Harvard University http://www.news.harvard.edu/tour/main.html. The site has approximately 75 QTVR movies and takes the visitor on a virtual tour of the Harvard campus. Students can examine a wide variety of anatomy resources at Wright State University (www.anatomy.wrigth.edu/QTVR/QTVR menu) to get a full grasp on basic anatomy. Architecture students can tour a building or house to fully understand constructional considerations and to develop a comprehensive understand of the interior makeup of a structure (http://www.qtvr.com/qtvrshock/index2_2.html). In addition to these sites there are numerous web sites that can be accessed to enhance the tradition classroom curriculum.

Conclusion

Virtual reality, if used in an appropriate manner, can be a wonderful element to add to the traditional classroom curriculum. It is no longer an expensive technology tool that is monopolized by governmental, corporate, or business agencies. VR is a practical tool that can be integrated into education. VR in educational environments is, for the most part, still in its infancy. In the foreseeable future resource limitations, financial constraints, and apprehension about using VR should decrease and educators will eventual use VR on a larger scale. VR integration can be an exciting new addition to the classroom curriculum.

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Comparing Simulation-based Lesson Planning in Experienced and Preservice Teachers

Harold R. Strang
Curry School of Education
University of Virginia
United States of America
hrs9j@virginia.edu

Abstract: First, the four major features of the most recent LP II lesson-planning simulation are described. Next, major variables obtained during participation are defined. Finally, initial findings derived from data generated by collaborating clusters of preservice and inservice cohorts are discussed. The results suggest that, across cohorts, variables cluster to produce a single factor defined by the complexity of participant navigational movement during lesson planning. Furthermore, experienced teachers achieved significantly higher scores on this factor than did their inexperienced counterparts. Regarding planning outcomes, the increased open-ended nature of the simulation experience appears to have yielded results best defined by the interaction among a variety of qualitative variables rather than by unitary values of specific qualitative variables.

Introduction

Over the past several years, an ongoing research project in preservice and inservice teacher education at the Curry School has focused on developing and testing the educational efficacy of software-based lesson-planning simulations (Strang & Clark, 2001; Strang, 2000; Howard & Strang, 2000). The purpose of the current study is to compare the decision-making processes and planning outcomes of experienced and preservice teachers as they complete the most recent LPII simulation. This tool allows participants to create lessons for motivated and unmotivated software-defined students. The results obtained from this study will not only contribute to lesson-planning pedagogy, but when provided to future participants during simulation debriefings, will stimulate personal involvement in group discussions and ultimately help the participants to improve their lesson-planning decision-making skills. After describing the LPII simulation's interactive features and the empirical measures derived from its use, this paper will describe a preliminary study designed to assess the simulation-generated lesson-planning patterns for motivated and unmotivated students exhibited by preservice and experienced teachers representing two levels of teaching.

The LPII Simulation

Interactive Features

Using common keyboard and mouse functions, from 10 to 30 participants, seated in front of PCs in a computer lab, typically engage in the lesson-planning simulation alone or cooperatively in small clusters. As described by Strang and Clark (2001), the LPII simulation experience involves a decision-making sequence defined by the following four-phases.

1. A grade level is selected and the genders of hypothetical high- and low-motivation students are determined.
2. A three-step sequence is completed that defines the content of the simulated lesson. This sequence includes defining the lesson subject (language arts, social sciences, mathematics, or science), selecting a subject area from three appropriate Standard of Learning (SOL) goals (Virginia Department of Education, 1999), and finally, selecting one of three specific lesson goals related to the selected SOL.
3. A series of decisions is made that defines the nature of the lesson activity for each of the two hypothetical students. This major planning phase involves deciding for each student the number of distinct

activities, and, then within each activity, what the student will do, with whom the student will work, what learning aids will be used, what level of thinking will be encouraged, and how long this activity will last. Throughout this phase, decisions may be communicated via options defined by the software or via options authored by the participants themselves. Also, during this phase, participants may include an explanatory note accompanying any recorded lesson-activity decision.

4. The lesson's instructional effectiveness is evaluated for the hypothetical students during the final phase. Any combination of seven software-defined and two participant-defined evaluation options can be used to define how each of the two hypothetical students' lesson-related learning is to be evaluated. This phase also includes the preceding phase's note-taking option.

Navigation within the simulation is extremely flexible. After the high- and low-motivation students are defined, participants can quickly access previously completed phase screens to review and/or edit decisions and then quickly return to the current screen. Navigation within each of the phases also provides maximum flexibility.

Empirical Measures

Two types of variables are generated by participant keyboard and mouse activity during the lesson planning.

1. Process variables. Measures in this category focus on how participants plan the lessons for each of the two students. Specific variables include the length of time devoted to planning the lesson, the number of decision reviews and changes, the frequency of creative participant authoring, and, the frequency and length of participant note taking.

2. Outcome variables. Measures in this category focus on the results of participant planning for each of the two students. Specific variables include the length of student lessons, the number of lesson activities, the opportunity for independent student work, the cognitive demands placed on the student, the technology support integrated into the lesson, and the number of different forms of evaluation employed at the end of the lesson.

The Current Study

Samples of preservice and inservice teachers representing two grade level categories (grades 1-5 and grades 6-12) were drawn from students enrolled in both on-grounds and off-grounds teacher-education courses offered by Curry faculty members. All participants completed the simulation in collaborating dusters of from two to four teachers who, just prior to participating, had self-selectively formed clusters based on teaching level and teaching discipline. The cluster count for preservice and inservice teachers was 54 and 23, respectively.

The goal of the current study was to explore how the preservice and inservice teachers at each of the grade level spans planned lessons for their motivated and unmotivated pupils. A two-step analysis plan was implemented. First, two principal components factor analyses with varimax rotations were performed to ascertain the degree to which the six process and six outcome variables constituted mathematically as well as conceptually distinct factors for motivated and for unmotivated students. Next, a second level of analysis was performed to ascertain the influence of teaching experience, teaching level, and student motivation level on the mathematically defined factor scores. To achieve this outcome, factor scores were submitted to the appropriate number of 2(teaching experience) X 2(grade level category) X 2(pupil motivation level) ANOVAs.

Results

Mathematical Factor Validation

Neither of the two principal components factor analyses yielded viable two-factor solutions. Inspection of both numerical factor loadings and graphical scree plots suggested single-factor solutions. Factor structure replication across the high-motivation and low-motivation data was assessed via the coefficient of congruence statistic (Gorsuch, 1974, pp. 253-254). The resulting coefficient of 0.924 further attested to the validity of the one-factor interpretation. Table 1 displays the factor loadings for the six process and six outcome variables for motivated and for unmotivated students, respectively.

	Factor Loadings	
	High-motivation Student	Low-motivation Student
Process Variables		
Total lesson-planning time	**.83**	**.83**
Number of lesson/evaluation reviews	**.51**	**.53**
Number of decision changes	**.79**	**.62**
Number of authoring entries	**.58**	**.66**
Number of notes	**.73**	**.58**
Average note length	.33	**.57**
Outcome Variables		
Lesson time	**.45**	**.41**
Number of lesson activities	**.60**	.33
% time student worked alone	-.05	.14
% time student created/judged	-.11	.39
% time computer was used	-.02	-.01
Number of different evaluators	.02	-.07

Table 1: Factor Loadings for the Six Process and the Six Outcome Variables

An inspection of the loadings revealed that the single factor was primarily defined by complexity of participants' navigational movements during their lesson planning. The most prominent variable was participant completion time, a measure that embraced the reviewing of previous decisions, the changing of previous decisions, the authoring of personal options, and the inclusion of personal notes variables. Interestingly, the results of the navigational complexity seemed also to yield student lessons that were longer and more likely to include more activities.

ANOVA Results

The results of the split-plot ANOVA applied to the factor scores yielded one significant main effect and no significant interaction effects. Experienced teachers scored significantly higher on the navigational complexity factor ($F(1,73) = 6.75$, $p = .011$). Neither the teaching level main effect ($F(1,73) = .204$, $p = .653$) nor the pupil motivation level main effect ($F(1,73) = .200$, $p = .656$) approached significance.

Conclusions and Implications

Two important observations can be drawn from the findings of the present study. First and most clearly, the quantitative variables generated during participants' completion of the simulation collectively define a dimension anchored on one end by fast, linear planning movements, and on the other end, by slow, nonlinear planning movement. Furthermore, the ANOVA results suggest that teaching expertise is a major definer of a participant's movement pattern. It appears that with their rich collective histories of professional classroom instruction, experienced teachers, in collaborating clusters, were able to use the simulation's movement and authoring freedom to create more complex and perhaps more integrated and more individualized lessons for their simulated students than were their preservice counterparts. Of course, support for the later two planning outcome assumptions requires validation via a qualitative analysis of the records of individual participant clusters. To further support the necessity for such analyses, let's briefly review the second important observation linked to the findings.

No meaningful outcome factor emerged from either of the factor analyses. A comparison of the key attributes of the current simulation and its predecessors may help to explain why a clear lesson-planning outcome factor structure, found in earlier simulation results (e.g., Strang, 1998), did not appear in the current LPII simulation findings. The present simulation was deliberately constructed to offer participants more opportunities both to navigate option screens freely and to do more than point and click when they made planning decisions within these screens. It is apparent that the increased freedom offered in the LPII has yielded a powerful quantitatively defined navigation factor. But variability attributable to an increased number of lesson-planning options, coupled with the opportunity to circumvent preprogrammed options with personally authored alternatives, has yielded lesson-planning outcomes that are highly individualized yet fail to fit clear factor structures. Of course further qualitative analyses of the current data and both quantitative and qualitative analyses of future participant datasets must be performed both to validate the current results and to define more completely the importance of the navigation and outcome variables.

A confirmation of the current findings will result in several practical changes in the LPII simulation's use in teacher training, particularly relating to the content and procedures that define the group-debriefing sessions that follow the creation of the lesson plans. Content shifts may include changing the Compare Profile. This printout, which presently allows participants to compare quantitatively their individual (or cluster) navigation and planning decisions with group averages, may be redesigned to present solely quantitative information on navigation patterns. Two additional post-training feedback instruments may be employed to provide participants the opportunity to compare their individual (or cluster) planning decisions with those of classmates or mentors (e.g., experienced teachers). The Event Record presents a decision-by-decision printout with an accompanying timeline, and the Lesson Plan printout creates an integrated picture of content, activity, and evaluation decisions with accompanying self-authored options and notes.

Procedurally, the debriefing session may be reframed to focus on the sharing of planning decisions via group discussions or one-on-one dialogue exchanges. Such a debriefing restructuring redirects the activity's focus from an information-providing session to one that promotes dialogue exchange tied to personal planning commitments. Finally, with its emphasis on exploration and discovery and de-emphasis on specific pedagogical absolutes, the restructured debriefing will offer more universal appeal as a dialogue tool in teacher education methods courses.

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Nurturing Reflective Teaching in a Computer Simulation Program: An Investigation of Intervention Effects

Yu-chu Yeh
Graduate Institute of Education
National Sun Yat-Sen University
Taiwan
ycyeh@mail.nsysu.edu.tw

Harold R. Strang
Curry School of Education
University of Virginia
United States of America
hrs9j@virginia.edu

Abstract: Nurturing reflective teaching and improving critical-thinking instruction are achievable only when teachers-in-training are provided with opportunities to build professional knowledge and practice reflective teaching skills. The CSTGCTS computer simulation was developed to provide such opportunities. A pretest-posttest control group design was defined by four preservice teacher groups and two treatments. The findings suggest that the employed treatments contributed to reflective teaching and helped enhance professional knowledge and teacher behaviors on the part of preservice teachers during the teaching of critical thinking.

Introduction

Many recent studies have addressed the importance of nurturing reflective teaching in teacher education (Rodriguez & Sjostrom, 1998; Abell, et al., 1998). Recently, the principal author developed the Computer Simulation for Teaching General Critical Thinking Skills (CS-TGCTS) program, a software tool designed not only to cultivate reflective teaching in participants, but also to bring about improvements in their effectiveness in the teaching of critical thinking.

Definitions of reflective teaching suggest that performance with regard to professional knowledge and teacher behaviors are two indices for understanding a preservice teacher's degree of reflective thought in his or her teaching practices (Abell, et al., 1998). Two types of knowledge and three categories of teacher behaviors were identified and incorporated in the CSTGCTS program. Knowledge was divided into content knowledge and pedagogical content knowledge of critical thinking while teacher behaviors were classified into those that contribute to enhancing students' prior knowledge, their critical-thinking dispositions, and thirdly, their critical-thinking skills. Moreover, since increasing self-awareness and provoking mindful learning are crucial for breeding reflective teaching (Collier, 1998), interventions designed to improve these two mechanisms were central in the CSTGCTS program. With the focus on nurturing reflective teaching, this study tested the following hypothesis: Providing immediate feedback concerning teacher behaviors as well as literature related to professional knowledge would increase self-awareness of teacher behaviors and increase mindful learning in professional knowledge, which in turn, would provoke reflection in teaching practices, and, further, result in improved teacher behaviors.

Method and Results

Participants were 50 male and 99 female preservice teachers enrolled in a two-year teacher program at National Sun Yat-sen University, Taiwan. The interactive experience was achieved via the CS-TGCTS's two serial simulations, each of which takes about two hours to complete. The software also provided records of professional knowledge and teacher behaviors that denote critical thinking. Professional knowledge was measured by the *Questionnaire of Professional Knowledge for Critical-thinking Instruction* (Yeh, 1999), whereas teacher behaviors were measured by teachers' actual usage of 12 teacher behaviors in the CS-TGCTS program.

The study employed a pretest-posttest control group design. Participants were randomly assigned to one of the three experimental groups or to a control group. Two treatments were employed. Treatment I included five text files of research-based literature concerning professional knowledge for teaching critical thinking; Treatment II included a bar chart which indicated the usage rate of twelve teaching behaviors during the first simulation. The treatments were administered at the completion of the first simulation. Group A (the control group) received neither of the treatments; Group B received only Treatment I; Group C received only Treatment II; and Group D received both treatments.

The first MANCOVA yielded a significant group effect for professional knowledge, Wilks' ?=.88, *p*

< .01. The ANCOVA results also indicated a significant group effect for content knowledge, $F(3, 143) = 4.10$, $p < .01$, but not for pedagogical content knowledge, $F(3, 143) = .38$, *ns*. Comparisons of the least-square means revealed that participants in Group B and Group D, who received the treatment of professional knowledge, acquired more content knowledge than did the control group, $p < .05$.

The second MANCOVA yielded a significant group effect on teacher behaviors, Wilks' ? =.82, $p < .001$. Follow-up ANCOVAs, similarly, showed significant group effects for all aspects of teacher behaviors, $p < .01$. Comparisons of the least-square means revealed that Group D outperformed the other groups on teaching behaviors for increasing prior knowledge ($p < .05$); Group C and Group D outperformed the control group, and Group D outperformed Group B on teacher behaviors for enhancing critical-thinking dispositions ($p < .05$); Group C and Group D outperformed the control group on teacher behaviors for improving critical-thinking skills ($p < .01$). Moreover, based on the total mean scores on the posttest, Group D outperformed the other groups, $p < .001$. The mean scores for the four groups were 48.77, 53.59, 56.50, and 60.99, respectively. Group D, which received both types of treatments, achieved the greatest improvement in teacher behaviors among the four groups.

Discussion and Conclusions

The hypothesis proposed in this study was fully supported. More specifically, the data confirm that preservice teachers who received interventions for increasing self-awareness and mindful learning benefited the most from the computer-simulated training: their teacher behaviors improved significantly, and they outperformed their counterparts in the control group on all teacher behavior measures. These findings also support earlier conclusions that appropriate feedback increases self-awareness (Yeh, 1999); mindfulness and self-awareness contribute to nurturing reflective practice (Titone et al, 1998); and reflective teaching requires background knowledge (Rodriguez & Sjostrom, 1998).

The data also show that computer-simulated training leads to greater improvements in preservice teachers' content knowledge than pedagogical content knowledge. The insignificant improvement in pedagogical content knowledge most likely reflects the fact that this type of knowledge addresses a much broader scope of understanding than simple content knowledge—a scope that involves teachers' responses to students with differing needs in a specific domain. An alternative explanation is that the CS-TGCTS's instructional components focus more on the acquisition of content knowledge than on pedagogical content knowledge.

In conclusion, nurturing reflective teaching is crucial to successful teacher education. The ultimate goal of emphasizing reflective teaching is to help the preservice teachers gain a deeper understanding of their teaching practices so that they can improve them. The findings provide evidence that the CS-TGCTS simulation is an effective tool for improving preservice teachers' reflective teaching in critical-thinking instruction. Finally, the simulation's educational benefits are strongly related to its capacity to improve professional knowledge coupled with its capability to provide an analytical yet supportive environment for practicing teaching skills.

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SOCIAL STUDIES

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Technology Portfolios in Pre-Service Social Studies Teacher Education

Marsha Alibrandi

A state-mandated technology portfolio required for initial licensure has changed the lives of Social Studies Methods Educators. North Carolinian Social Studies professors meet the challenge in various ways. This case study investigates the types of adaptations made to accommodate the new requirement. As digital archives, lesson plans, webquests, geographic and Census information become available through Internet sources, how are today's initially-licensed teachers being prepared to meet challenges of integrating technology across the social studies?

Since 1999, the North Carolina Department of Public Instruction has required a Technology portfolio for initial teacher licensure. For students earning a license as part of an undergraduate degree, this means that during the 'professional semester,' or the semester of the student teaching practicum, the student must design, implement and field test digital portfolio products developed within the Methods class.

Professor A:
In a one-semester combination of Methods and student teaching, how, when and where are the appropriate practice and tools integrated into the pre service course? Over a three year period, refinements to a computer lab component have resulted in the development of more streamlined lessons, tools and products. The dilemma a teacher educator faces is, "What gets left out of the Social Studies Methods curriculum?

One successful practice has been to add a computer lab component to the Methods class. Meeting on Fridays afternoons from 3:30 to 5:30, the computer lab component is amazingly well attended. Research on prior skills of the students revealed that many have never used the Internet to search for lesson plans or student activities, most had never designed or mounted a website, a few had used some of the functions of PowerPoint, and none had heard of WebQuests.

Discrete lessons are sequenced and presented weekly during the Friday labs. The first four weeks introduce new skills; one each week. Students have collaborated in co-designing the lab components. The four components are:

1) Boolean searches for finding Social Studies lesson plans, student activities, simulations, role plays, web quests, maps, digital archives and other useful Internet resources. Students are generally unaccustomed to using Boolean search strategies prior to this introduction.
2) The WebQuest on WebQuests at the Filamentality website. Students are assigned to develop a WebQuest using a self-guided worksheet developed by a prior student.
3) Power Point: Features and functions of Power Point are introduced in the first hour, and a 6 slide product is required by the end of the second hour in which images are imported, sound and slide effects are demonstrated.

4) Web site development. With a former student lab assistant, a one hour step by step tuorial was developed to assist student to design a website with additional pages and links and images.

Subsequent Fridays (of which there are only four and students often stay after class to work on their products), additional effects, enhancements and techniques are added, but primarily this is lab time for the design and development of the products. The website component is now available on the web at: http://www.ncsu.edu/ced/clt/workshops

Students indicated in reflections on their prior knowledge that their skills were generally undeveloped. For example, several were learning for the first time that multiple windows could be open and in use, many had never imported an image, and most had never used the sound or slide effects in PowerPoint. None of the undergraduate students had ever developed a web page. Note that these students began matriculating in 1998.

Professor B:

In a Middle School Social Studies class, the introduction and co-construction of a virtual field trip was designed to develop curriculum-appropriate products in line with the middle school Social Studies curriculum which introduces the major world regions of the Americas (grade 5); The Eastern Hemisphere: Europe and the former Soviet Republics (grade 6); Africa, Asia and the Pacific Realm (grade 7) and North Carolina and the World (grade 8).

With assistance from Instructional Technology specialists who join the Methods class to co-construct virtual field trips with pre service middle school teacher candidates. Over a semester-long double methods course (Social Studies and Language Arts), the students spend one and one half hours per week preparing their technology portfolio products. Instruction in Hyperstudio and DreamWeaver prepare the candidates for the virtual field trip products they are assigned to create are to enhance the curriculum they will teach in their student teaching practicum sites in the following semester.

In each of these settings, the curriculum is the driving force behind what products the students will develop. Several of the middles school products are mounted at the www.ncsu.edu/clt website. In the high school Methods class, students mount WebQuests at the Filamentality site or in university web space, mount their webpages either at the university or at their practicum site schools, and several developed activities for high school students that require the development of PowerPoint presentations.

From shared constructivist theoretical perspectives, the integration of technology and computer skill development is grounded in the target curriculum. To demonstrate best practice and 'seamless' technology integration, computer lab components are collaborative endeavors that use student skills as the basis of cooperative learning.

North Carolina's Sixth Graders Go to Russia: A Global Education/Curriculum Integration Project that Redefines the Virtual Field Trip and Makes Social Studies Education in a Technology Enabled Environment Meaningful and Exciting

Dr. Candy Beal, Department of Curriculum and Instruction, College of Education, NC State University, USA, <candy_beal@ncsu.edu>

Dr. James Clark, Humanities Extension/Publications, College of Humanities and Social Sciences, NC State University, USA, <james_clark@nusu.edu>

Amanda Robertson, School Of Design, NC State University, USA, <amanda@imediagraphics.net>

Bill Beal, Office of Air Quality, Planning and Standards, Environmental Protection Agency, USA, <beal.bill@epa.gov>

Pru Cuper, Department of Curriculum and Instruction, College of Education, NC State University, USA, <pruinnc@aol.com>

Abstract: This project traces the three year development of preservice teachers' global technology projects from the after- the- fact journaling accounts of a research trip to Russia to a year long research study about Russia involving hundreds of sixth grade students, their teachers, a university research team and preservice teacher education students. Sixth grade students and their teachers involved in the final year of the project used a curriculum integration teaching and learning approach to study Russia. The students' ability to recall discrete facts and engage in reflective thinking as well as both teachers' and students' attitudes about learning using this approach were measured.

This paper discusses the preliminary results of a project that examines the effectiveness of using the curriculum integration approach for teaching and learning in a technology enabled environment. The overall project that used Russia as its focus began in 1997 with a professor's research trip to Russia to study Russian education, specifically teaching and learning approaches used in middle grades. The project evolved from a single professor researching to preservice teacher student involvement. Students accompanied the professor to Russia, taught classes and observed in Russian schools, pre K-college. While in Russia, the college students journaled back information via the Internet about the country, culture and education. Colleagues and middle school students following the trip in the United States were fascinated by the accounts, but were disappointed that they were unable to ask questions of the travelers. In an effort to satisfy the demand for home-bound students and teachers to play an interactive role in the research in Russia, the most recent version of the research trip was built to maximize involvement by sixth grade classes.

The 2002 Great Adventure to Russia Project (www.ncsu.edu/chass/extension/russia-nc6) was developed as an experience that used a curriculum integration approach to teaching and learning in a technology enabled environment. Researchers sought to determine if, by using the curriculum integration approach to teach early adolescents about Russia, students were able to both recall discrete facts and practice reflective thinking. Attitudes about learning and teaching were also examined.

In September of 2001, the project enrolled forty sixth grade classes interested in studying Russia. It took the classes through the months of preparation for an actual trip to Russia in February. Students were part of the home-based research team and took the trip virtually.

Briefly: In the fall and winter middle school classes received Internet Postcards From Russia, met the NC State traveling student research team on line, and logged on to offer suggestions about what to pack to survive sub-zero weather and what gifts to bring to host families. In late November, sixth graders posted 500 questions for the team to research while in Russia. Three hundred questions were selected to be answered. One half of the questions would be answered by team members interviewing Russian students and parents and the remaining 150 questions could be answered through general knowledge of the professor researcher. To coincide with the trip, teachers would teach a unit about Russia that was prepared using a technology enhanced curriculum integration format driven by the students' research questions. While on the trip to Russia, the traveling research team would send home daily reports, pictures and interviews conducted with Russian school children. The home-based sixth grade teams researched Russia and supplemented what they learned with information from the field, sent back via the web. Students completed their study of Russia by sharing their research projects. This activity enabled all of the students to know the information gathered about the classes' questions. The final stage of the project provides for teachers and students from around the state to come together to report their project findings at a Global Connections Conference at NC State University in May.

As of late December we have discovered the following:

$ Postcards From Russia have generated a great deal of excitement in the classrooms. Reports from teachers tell of students racing to computers to pull up the most recent card in order to answer the mystery question included in each card. Children beg for research time to discover the questions' answers and learn more about Russia. Because few of the children had little knowledge of Russia before the project, we have determined that the information on each postcard has elevated the level of learning for all of the students. This is evident in the complexity of the 500 questions that we have received. Many of the questions are sophisticated and indicate a deeper level of knowledge about Russia. We believe this to be an example of Vygotsky's (Vygotsky, 78) scaffolding principle. Students' level of knowledge can be raised if new information is introduced incrementally.

$ High interest in social studies has been generated through the game board homepage, the postcards, the mystery game, Teachers Talk pages, etc.

$ By submitting research questions, students report they have felt empowered to be able to direct their own study of Russia.

$ Teachers are heartened that university researchers are examining how students learn best. They have reported back that interest and support of their classroom efforts is empowering.

$ Teachers are willing to incorporate technology into their classroom, especially if it can be accomplished seamlessly and in support of the overall lesson.

$ Interest in a topic can be gradually built through high interest touchstones.

As of this writing, teachers have yet to teach the unit, but students are already doing informal research on their questions. This indicates that once excited about a topic, early adolescents want to continue their learning. They are eager to add their input to the learning process, as evidenced by the 500 questions. If they seek to answer their own questions they are that much more motivated to research.

This ambitious project researches teaching philosophy and approach, examines how we believe students learn best, and shows the scope of what can be taught in a technology rich environment. It emphasizes the need to imagine and act on the possibilities teachers have if they dare to develop and dream in a technology enabled environment.

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THE ETHICAL, CULTURAL AND SOCIETAL ISSUES OF TECHNOLOGY IMPLEMENTATION: THE ROLE OF THE SOCIAL STUDIES

Michael J. Berson, Ph.D.
Department of Secondary Education
University of South Florida
U.S.A.
berson@tempest.coedu.usf.edu

Abstract: This paper describes the integration of social, ethical, legal and human issues surrounding technology into social studies instruction. The cornerstone of this work is the promotion of participatory citizenship by evolving a culture of caring online. The emphasis of this work is on the dissemination of constructive solutions and a plan of action for the social studies, which fosters protective and productive online learning experiences for children and youth.

The Internet provides an extraordinary tool for enriching teaching and learning in the social studies; yet, safe and productive participation in cyberspace necessitates the ability to make informed decisions and apply online critical thinking skills. Internet safety encompasses those initiatives which mediate the online experiences that are disadvantageous to a child's physical, cognitive, and socio-emotional functioning. The recognition of threats to children in cyberspace is an important first step in developing constructive solutions and a plan of action which fosters protective and productive learning experiences. Through the social studies, the opportunity to foster the social and emotional skills of young people in cyberspace can be integrated into civic education with an exploration of the ethical, cultural and societal issues related to technology implementation. Social studies citizenship concepts are integrally linked to the ISTE National Education Technology Standards for Teachers and Students which promote cybersafety. This paper will describe an overview of a project to engage social studies educators and students in an exploration of critical social issues and public problems in cyberspace.

Pedagogical and Research Aims of Project

The Internet serves as a powerful medium for education, entertainment, information retrieval, and communication; however, cyberspace also may transform the nature of social interactions among youth. Whether these changes are beneficial or problematic may depend on the influence of parents, teachers, and peers whose guidance may assist students in making informed decisions and allow them to demonstrate an ability to apply online critical thinking skills and productive social participation. Issues of accountability, responsibility, tolerance, and respect– topics which are often addressed in the social studies curriculum-are critical to counter exposure to hate, violence, misinformation, consumer exploitation, and sexual predators in cyberspace.

In the social studies, exploration of the ethical, cultural and societal issues related to technology implementation is an extension of participatory citizenship with a focus on engaging educators and students in a dialogue about emerging social implications of technology. Thematic strands in the social studies which address participatory citizenship include: Power, Authority and Governance; Global Connections; and Civic Ideals and Practices. As teachers become interested in developing curriculum and experiences for their students, educators often recognize that they need to broaden their own knowledge and understanding as well. Social Studies teachers can bring these perspectives into the classroom by accessing online materials and promoting cyber-interactions, which can be useful resources for making connections within the classroom and fostering informed and active participation in the global community.

Identifying linkages between civic action in the social studies and national technology standards provides a basis for emphasizing Internet safety in the social studies classroom. ISTE has recognized that reliance on technological resources and expansive communication networks must be accompanied by greater attention to and awareness of the repercussions to peoples and nations. They have developed National Educational Technology Standards (NETS) for teachers and students which promote responsible and safe use of technology resources.

Program Goals and Objectives

This initiative models active participation in a multidisciplinary, community-oriented intervention effort which engages educators and students in a dialogue about critical social issues and public problems. The cornerstone of this work is the creation of safety for vulnerable children and the advancement of advocacy efforts by parents, schools, and communities to evolve a culture of caring online. In the context of the social studies curriculum, students and educators can explore the social, ethical, legal and human issues surrounding technology.

This project focuses on disseminating constructive solutions and a plan of action for the social studies, which fosters protective and productive online learning experiences for children and youth. The overall goal is to disseminate information in the social studies to promote technology learning experiences which are protected and optimize students' skills in participatory citizenship and global connectivity via cyberspace. Moreover, this project explores challenges and potential solutions for mobilizing and coordinating the transfer of technology safety innovations across instructional settings.

Objectives

The outcomes of this research include a clarification of policies and practices that may contribute to safety for children online. The objectives of the project are:

- To discuss teachable moments in the social studies curriculum that foster safe practices online and facilitate the application of critical thinking skills for responsible decision making
- To clarify future directions in technology applications which necessitate awareness and education on cyberethics within social studies classrooms
- To inform preservice teachers about Internet safety issues and instructional applications which promote social studies citizenship skill development as a nontechnical approach to protecting children in cyberspace
- To promote critical and active users of digital information who consider the authority, bias, and currency of the available information
- To identify barriers to educators' effective integration of online safety practices

Collegiality in Project Development

The ability of schools and universities to overcome many pressing challenges, including the pressures of curriculum standards and intensified assessment requirements, ultimately rests with schools shedding their identity as isolated institutions. As we seek new perspectives and insights, it is critical that we anticipate the school of the 21st century in which interdisciplinary and interprofessional collaboration is an established mechanism for meeting the needs of students. This is a key component of the Internet safety action plan which has been developed. Ultimately, this exchange may create the potential for educators to access their untapped resources and discover the richness of their strengths for advancing powerful teaching and learning while preparing children and youth for safe online experiences.

This project conceptualizes schools and universities as prosocial support systems for children and families in which educators are active participants in multidisciplinary, community-oriented intervention efforts. The project builds on a University of South Florida (USF) community-wide initiative which focuses on Internet safety for children in the Tampa Bay area. The Advisory Committee for the USF project includes collaboration among an interdisciplinary group of professionals from K-12 schools, law enforcement, mental health agencies, public libraries, child protection agencies, child abuse organizations, Internet safety advocacy organizations, and university researchers in education, children's mental health, and trauma. This initiative also draws on evolving knowledge through collaboration with researchers throughout the nation and around the world who are similarly dedicated to fostering safe practices online in conjunction with teachers and caregivers.

Pedagogical Ethnotechnography: A Study of the impact of Information Technology as a pedagogical tool on the attitudes of Preservice Social Studies Middle School Teachers

Prince Hycy Bull, North Carolina State University, US

In February 2000, the United States Department of Education realizing that there was a critical need to integrate technology in teacher education programs and teaching, issued this challenge to all higher educational institutions to integrate technology as a pedagogical tool.

Purpose of study

The purpose of this research is to study the impact of information technology as a pedagogical tool:

- On the attitudes, self-efficacy and practices of preservice middle school social studies teachers toward technology information;
- To analyze how effectively information technology is integrated and modeled in the course;
- To identify factors that enhanced their practices in using information technology.

Theoretical framework

Two theoretical frameworks guide this study: social cognitive theory and constructivist learning theory. The social cognitive theory states that behavior, cognition and environment co-exist in a reciprocal relationship and thereby influence each other. Self-efficacy is a central theme of social cognitive theory. It states that a person's belief in performing a behavior or a task can lead to the successful completion of the task (Bandura, 1986).

The second theoretical framework guiding this research is constructivism. Constructivist theory states that students' experiences, collaboration and self-construction of knowledge is relevant to instruction. According to the National Council for Education Statistics (NCES, 2000), report on teachers' use of technology, for each classroom instructional activity, teachers who reported feeling well prepared or very well prepared were more likely than teachers who reported feeling unprepared to assign students to use various technologies.

Teacher Education Programs and Information Technology

According to Gunter, Gunter and Wiens (1998), instructors need to strive to light a fire and motivate preservice teachers to understand the influence educational technology can have in their lives and classrooms. In a 1998 survey of 416 Colleges of Education, the International Society for Technology in Education (ISTE, 1999) concluded that teacher-preparation programs were not giving preservice teachers the needed training to integrate technology into their teaching. Green (1999) reiterated the view that there was enough evidence to suggest that one of the greatest challenges for college and university faculty was integrating technology into their instruction.

Social Studies and Information Technology

The teaching of social studies is no exception to the limited use of information technology in instruction. It was this limited use of information technology in social studies that led Martorella (1997) to assert that, " technology is a sleeping giant in the social studies curriculum" (p.511). If technology is a "sleeping giant," then, who is going to wake the sleeping giant and how effective will the giant be upon waking? This researcher argues that part of the answer to the first question can be found in the curriculum of teacher education programs and the answer to the second half of the question depends on how effectively technology -trained preservice teachers integrate technology on becoming In-service teachers.

According to White (1999), the integration of technology in social studies provides opportunities to empower students and teachers and facilitates a constructivist approach. The traditional approach to social studies has been teacher centered with lecturing, reading texts, and taking tests. The transformative constructivist approach, as defined by the National Council for the Social Studies (1994), stressed the importance of technology integration at all levels of social studies education by focusing on teacher education programs as a starting point.

Preservice Social Studies Teachers and Information Technology

According to the research on effective social studies teaching, White (1999) stated that effective teaching and learning takes place when preservice social studies methods courses use the transformative approach. According to White, the transformative approach reflected the constructivist approach to teaching and learning, which included modeling and applying, reflecting, collaboration (Vannatta and Beyerbach, 2000), and developing an interactive community of learners (White, 1999; NCSS, 1994).

The goal of every teacher education program and every methods course in social studies in integrating technology is to integrate technology within the curriculum rather than teach it in isolation (Mason et al. 2001). According to Halpin (1999), the integration of technology across the teacher education curriculum provides preservice teachers with an explanatory and discovery oriented environment enhancing their abilities to use different computer applications for instructional purpose. Halpin states that the use of technology facilitates a problem-solving environment, a tenet of constructivist theory, with the goal to motivate students to seek information and solve problems. Keiper, Harwood and Larson (2000) state that integration of technology - enabled teaching and learning enhances social studies instruction in K-12 classrooms and makes lessons exciting for the teacher and the students. According to Partee (1996), the integration of electronic communication in teacher education programs not only provided an alternate environment but also extended the boundaries of the traditional classroom. Electronic communication through email (Hall, 1993) and Newsgroups (Lempert, 1995) provided alternate communication for classroom participation and peer support during student teaching.

Research Questions

Research questions and hypotheses will be used to understand the impact of technology information as a pedagogical tool on the attitudes, self-efficacy and practices of preservice middle school social studies teachers.

1. How effectively is technology integrated in the middle school social studies methods course?
   - What is the effect of using electronic forum as a pedagogical tool on the attitudes of preservice teachers towards information technology?
   - What is the effect of using synchronous e-chat as a pedagogical tool on the attitudes of preservice teachers towards information technology?
   - What is the effect of using asynchronous email/listserv as a pedagogical tool on the attitudes of preservice teachers towards information technology?
   - What is the effect of using the Internet as a pedagogical tool on the attitudes of preservice teachers towards information technology?
2. What are the pretest and posttest attitudes of preservice middle school social studies teachers toward technology information (Electronic mail, WWW, Multimedia, Teacher productivity and student productivity) in the social studies methods course?

Methodology

Participants

1. Participants are 10 middle school social studies preservice teachers currently enrolled in a social studies methods course at a large research based southeastern university. Participants were purposefully selected for this study. WebCT is used in this research as the web-based pedagogical medium guiding information technology integration in the course. Web CT is a web-based flexible, integrated pedagogical tool designed to foster inquiry, encourage discourse and inspire collaboration between instructor and students, and students and students.

Pedagogical ethnotechnography

This research employs the use of a "pedagogical ethnotechnography" method of research developed by this researcher. This researcher defines a "pedagogical ethnotechnography" method as a study of technology as a pedagogical tool as experienced by stakeholders- students, teachers, or school administrators - within an educational realm with an empirical analytic paradigm, within a defined boundary set by the empirical analytic paradigm. Pedagogical ethnotechnography utilizes both qualitative and quantitative methods.

Qualitative Analysis of Data

1. The qualitative data is collected through forum, email, and e-chat databases, classroom observations and group interviews. The qualitative data will be coded and analyzed using Glaser's (1978) constant comparative methods.

Although the constant comparative method is presented as a series of steps, the process when practically applied is non-linear, goes on all at once and the analysis keeps doubling back to more data collection and coding, (Brogdan and Bilken, 1998).

Quantitative Analysis of Data

The Independent variable is the use of information technology through WebCT to positively influence student's attitude towards information technology as a pedagogical tool. The dependent variable is students' attitude scores of Teachers' attitudes Towards information-Technology Scale (TAT). A t-test of independent samples will be conducted for the five part index – Electronic mail, WWW, Multimedia, Teacher productivity and student productivity - means (pre and post test) at the alpha level equal to .05 to test for a significant attitude towards information technology as a pedagogical tool. According to Knezek and Christensen (1998), the internal consistency reliability estimates for the five scales on the TAT - Electronic mail, WWW, Multimedia, Teacher productivity and student productivity - range from .93 to .96.

Preliminary findings

Initial review of data show that there is some positive attitude by preservice teachers toward information technology as a pedagogical tool, especially in the teaching of middle school social studies:

- Overall, students feel that technology can enhance lessons but there are inherent dangers in using technology in instruction, such as supervision of students.
- Students also recognized that use of technology as a pedagogical tool is a collaborative effort in which teachers and students learn from each other.
- Students are also concerned about the effects of the "digital divide" on student's learning outcome outside of the school.

The initial findings from the qualitative analysis seem to be leading to positive preservice teachers attitudes toward technology information as a pedagogical tool.

Social Studies, Lesson Development, and Genealogy

Mary Jane Ford
Department of Curriculum and Instruction
University of Louisiana at Lafayette
United States of America
mjford@louisiana.edu

Sally McClure Dobyns
Department of Curriculum and Instruction
University of Louisiana at Lafayette
United States of America
dobyns@louisiana.edu

Gail Hymel Dack
Department of Curriculum and Instruction
University of Louisiana at Lafayette
United States of America
gdack@louisiana.edu

Abstract: This presentation will explore the use of genealogy software in developing social studies lessons to address NCSS and state content standards using students' natural curiosity about individuals, families, and ancestors. Genealogy software programs and lessons incorporating this type of software will be discussed. In a project as part of two graduate technology classes, inservice teachers collaborated to develop lessons based on national and state content standards designed around the use of a genealogy software program.

Introduction

Social studies and technology seem made for each other. Almost any software package or application can be integrated into the instruction of social studies concepts. Some authors have questioned the value of technology use in instruction in general and social studies instruction in particular (Shaver, 1999). Shaver (1999) points out that often the effects of the technology as the medium are confused with the effects of the content and the methodology of instruction. On the other hand, Schwartz and Beichner (1999) maintain that although the social studies classroom may, at first glance, appear to be the same as it was 20 years ago, technology has had a positive effect in many social studies classrooms. They also assert that the inclusion of computers in the teaching of social studies is mandated for several reasons: (a) computers are one of the most powerful influences in society today; (b) good teaching today looks like good teaching of the past, but today's technology makes good teaching more accessible; (c) today's social scientists rely heavily on computers, requiring that students be exposed to these methods used by social scientists; and (d) the Internet makes possible global connections and interactions that can have a profound effect on students.

The National Council of the Social Studies (NCSS) offers as one of its ten themes "Science, Technology, and Society" which addresses the concept that modern life would be impossible without technology (Roblyer & Edwards, 2000). To understand the effect of technology on society, one must understand and use the technology itself.

Social studies instruction provides opportunities to use a variety of software. Software which allows teachers to develop lessons that promote open-ended learning environments can be invaluable in the social studies classroom. Open-ended learning environments such as problem-based learning (Morrison, Lowther, & DeMeulle, 1999) and mindtool learning activities (Jonassen, 2000) can be utilized in lesson development using software that is designed for non-education uses. *Family Tree Maker*, a genealogy package, is one such program.

Delving into family history has great allure for learners of all ages. Genealogy has been used successfully to understand cultural backgrounds (Simon & Simon, 1978), to develop skills in the use of library resources (Southwick, 1985), to promote family awareness and intergenerational communication (Allen, 1987), and as a motivational tool for middle grade students (Fielder, 1985). The marriage of genealogy and technology, through genealogy software and the Internet, appears to be the next logical step in the exploration of this beguiling topic.

Goodlad (1984) found that the range of instructional practices used by classroom teachers is narrow: "They lectured, monitored seatwork, and engaged in activities requiring only rote learning" (p. 298). Few instructional activities required or encouraged active learning, and the most often observed instructional group is the whole class (Goodlad, 1983). Factors that contribute to this limited repertoire of teaching strategies, as suggested by Goodlad (1984), include the following reasons. First, society does not pressure schools to change these instructional practices, since they reflect the conventional wisdom about how classrooms should be conducted. Second, these are the ways in which teachers themselves were taught from their days in elementary school through college. Third, preservice teacher education programs are of insufficient depth to successfully counter the conventional wisdom about teaching and classroom learning.

Present teacher education programs are in a position to counter the conventional wisdom about teaching and classroom learning. By engaging preservice and inservice teachers in in-depth research and development of problem-based learning activities, teacher education programs are better able to impact the quality of instruction in K-12 classrooms. The activities discussed in this paper were designed to provide for teachers the kinds of learning experiences that will ultimately benefit their own students.

Genealogy Software

Genealogy software is abundantly available, ranging from simple database type programs that are available as freeware or shareware to complex multimedia programs costing over $100. Genealogy freeware is readily available as free downloads on the Internet while some of the more expensive commercial versions have downloadable trial copies. The software is available for the PC or the Macintosh platforms with several outstanding programs available for both. Lists of genealogy freeware can be found at http://www.gensearcher.com

The Internet supplies a plethora of websites that provide information and assistance in genealogical research. Many of the genealogy programs have websites that provide access to major genealogical resources such as war pension lists, U. S. Census records, and Social Security death index. Several outstanding genealogy packages include the basic genealogy software, CD-ROM databases of information, and Internet websites with access to genealogical resources.

Several websites (i.e., www.familychronicle.com/software.html) provide reviews of various genealogy packages; one site (www.mumford.ab.ca/reportcard/) provides a report card that compares15 of the packages on 12 items. The report card is based on scorecards of each of the items for each package. These reviews and comparisons assist the teacher in selecting the most appropriate genealogy software for lesson development.

Broderbund's *Family Tree Maker* was selected for use in the lesson development activities for several reasons (a) the level of experience required to use the features of the program is considered intermediate which would make the learning curve manageable, while providing access to a program with powerful features; (b) its excellent website (www.familytreemaker.com) provides powerful support for activity development; and (c) its multimedia capabilities allow the inclusion of photos and sound.

The Project

One way of understanding the uses of technology in today's society is to experience its impact in project-based learning. The use of genealogy software combines the use of a dedicated database program with the power of the Internet and the storage capabilities of CD-ROM. Two of the ten NCSS themes address the individual and individual development and identity. Genealogy software provides an excellent vehicle for developing some very important and powerful concepts about the individual.

Students in two graduate technology courses were taught the use of Broderbund's *Family Tree Maker* and then were required to develop lessons utilizing the software. Students worked collaboratively on these lessons. These inservice teachers taught various grade levels from elementary to secondary; the content areas of the secondary teachers included all subjects. Therefore, the collaborative groups were encouraged to create interdisciplinary connections in the lessons they developed and to address all related content standards. Although the lessons included various subject areas, the preponderance of lessons dealt with social studies issues as the major focus of instruction.

Social Studies Content Standards

According to Parker and Jarolimek (1997), social studies content standards should serve as a framework for K-12 social studies program design, serve as a guide for curriculum decisions by providing performance expectations for all students, and provide examples to guide teachers in lesson development. Louisiana and many other states require that classroom teachers connect instructional objectives and activities to benchmarks that represent student performance expectations. The use of genealogy software in the K-12 setting lends itself naturally to the accomplishment of the following historical thinking benchmarks and foundation skills that were developed by the Louisiana Content Standards Task Force.

Louisiana History Content Standard
(www.doe.state.la.us/DOE/assessment/standards/SOCIAL.pdf)

Standard: Students develop a sense of historical time and historical perspective as they study the history of their community, state, nation, and world.

Historical Thinking Skills (K-4)

- Demonstrating an understanding of the concepts of time and chronology
- Recognizing that people in different times and places view the world differently
- Identifying and using primary and secondary historical sources to learn about the past

Historical Thinking Skills (5-8)

- Describing chronological relationships and patterns
- Demonstrating historical perspective through the political, social, and economic context in which an event or idea occurred
- Analyzing the impact that specific individuals, ideas, events, and decisions had on the course of history
- Analyzing historical data using primary and secondary sources
- Identifying issues and problems from the past and evaluating alternative courses of action
- Conducting research in efforts to answer historical questions

Historical Thinking Skills (9-12)

- Applying key concepts, such as chronology and conflict, to explain and analyze patterns of historical change and continuity
- Explaining and analyzing events, ideas, and issues within a historical context
- Interpreting and evaluating the historical evidence presented in primary and secondary sources
- Utilizing knowledge of facts and concepts drawn from history and methods of historical
- Inquiry to analyze historical and contemporary issues
- Conducting research in efforts to analyze historical questions and issues
- Analyzing cause-effect relationships

Louisiana Foundation Skills

The following foundation skills apply to all students at all grade levels in all disciplines.

- Communication
- Problem Solving
- Resource Access and Utilization
- Linking and Generating Knowledge
- Citizenship

The Lessons

All lessons were designed to incorporate the Louisiana History Standard and its accompanying benchmarks that focused on the Historical Thinking Skills for grades K-12 as described above. Included within the latter were benchmarks relating to the historical impact of specific individuals or events, analyses of primary and secondary sources, and research endeavors based on historical questions. Many of the lessons addressed additional social studies benchmarks related to geography and civics standards. Other subject area standards enhanced the lessons by providing interdisciplinary connections.

Lesson plan topics were grouped into three broad categories: family relationships and genetic traits, family histories of famous Americans, and family histories of participants in famous events. Some plans were designed with novice genealogists in mind and were based on family group records and pedigree charts. Other plans provided experiences for more advanced learners and incorporated timelines of important events and graphic organizers. All participants designed a rubric for evaluation. Technology performance indicators included the use of logical thinking programs, writing and graphic tools, and the use of digital cameras and web tools.

Learning activities were tied directly to the state standards and benchmarks. For example, a lesson based on the family history of President John F. Kennedy was developed. The state content standard was *History: Time, Continuity, and Change. Students develop a sense of historical time and historical perspective as they study the history of their community, state, nation, and world.* The benchmark was *Describing chronological relationships and patterns*, and the learning activity, using *Family Tree Maker*, provided opportunities for students to create a Kennedy Family Group Record and a Kennedy Pedigree Chart. A later activity based on the Group Record and Pedigree Chart included the creation of a timeline of Kennedy family events, using illustrations, magazine articles, or Internet photographs.

Conclusion

The instructional use of genealogy and technology can lead to a richer, deeper teaching and learning experience for those involved in social studies education. Teachers should use software like *Family Tree Maker*, a program not originally designed for educational purposes, to create problem-based learning experiences for K-12 students. This type of teaching can address some of the criticism of narrow, teacher driven instruction through the motivating nature of both the topic and the medium. In this way, someday the comment "teachers teach as they were taught" will have positive implications.

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Using Web-Enhanced Problem-Based Learning in Teacher Education

Susan Gibson
Faculty of Education
Department of Elementary Education
University of Alberta
Canada
susan.e.gibson@ualberta.ca

Abstract: Integrating computer technologies into preservice teacher education programs is critical if future teachers are to become effective users of these technologies in their own teaching. However, preservice teachers need to be challenged to rethink traditional instruction when considering how best to use these technologies. One possibility for integrating computer technologies into teacher education courses in a non-traditional way is through a constructivist, problem-based learning approach. This paper is a report of one instructor's experiences with this approach through the use of a virtual field trip to an elementary school in a social studies curriculum and instruction course. Students were interviewed and surveyed about their course experiences with the virtual field trip. Findings indicated that students constructed a better understanding about the teaching of social studies as well as gaining more confidence and competence with the integration of computers into their teaching as a result of their course experiences.

Introduction

Most teachers graduate from teacher education institutions with limited knowledge of the ways technology can be used in their professional practice (Wetzel & Chisholm, 1996). Few preservice teachers have any instruction in actually using technology in the classroom (Vagle, 1995), and yet, being able to effectively apply technology is high on the list of what beginning teachers should know and be able to do in today's classroom (Kortecamp & Croninger, 1995). Integrating technology in teacher education programs is a necessity in order that preservice teachers are able to see the importance of developing and using computer-based lessons in their own teaching (Wiburg, 1991). "Preservice teachers need to perceive computers as integral parts of the instructional strategies and professional activities of teachers and become committed to their use" (Woodrow, 1993, p. 373). However, merely exposing students to technology is not sufficient. They need computer experiences that help them to rethink traditional instruction rather than simply using computers as an add-on to that instruction (Barron & Goldman, 1994; Heterick, 1996).

One possibility for integrating computer technologies into teacher education courses in a non-traditional way is through a constructivist, problem-based learning approach. According to Cameron White (1995), "A constructivist process orientation to teacher education is essential if we are to encourage students to develop problem solving and critical thinking skills and to apply, analyze, synthesize and evaluate knowledge, skills and attitudes" (p. 290). Computers can be effective vehicles for introducing problems for student investigation because they "allow students to experience a shared context in which they engage in sustained thinking about complex problems and engage in interpretive learning experiences" (Barron & Goldman, 1994, p .84). A key characteristic of problem-based learning is that the learning should be situated in the examination of authentic, real-life problems of relevance to the learner (Duffy & Cunningham, 1996). Using the computer in this way provides authentic examples and problems of education from real classrooms, thereby heightening students' appreciation of the realities of teaching practice (Downs & Rakestraw, 1997).

In this paper, I describe a constructivist, problem-based learning approach that I have developed for use in an undergraduate teacher education course. The course is delivered by means of a web enhanced, interactive, virtual field trip to a local elementary school.

Description of the Virtual Field Trip Experiences

Using WebCT, I designed a web-based virtual field trip to an elementary school as a learning tool for an undergraduate social studies curriculum and instruction course offered as part of a teacher education program at a large university. My goals for the course were both to expose my students to ideas for integrating technology into their teaching and to assist them in clarifying their roles and responsibilities as social studies teachers.

The virtual field trip is organized around five key problems about teaching social studies from actual classroom practice. These key problems are:

- Why is social studies taught in elementary schools?
- How do you choose content and plan for instruction in social studies?
- What resources are available to support your teaching of social studies?
- What approaches to social studies teaching would best help you to meet your goals? and,
- How do you assess children in order to enhance their learning in social studies?

My students use a variety of multimedia experiences provided through the virtual field trip to assist them in the investigation of these five problems. Through the virtual field trip, they are given the opportunity to look at each problem from a number of perspectives, including teachers, children, peers, the curriculum and social studies experts. Students can listen to interviews with teachers, children and other student teachers in which they talk about social studies; view videoclips of social studies classrooms "in action"; examine lesson plans, curriculum guides, samples of children's work and other school-related artifacts; hear from social studies experts across the country; and, interact online with each other and myself using the WebCT conferencing tool. As a way of authenticating the virtual field trip experiences, students can also take a virtual tour of the school building, listen to a welcome message from the principal, view samples of teachers' weekly timetables and examine the school handbook.

Two weeks of this 13-week course are spent examining each one of the five key problems specifically. Students have one face-to-face seminar and one class in the computer lab each week. During the lab sessions, students work independently selecting, collecting and synthesizing the information presented on the virtual field trip. After examining each problem using the virtual field trip, we share their experiences and discuss their ideas in small group and large group sessions during the weekly face-to-face seminar. At the end of the two-week period, students write a reflective synthesis paper in which they discuss their learning about the specific problem under investigation based on their web and seminar experiences. We then move to the next problem and repeat the pattern until we have completed all five of the problems.

A major assignment for the course offers interested students the opportunity to design their own learner-centred, computer-based project for a specific grade and social studies topic from the elementary school curriculum guide. A variety of formats are possible including: Hyperstudio multimedia projects, web quests, web activity pages, virtual field trips, and Internet treasure hunts, among others. Since the majority of my students have limited computer skills, they are encouraged to work in pairs or small groups to capitalize on each other's computer experience. A lab assistant offers further help and extra lab time is booked outside of class time to allow students to practice newly acquired skills. Weblinks to tool training sites are provided on the virtual field trip site as well for students to learn how to use the tools on their own. As a culminating activity, students share these computer projects in presentations to the class.

Student Feedback on the Virtual Field Trip

A research assistant was hired in the Fall of 2000 to administer an entering and exiting questionnaire to the class (n=22) and to interview self-selected students several times throughout the 13 weeks of the course in order to ascertain what students felt they were learning from the virtual field trip. Student feedback from the initial and summative questionnaires and the interviews suggested that my course goals were achieved and that the web-based experiences were important to achieving those goals. Generally, students liked that the virtual field trip provided exposure to a novel, constructivist-based approach to teaching and learning. The problem-based approach set within a "real" school context gave students a meaningful, authentic and relevant learning experience. The multiple perspectives were appreciated as they helped students to gain insights about teaching and children as well as allowing them to pick up teaching, resource and organizational ideas. In this way, students were offered an opportunity to link the theories they were hearing about in their university courses to the statements made by the children, teachers and experts in the field.

As well, students liked the hands-on learning that the virtual field trip offered. Requiring them to be actively involved on a regular basis with the computer as a component of the course experience resulted in a general decrease in technology anxiety and an increase in their confidence with the computers. Students were also better able to envision how to apply and integrate technology in their teaching and were motivated to develop technology-based projects for use in their future classrooms.

Based on the findings, I feel that I have been able to assist my students in developing new models of teaching and learning using computer technologies. I feel confident that I am addressing the concern expressed in the research literature regarding preservice teachers not learning enough in their courses about how to integrate technology into the various subject areas (Rose & Winterfeldt, 1998; Vagle, 1995).

Concluding Remarks

Interactive multimedia based on problem-based learning principles may be one of the combinations that will contribute to the next wave of improvements in the proportion of future teachers learning with technology. This article has presented one such possibility for helping preservice teachers to "rethink" traditional instruction by immersing them in a constructivist, problem based learning environment with the assistance of computer technologies.

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Social Studies and Technology: Teachers' Perceptions of Effective Integration

Tina Heafner
Department of Curriculum and Instruction
University of North Carolina at Greensboro
United States
tlheafne@uncg.edu

Abstract: Billons of dollars are being poured into technology with the hope that innovative use of technology will improve our schools. With the growing expenditures on technology in education, a pertinent issue arises: How is technology being used to enhance the curriculum? Effective uses of technology vary among disciplines. Thus this study focused on secondary social studies instruction. This study sought to examine secondary social studies teachers' perceptions of effective integration of technology.

Introduction

Schools are moving at different paces at integrating technology. Technological resources within schools can be placed on a continuum, with the opposing points being the technology-rich and the technology-poor. Where schools fall on this continuum depends on how they value technology (Maushak, 1999). Concern about the social consequences of technology have driven some to suggest de-emphasizing technology in education, while others have argued that effective instruction, particularly in social studies education, must include a range of computer technology skills (Martorella, 1997). Even within the technology-rich schools, there are varying degrees of integration of technology into the curriculum. Varying beliefs about the effectiveness of technology has contributed to the inconsistency in implementing technology.

Effective uses of technology vary among disciplines. Successfully integrating technology in social studies classrooms is a vital issue facing social studies educators (White, 2001,1), especially with the inconsistencies that exist in technology use. In many social studies classrooms, technology is viewed as an extra resource and is not integrated as an essential component of the curriculum. As Berson (1996) has noted, social studies educators have been reluctant to integrate computers into their curriculum and instruction. Limited research exists on the effective integration of technology in social studies classrooms (Mason, Berson, Diem, Hicks, Lee, & Dralle, 2000). Thus the question arises: What is the effective integration of technology in social studies classrooms?

Literature establishes parameters for effective integration as instruction that motivates, provides variety, promotes meaningful learning, and facilitates interactive learning (White, 1997). Effective integration of technology allows for students to take a more active role in their learning and allows them to connect with worlds and cultures that historically would have been impossible. White (2001) argues that effective utilization of technology not only empowers students, but it is a means for transforming the curriculum to one that facilitates the development of students who can think for themselves and participate as responsible citizens in an ever changing world. The effective integration of technology "redefines what classrooms are, how kids learn, and what constitutes a learning community" (Sullivan, 1994, p. 5). Mason et al. (2000) recognize the lack of empirical research in technology integration in the social studies. They also call for continued research to expand technology use within the social studies curriculum.

The Study

The purpose of this study was to examine how secondary social studies teachers in North Carolina define effective technology integration. Using a survey design, descriptive data was collected to identify teachers' beliefs about technology integration in secondary social studies classes. A multistage sampling procedure was used to identify the sample. The target population of the study is all secondary social studies teachers in North Carolina. The questionnaire was designed to identify the importance of existing beliefs about technology. The guiding research question for the study is: How do secondary social studies teachers define effective integration of technology in social studies?

Findings

Effective integration of technology in social studies classrooms is defined by the development of respondents' responses in a pilot study. Patterns that emerged identify teachers' perceptions of effective integration of technology. First, the effective integration of technology extends learning beyond what could be done without technology. Technology increases teachers' resources and options as they plan to help students gather, organize, manipulate, and think about new information. Technology provides resources that are relevant, current, and engaging. A teacher remarked, "Activities using technology should be designed that cannot be done the 'old-fashioned' way."

Effective integration of technology in social studies enhances the curriculum. Effective integration of technology enhances learning by offering access to resources that are not accessible in a traditional classroom setting. Teachers have access to useful and innovative teaching materials and valuable primary sources through the Internet. A teacher commented, "Technology should enhance the existing curriculum, not be an add-on." The ideas established in the NCSS: Social Studies Curriculum Guidelines state that social studies teaching should draw from a broad range of content sources and use varied learning resources and activities (NCSS

Powerful Teaching, 1992). Many teachers identified the use of technology to supplement their instruction and instructional resources. A teacher stated, "The effective integration of technology utilizes a multitude of computer programs to supplement text and teacher instruction."

Next, the effective integration of technology promotes communication among students, teachers, and the global community. One teacher described his/her classroom's partnership with another classroom in Eastern Europe via email as a method for effective technology integration. Effective integration of technology offers students and teachers the opportunity to become interconnected with the local, national, and global communities. Email and discussion boards allow students and teachers to communicate with the students and teachers around the world. Many teachers reported the increased communication with their students due to the use of email.

The effective integration of technology changes the classroom environment. Instruction shifts from a teacher-directed approach to a more student-centered classroom. Technology as a tool does not change basic learning processes, but instead it transforms how these processes are developed. Teachers can more easily prepare lessons; consequently, their focus shifts to explaining information instead of conveying information. One teacher remarked, "I use technology every day to prepare for my classes. I believe it helps to have access to up-to-date information at the click of a button. I use Microsoft Word and Excel to create worksheets and charts for my students to complete, as well as the Internet to contact them about missing homework assignments. I also use PowerPoint presentations to make the information a little more exciting then simply having to take notes from the overhead, where there is little color or animation. Also, my students prefer to take notes from something that is legible (typing), rather than trying to decipher my handwriting." Another teacher responded, "To effective use technology, students should be actively engaged in data collection or manipulation, not just random surfing."

Lastly, the effective integration of technology promotes skills, knowledge, and participation of students as good citizens in a democratic society, which are the goals of the National Council on the Social Studies (NCSS). One teacher commented, "Technology provides a variety of instructional strategies to take advantage of different learning styles. The frequency of use allows students to develop technological skills and enhance inductive learning." Another teacher commented, "The effective integration of technology means that students will be able to use technology in all facets of instruction. For example, they can use the Internet to conduct research, Microsoft Word to type a research paper, use PowerPoint to create a presentation, include a spreadsheet or graph in the PowerPoint presentation."

Conclusions

Social studies is often perceived as a boring subject. The common methodology for teaching this "boring subject" is the transmission of facts through direct instruction. This is reflective of a curriculum that was designed decades ago. White (2001) suggests that many social studies classrooms reflect little meaningful instruction. White (1997) asserts that effective integration of technology can provide opportunities to make social studies education empowering and transformative. To promote technology use in secondary social studies, teachers need to conceptualize what it means to effectively integrate technology.

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Information Technology, Constructivism, and Social Studies Teacher Education

David Hicks, Virginia Polytechnic Institute and State University, US
Peter Doolittle, Virginia Tech, US
John Lee, Georgia State University, US

Many social studies educators have argued that preparing students for the responsibility of the office of citizen, in terms of developing the knowledge, skills and dispositions necessary for informed deliberation, active decision making and civic participation, is in fact the perfect place to let students learn to critically explore their world through the use of such interactive technologies as the Internet.[i] A key assumption of this proposed use of technology is that having access to up-to-date knowledge resources, archives, and experts via information technology can improve teaching and learning within the social studies.

However, in spite of its promise and potential, the literature suggests that very little development, and implementation of technology has taken place within social studies preservice and inservice classrooms.[ii] The danger of such a situation continuing, Fontana warns, may well be that,

> others who know nothing of the discipline will shape these important networking tools without the needs of the social studies in mind. If social studies educators fail to be at the forefront of technology, they risk having parents and policy makers conclude that the social studies are not relevant in the information age.[iii]

However as Means and Olsen note, efforts to introduce technology into schools as a whole have struggled because they were founded upon the "wrong model of teaching with technology." The problem they contend was that "product developers believed in their content knowledge, pedagogical techniques, and in the power of technology to transmit knowledge to students" instead of providing the types of technologies that support "students and teachers in obtaining, organizing, manipulating and displaying information." [iv] With this in mind, the question that must be addressed by social studies educators in the information age is how can we prepare social studies teachers to best implement current and emerging technologies within our classrooms? The process of answering such an important question, we believe, must begin with the development of a clearly defined theoretical foundation designed to inform our understanding of why and how the incorporation of technologies can move us toward the National Council for Social Studies' (NCSS) vision of powerful social studies teaching and learning.[v] It is disconcerting that despite support for integrating technology; the application of technology within the realm of social studies is theoretically underdeveloped. Even the most recent research that has advocated the use of a constructivist theoretical perspective to undergird the use of technology in the social studies classroom has not fully developed a clear framework of principles that support the integration of technology into the social studies.[vi] The purpose of this paper is to provide such a practical constructivist framework of principles, along with specific examples of how the application of technology, and in particular the Internet, can be used as a developmental tool to facilitate inquiry, perspective taking, deliberation, and knowledge construction in the education of young citizens.

The paper will argue that if technology is to have a powerful impact on the teaching and learning of social studies then "the ways that we use technologies in schools should change, from their traditional roles of technology-as-teacher to technology-as-partner in the learning process."[vii] The key to achieving powerful teaching and learning in social studies, therefore, is not technology itself, but rather how technology is used as a tool to encourage the doing of social studies in the pursuit of citizenship. Such efforts must be grounded in theory; otherwise, the results will be little more than a collection of disparate individual efforts that do little to truly advance social studies programs toward the NCSS's vision of powerful teaching and learning.

The challenge in preparing social studies teachers to use technology must begin with identifying why and how technology can be used to facilitate the creation of meaningful and disciplined knowledge within each student, and not to serve as a substitute for knowledge creation or for traditional classroom "teacher talk." The theoretical foundation for the integration of technology into the social studies emphasizes that the proper role for technology in the social studies is that of "technology-as-partner." Grounding one's actions within and through such a theoretical framework, we contend, is a vital first, and much needed step in the process of developing and preparing social studies teachers who know why and how to use technology to transform their classrooms into a model based on authentic student inquiry and experiences.

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[i] See themed issues of *Theory and Research in Social Education* 28(4) 2000; *Social Education,* " Bits, Bytes, Bugs: Social Studies Education in the Digital Age" volume 63, No. 3, April 1999 and "Teach Social Studies in the Information Age" volume 64, No.3 April 2000; Michael Berson, Barbara Cruz, James Duplass & J. Howard Johnson. *Social Studies and the Internet* (New Jersey: Merrill Prentice Hall, 2001); Joseph A. Braun and C. Frederick Risinger, eds, *Surfing Social Studies: The Internet Book* (Washington, DC: NCSS, 1999); John. Cogan, David. Grossman, & Mei-hui. Lei, "Citizenship: democratic imagination in a global context," Social Education 64 (1), (2000): 48-52; Richard Diem, "Editor's note," *Social Studies and the Young Learner. 2* No.1 (1999, September October): 2; Warren C. Hope, " It's time to transform social studies teaching," *The Social Studies* 87 No.4 (1996): 149-151; Carol Klenow, "Electronic social studies" *Instructor* 102, No. 3 (Oct 1992): 65-66; Peter Martorella, ed, *Interactive Technologies and the Social Studies,* (Albany, NY: State University of New York Press1997); Cameron White, (1999). "It's not just another new thing: technology as a transformative innovation for Social Studies teacher education." *Journal of Technology and Teacher Education*. 7(1) (1999): 3-12.

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[iv] Barbara Means, and Kerry Olsen, "The link between technology and authentic learning," *Educational Leadership* 51 No. 7 (1994): 15-19.

[v] National Council for the Social Studies, *Expectations for Excellence: Curriculum Standards for Social Studies* (Washington DC: NCSS, 1994)

[vi] See Margaret Smith Crocco "Leveraging constructivist learning in the social studies classroom: A response to Mason, Berson, Diem, Hicks, Lee, and Dralle," *Contemporary Issues in Technology and Teacher Education* 1 no 3 (2001); Simon Hooper, and Brad Hokanson, "The changing face of knowledge," *Social Education* 64 No. 1 (2000): 28-31; Anthony W. Lorsbach, and Fred Basolo, Jr., "Problem-based learning," in Joseph. A. Braun and C. Frederick. Risinger eds. *Surfing Social Studies: The Internet Book* (Washington, D.C: NCSS, 1999), 121-128; Cameron White, "It's not just another new thing: technology as a transformative innovation for Social Studies teacher education," *Journal of Technology and Teacher Education.* 7 No. 1 (1999): 3-12.

[vii] David Jonassen, Kyle Peck and Brent. Wilson, *Learning with Technology: A Constructivist Perspective,* (Upper Saddle River, NJ: Merrill, 1999), 12.

Engaging in scholarly dialogue: CITE Journal and the social studies

John K. Lee
Georgia State University
USA
jklee@gsu.edu

Michael Berson
University of South Florida
USA
berson@tempest.coedu.usf.edu

David Hicks
Virginia Polytechnic Institute and State University
USA
hicks@vt.edu

Abstract: This paper focuses on dynamics that are unique to electronic publishing. The content of this paper is drawn from the authors' experience editing the social studies section of Contemporary Issues in Technology and Teacher Education (CITE) Journal. In this paper, the authors' will discuss the unique characteristics of the electronic publishing milieu with special attention to how these characteristics are incorporated within the editorial philosophy of the social studies section of the CITE Journal.

Introduction

Contemporary Issues in Technology and Teacher Education (CITE) Journal is an electronic publication focusing on theory, current issues, and current practices relating to technology and education. The journal is divided into numerous sections including social studies. The social studies section of CITE Journal is endorsed by the National Council of Social Studies College and University Faculty Assembly. The journal includes sound, animated images, and simulation, as well as immediate dialog about articles concerning current theoretical issues. CITE Journal accepts submissions relating to current issues in social studies and technology education, conceptual or theoretical uses of technology in social studies as well as significant policy and practice issues. Readers of articles may also write critiques/commentaries and submit them forpublication. These publications are treated as articles and refereed in the same way as all other articles.

As a scholarly publication CITE Journal reflects 3 unique electronic publishing dynamics. These dynamics include the interplay of unique characteristics relating to the journal's electronic or multimodal nature, the iterative character of the scholarly debate that occurs in the journal, and the potential for a new type of critical reading of scholarly papers. This paper is focused on these distinct dynamics.

CITE Journal's electronic or multimodal nature

Electronic publication opens the door to a wide variety of presentation techniques. Authors writing in electronic or multimodal mediums are no longer tied to linear narrative. In disciplines such as history and literature non-linear narrative is prompting a reconsideration of issues relating to the intent and authority of the reader and the author. Digital non-linear presentation provides students with a means to explore alternative representations of their findings. Non-linear hypertext narratives can be used to connect arguments to evidence and they give readers a greater deal of autonomy (Rosenzweig, 1999). Some radical thinkers see hypertext as freeing mechanism that may displace traditional narrative (Landow, 1995). Others suggest that hypertext is oversold and not substantially different than other forms of non-linear text

(Davidson, 1997). What is beyond debate is the technical capacity of hypertext, which enables writers to construct connective meaning in ways that are not possible in traditional narrative (Dobrin, 1994). CITE Journal encourages non-linear narrative texts and facilitates the development of these texts.

Articles in electronic publications can incorporate a wide variety of media including still images, audio, and video. In addition, software specific simulations and demonstrations may be used to enhance the rhetorical value of a piece or to communicate a practical dimension that might otherwise be absent in a print journal. CITE Journal is providing social studies researchers opportunities to develop a wide range of alternative presentation formats.

An example of an alternative presentation can be found in a CITE Journal article on Geographic Information Systems by Alibrandi and Palmer-Moloney (2001). In this article, Alibrandi and Palmer-Moloney use links and images to engage the reader with a wide range of possible web-based experiences. Readers are encouraged to read (via links) the literature that informed the authors' findings. Readers are also able to experience a variety of GIS related web-based resources. As readers use these resources concurrent with reading the article, they can generate a type of authenticity that is very difficult in traditional print media.

Readers might also experience an author's actual research data or foundational work. Another article in CITE Journal by Sherman and Hicks (2001) invites readers to view virtual reality files from a course taught by the authors. The potential for engaging the work underlying an authors' published findings is a groundbreaking step in publishing. CITE Journal is dedicated to continuing to provide readers with access to the raw data used by researchers.

The common way to refer to the experiences resulting from reading mu ltimodal online articles is to use the much overused term "interactive." The Journal of Interactive Media in Education defines interactive as referring "both to interaction *through* the media with other people (e.g. teacher-student, student-student, researcher-teacher), and to interaction *with* the materials embedded in the media (e.g. control of a simulation or educational game)" - (see the Journal of Interactive Media in Education at http://www-jime.open.ac.uk/). CITE Journal promotes interaction in both senses of the above definition. As pervious described, readers are encourage to experience various forms of media. In addition, readers are encouraged to interact with other scholars. The primary vehicle for this personal interaction is the commentary feature in the journal. This feature generates a form of scholarly debate that is almost impossible in traditional print media.

The iterative nature of the scholarly debate on CITE Journal

Scholarly discourse should be continuous, vibrant, and iterative. Often the nature of these debates is severally limited by the publishing environments in which debates takes place. Reponses and rejoinders to published journal articles are important and often quite vibrant, but the restrictive characteristics of print journals sometimes limit the reader's ability to access the full debate. Often responses and rejoinders are published in latter editions and the reader may not have all of these pieces available. Electronically published journals can offer the reader the opportunity to easily immerse themselves within ongoing academic conversations. In addition, the dialogue can be presented in a dynamic fashion as additional responses are published.

One of the most important features of CITE Journal is the commentary. Editors and readers are invited to write commentaries for published and soon to be published works. These commentaries are organized on the CITE Journal web site in a thread. As new commentaries are written the thread reflects the changes.

There are numerous issues in social studies that may be relevant for such scholarly discourse. The question of how technology fits in with the democratic mission of social studies is a prime example of how discourse in a web-based environment might be enlivened. The active interplay of ideas is essential for a democratic society and CITE Journal encourages this type of active engagement. The Web allows for a level of flexibility that is better suited for the multiple voices that must be heard in order for the dialogue to be democratic. In addition, the focus of control over the discourse can shift from the authors and editors to the reader.

Critical reading and CITE Journal

Critical theorist claim that objectivity, truth, and other fixed and permanent means for analyzing text (and philosophically life in general) are flawed. An exhausting variety of theories have been proposed as corrections for the "flaws" of objectivity. Although CITE Journal is not a publication that actively explores critical theory, it does serve as an outlet for the expression of certain critical theories. In a broad sense, CITE Journal is critical because it is in hypertext and it is multimodal and the articles in the journal are given meaning when they are read. This form of "reading" hints at the "writerly" potential of web-based publishing. The term "writerly" is attributed to Roland Barthes who conceptualized of "writerly" text as a form of text that is situated in the present and is real only when experienced. The multiple meanings that emerge from reading experiences are in a sense exaggerated in hypertext by the presence of choices about how to proceed through a text. Readers can follow links within and outside the CITE Journal web site. They can access simulation, video, and audio, which may accompany the text. They might also take the text out of its presentation context (using a save or cut and paste technique) and redesign the text to better suit their needs.

Beyond the technological characteristics that allow for critical reading, CITE Journal editors actively seek topics that might generate critical analysis. In addition, readers are invited to participate in dialogue spinning off an original publication. Since there are no restrictions on publication quantity, multiple voices can be heard without the stifling influence of publication costs.

Conclusion

CITE Journal is focused on the proposition that scholarly publication in a web-based environment can encourage a type of interaction that is impossible in traditional print format. By connecting readers to resources outside the actual publication and encouraging other scholars to engage in electronic scholarly dialogue, CITE Journal is operating in a new landscape. This new landscape can serve to free readers from the constraints of linear text and can provide new media outlets for authors seeking to express their findings in contexts that reflect their research. In addition, CITE Journal is promoting new type of critical reading that places the reader at an advantage. Readers can access the author's research to confirm or disconfirm findings and to follow-up or expand upon the author's findings. Most importantly, a dynamic scholarly dialogue that is not possible is traditional print can be facilitated on the Web. By publishing in CITE Journal social studies scholars can expand on the existing paradigms of publishing and research and open new doors for future understandings and interpretations.

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Use of digital historical resources in a large urban school system

John K. Lee
Georgia State University
jklee@gsu.edu

David Hicks
Virginia Polytechnic Institute and State University
hicks@vt.edu

Abstract This paper will report on the results of comprehensive survey administered in a large urban/suburban school district in the southeastern United States. The findings presented in this paper will illuminate the extent to which teachers are using digital historical resources and the ways in which they are using them. This study involved a survey of 73 high school social studies teachers in a large southern urban/suburban school district. The survey instrument included four dimensions, a demographic section, a section surveying teachers' general belief about social studies and his or her use of non-web based primary historical sources, a section inquiring about teachers' comfort with technology, and a section on the specific uses of digital historical resources. The findings of this survey support the contention that digital history has the potential to alter the general study of history, but there are several obstacles to this change.

Introduction

Throughout human history technological innovations have interacted with academics. The emergence of modern science in the 16th century was in part a consequence of the development of print technology and the newfound ability to publish and disseminate scientific findings. The rapid expansion of science led to the invention of new technologies, which in turn have made possible academic work in a variety of academic areas. Today it is Internet technology that is most dramatically affecting academia. The academic study of history with its reliance on information is particularly susceptible to change. With the advent of the Web, historians and students now have access to materials in places and at times that were previously unimaginable.

As teachers and students begin to use historical resources, social studies and history instruction will change. This article is a report on the results of a comprehensive survey administered in a large urban/suburban school district in the southeastern United States. The findings presented in this article will illuminate the extent to which teachers are using digital historical resources and the ways in which they are using them. Before presenting these findings three ideas related to the phenomena of digital history must be explored, 1) What is digital history? 2) How does digital historical research differ from traditional historical research? and 3) What are the pedagogical implications of digital history?

What is digital history?

Digital history is the study of the past using a variety of electronically reproduced primary source texts, images, and artifacts as well as the constructed historical narratives, accounts, or presentations that result from digital historical inquiry. Digital historical resources are typically maintained on the World Wide Web. The availability of the materials on the Web is the most important distinguishing characteristic of digital historical resources. By using online historical sources teachers and students can avoid the complexities of access that are associated with visiting a physical archive.

Beyond the enabling fact that digital historical resources are "available," these materials also facilitate the construction of new typed of scholarship and narratives. In the digital genre of history, students have the same access as historians. Interpretations compete on the same ground. As the numbers of students making interpretations increases and as students' various interpretations begin to via for attention and respect, students will begin to adapt to a view of past that is tentative and process orientated. These changes have enormous implications for social studies teachers. Teachers will no longer be able to present history prima facia. Instead, using digital historical resources students will negotiate the stories of the past through their own inquiry and investigation.

How do digital historical resources differ from primary source documents?

Despite the similarities, digital historical resources are different from non-digital materials in at least four ways; 1) digital historical sources are more accessible, 2) they are easier to manipulate, 3) they are searchable, and 4) the flexibility of the web allows for a dynamic organizational strategy. Digital historical resources are clearly more accessible than non-digital primary source documents and artifacts. The ease of publication on the Web has lowered economic barriers to creating historical archives. This economic reality has resulted in the production of numerous very high quality collections. Although a comprehensive list of digital historical collections is not yet available, one of the best lists can be found at http://www.historymatters.gmu.edu/. In addition to increased availability, the structural differences between digital historical and non-digital resources (easier to manipulate, searchable, and flexibly organized) represent a major improvement over "physical" resources. Teachers and students can search digital historical collections to find information using rational and teachable techniques. The Web allows for the organization of individual documents and collections in logical and easy to use formats. As is the case with narratives, students who are constructing digital collections can arranged collections in a non-linear fashion that might reflect some of the idiosyncratic characteristic of the documents.

The unique characteristics of the Web, particularly its hypertexuality, also encourage alternative narrative forms. The nonlinear shape of the Web can serve as a lever to encourage students to deal with the multiple sequences, voices, outcomes and implications of historical narrative (Ayers, 1999). As students write historical narratives in hypertext they will have the ability, through the construction of links, to exercise a greater sense of control over the narrative and particularly the structure of arguments within the narrative.

How has digital history affected college and k-12 history and social studies education?

The Web did not simply appear and change social studies overnight. In fact, to the contrary, the almost euphoric expectations that accompanied the introduction and development of Web were for the most part unmet. The pronouncements of a technology revolution that echoed through the decade of the 1990s and followed us into this new century were in hindsight shallow and rhetorical. In the discipline of history there is reason to believe that most teachers actual practice was relatively unaffected by the technological revolution of the 1990s. In a wide-ranging series of reports based on a national survey of over 4,000 teachers Becker (2000) found that fewer than 20% of social studies teachers use computer technology. In a study of 54 elementary pre-service social studies education students Sunal, Smith, Sunal, and Britt (1998) found a low likelihood that teachers could plan to use the Internet to facilitate an inquiry lesson.

The most active use of digital historical resources to date has been in colleges and universities. For examples of hypertext scholarship online see Hypertext Scholarship in American Studies http://chnm.gmu.edu/aq/. Examples of students' digital historical scholarship can be found at the Virginia Center for Digital History http://jefferson.village.virginia.edu/vshadow2/projects/projects.html. The use of digital historical resources in colleges may well be a consequence of the hands-on historical activity that is associated with college level history. The shear number of resources available online is certainly adequate for facilitating serious historical inquiry and research. Numerous college history professors are making use of the Virginia Center for Digital History's Valley of the Shadow to facilitate their students' primary document based historical research. Galgano (1999) reported on his use of the site in an undergraduate history methods course in which students analyzed newspaper articles, letters, and diaries and completed exercises on historical bias, document verification, and statistical analysis. Umbach at Cornell University has also used the collection to facilitate students' analysis of documents and to construct of online hypertext narratives. See Umbach's students' work at http://instruct1.cit.cornell.edu/courses/hist100.06/. Using digital historical resources also offers historical methodological advantages over traditional historical resources. Kelly (2000) found that college history students engaged in a higher level of recursiveness (returning to the same document) when they used digital historical resources as opposed to print resources. The author also found that students were better able to relate documents and make connections when using digital historical resources.

The literature on the use of digital historical resources in k-12 social studies and history instruction is very limited. It focuses primarily on descriptive reports of classroom practice using history-related resources on the World Wide Web. Most of these reviews were very positive and almost utopian in orientation. Most often the authors claimed that the Internet offered "promise" or "potential" unmatched in educational history. Despite the lack of depth evidenced in these descriptive reports, some researchers made efforts to substantiate the pedagogical worthiness of digital historical resources. Wilson and Marsh (1995) reported that the use of the computers and, specifically, the Internet could better engage students and "stimulate an interest in the written word as students search for documents in remote libraries." Rehmel (1998) described a teachers' experience

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with online historical inquiry that was plagued by poorly operating hardware and uninterested peers. Rehmel concluded that using technology does not excuse teachers from maintaining student interest and focus in inquiry. Warren found that student generated web-based primary source collections are an invaluable means of injecting authenticity into high school history classrooms.

Method

A four part 84 question survey was sent to 110 high school social studies teachers in a single school system in a southeastern state. 77 surveys were returned. Of these 73 completed surveys were included in the analysis (representing a 66% of the survey population). The survey instrument included several questions concerning the participants' background. Another set of questions related to participants' teaching style, including questions about participants' philosophy of teaching history and their use of primary sources. Additional questions focused on participants' comfort level using various types of technology such as email, word processors, spreadsheets, and multimedia. A final set of questions concerned participants' use of digital historical resources including the types of resources used, the frequency of use, and pedagogical reasons for use. In reporting the results, descriptive statistical analysis was used.

Results

Characteristics of the school system

At the time of this study, the school system had 10 high schools and over 65,000 K-12 students. It was the fourth largest system in the state. The social studies curriculum in the system included high courses in U.S. history, world history, economics, and civics/government. In addition, students could take elective courses in area historical studies (e.g. Russian history), psychology, sociology, or current issues. The 2000 United States Census showed that the county's population was roughly half white and half black, with the northern area of the county distinctly white and the central and southern areas of the county distinctly black. A substantial number of the blacks living in the county attended a different school system in a city within the county. Forty-eight percent of the county's K-12 students were white, 39% were black, 5% were Hispanic, and 5% were Asian. The school system, like the county, had very distinct racial lines. Four high schools in the southern half of the county had 77% of all the blacks students in the county and 89% of all the students in these four schools were black. Respondents indicated that just over half of the schools (53%) were predominantly white, while 28% were predominantly black and 19% multiracial. Twenty eight percent of the respondents indicated that they worked in urban schools. Half of the participants indicated that his or her school was varied in terms of socio-economic status.

Characteristics of the teachers

Answers on section 1 of the survey provided a profile of the teachers who completed the survey. Teachers from grades 9-12 teaching in all mainstream social studies content areas were represented in the survey. Most of the teachers surveyed taught more than one grade level and all 4 grades were well represented in sample (28% taught 9th, 38% taught 10th, 46% taught 11th, 35% taught 12th). There was a wide range of courses taught. Sixty-two of the 73 participants (86%) taught history (either United States or world) and 12 of those teachers taught both courses. The other commonly taught courses were civics/government (25) economics (18), and geography (10). Participants taught an average of 13 years. Forty-four participants (60%) had a master's degree and 7 (10%) had doctorates. Half the teachers were male and half female and there was a normally distribution of teachers in terms of age age.

Reasons for teaching history

The first question in part 2 of the survey asked teachers to indicate the importance of several statements concerning why his or her students learn history. Participants believed that learning about the connections between the past and the present was the most important reason for learning history, acquiring knowledge of basic facts was second most important and developing skills of historical inquiry was third. Making historical generalizations and understanding the place of America in world history were considered to be somewhat less important. Developing a sense of time was thought by the participants to be the least important reason for teaching history.

The uses of historical sources in social studies

Participants were asked the extent to which they used primary sources in their class. All 73 respondents (100%) indicated that they used primary sources. When asked about the frequency of this use 30 *respondents (42%) said they used primary sources more than once a week,* 19 respondents (26%) said they used primary sources once a week, and 23 respondents (32%) said they used primary sources a few times a year. Participants were also asked if they used primary historical materials that were from specific resources. Almost all the teachers indicated that they used historical primary sources from the textbook (95%). A very large majority of teachers used primary historical sources from the Internet (86%). Smaller percentages of teacher used primary sources materials from resource pacts (46%) and book based collections (65%). Teachers used primary source texts and images with equal frequency, but were less likely to use historical video and audio recordings.

In addition to being asked about the frequency of primary source material usages, participants were also asked about the reasons for using these materials. Participants' responses indicated that providing students with a context for developing their historical thinking skills, providing students with a sense of the experiences and conditions of the period being studied, and providing students an understanding of the essential facts, concepts, and generalizations that underlie historical knowledge were most important. Providing students with an opportunity to question historical truths and engage in historical interpretation or revisionism were considered to be less important. Test preparation was by far the least important reason for using primary source materials.

Participants were also asked how important certain historical activities were for using primary source materials with their students. Using primary sources to learn about individuals and events was listed as most important. Detecting bias, distortion, and propaganda was second most important. Skills that are normally associated with the work of historians such as determining the context and credibility or authenticity of the sources were less important for teachers.

Comfort with technology

Participants were asked about their comfort with using certain technologies. The responses suggested that teachers were not comfortable using all forms of technology. Respondents were very comfortable using word processors, email, and the web. They were much less comfortable teaching students how to use these technologies.

The uses of digital historical resources in social studies

When asked, "have you ever accessed historical primary sources from the Internet for use in your classroom," 65 out of 73 (89%) of the respondents said yes. The use of digital historical resources was limited by participants' inability to find time to conduct searches on the Web and participants lack of access. Teachers most often made copies of the materials from the Web and brought them into class. Far fewer actually used computers in the classroom. When asked what needed to change in their school or classroom in order to increase the likelihood that they would use primary sources from the Web, teachers suggested the most important change would be to increase the number of computers. The second most important change would be to have more time in the curriculum to study historical documents. Following these two were fewer standards, training on using primary sources from the Internet, and training on historical methods for using primary sources.

On the last section of the survey participants were asked to agree or disagree to a series of questions about using web-based or digital historical resources. Participants strongly agreed that the Web provides access to previously unattainable resources. Participants also agreed that the Web was a valuable tool for comparing sources from the same period. To a lesser degree they believed that Web access has changed the way they teach. Participants disagreed with the statement that using primary sources on the Web makes no difference in how they teach. They agree with the idea that online primary historical sources give students a richer sense of historical experiences and conditions. Finally, participants tended to agree with the notion that teaching with web-based historical materials was different that teaching with traditional historical materials.

Conclusion

The findings in this study support the anecdotal evidence that suggests digital historical resources are being used in high school social studies classes. Eighty nine percent of respondents in this survey indicated that they used digital historical resources. Although there were limits on this use (time and computer access were the most important limits), the teachers in this survey seemed to recognize that digital historical resources were unique and valuable. The availability of previously unavailable resources was considered to be the most important attribute of the Web. This finding suggested that development of digital historical resource should be a high priority. Participants thought that using digital historical sources was (or would) change the way they taught. This finding suggested that digital historical resources posses some unique characteristics. Additional research should be conduct to uncover the differences between digital and non-digital resources.

Participants' general preference for having students make connections between the past and the present was an indication that teachers were interested developing real world functionality in the classrooms. Participants were willing to use web-based historical materials to help their students make these connections. Given the participants' responses concerning the importance of using primary source materials (both digital and non-digital), one could expect these materials to occupy a central position in the classroom. To some degree this was true, but a majority of the teachers were still reluctant to use primary historical sources more than one time a week. This was most likely a product of participants' belief that using primary historical resources does not help in test preparation. In a pedagogical atmosphere that rewards students' who posses "test-ready" factual understanding, teachers' unwillingness to regularly use primary source materials to conduct authentic historical inquiry is not surprising. Until the current practice of testing low-level historical knowledge is abandoned primary source materials will not be used frequently enough to meet the goal of helping students make connections between the past and present.

Participants were specifically asked about their use of digital historical sources. The literature suggested that there was a distinction in usage between digital and non-digital resources. Participants confirmed this finding when they indicated that their teaching style changed when using digital historical resources. They also recognized that certain conditions (including more time and resources) must change before effective use of digital materials can be achieved. This finding suggested that teachers must be provided more time to prepare their pedagogical knowledge of digital historical resources and that more computers should be placed at teachers and students disposal.

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Issues in Alaska Native Education

Ann H. McCoy
School of Education
University of Alaska Anchorage
United States of America
afahm@uaa.alaska.edu

Paul Ongtooguk
Institute of Social and Economic Research
University of Alaska Anchorage
United States of America
afpo@uaa.alaska.edu

Abstract: This paper explores the dynamic changes that occurred in teaching and learning when ED 478: Issues in Alaska Native Education, a traditional content course, was redesigned to become a technology-rich environment with support from a PT3 grant. The impact of technology was addressed from the point of view of the instructors and the students. Findings indicated that technology positively impacts the quality of student writing and creates an atmosphere where higher level discussion can occur in class. Many challenges still exist. Recommendations for the future included working with instructors to provide additional knowledge; allotting adequate lead time to review and revise course; collaborating with others in PTEP program on course sequence, scheduling, and continuity.

Introduction

The University of Alaska Anchorage School of Education along with partner school districts and businesses have participated in a Partnership for Teacher Enhancement grant during the last three years, working to redesign the teacher education program. A one-year, post graduate, intensive, internship model, Post Baccalaureate Teacher Education Program (PTEP) was developed. Our PT3 grant actively supported the integration of technology throughout the PTEP, including the development of an Essential Technology Skills Assessment (ETSA) and the redesign of ED 478 to be a technology rich course.

The PTEP was designed as a technology integrated program with no stand-alone technology class. Prior to the first cohort, the UAA PT3 grant supported the development of an Essential Technology Skills Assessment (ETSA) to assess student technology knowledge and skills and to ensure students had basic skills needed to be successful in technology rich classes, The ETSA was based on the ISTE National Educational Technology Standards (NETS) for Teachers.

Completion of courses in Alaska Studies and multicultural education/cross cultural communication are required for initial certification in Alaska. ED 478: Issues in Alaska Native Education meets the requirement for Alaska Studies. The course was delivered to the first cohort in a traditional fashion and sandwiched into an already full course of studies. Technology infusion into the program was not totally successful during the first year. Changes were made to the program structure, course sequence, and to how technology was infused.

ED 478: Issues in Alaska Native Education was moved to the summer session to focus on cultural issues from the beginning of the program and was to be redesigned to become a technology rich class. It became the initial course for the year-long cohort group. The course provided historical context for issues teachers in Alaska will face, as well as, a model for use of powerful and relevant technological tools. It was team taught by Paul Ongtooguk, a content specialist, and Ann McCoy, a technology specialist.

The instructors' backgrounds complimented the redesign of this course. Paul Ongtooguk is a senior research associate at the Institute of Social and Economic Research at the University of Alaska Anchorage. He is a project director for the Native Studies Curriculum Development. He taught high school history and social studies in rural Alaska and currently teaches ED 478. Ann McCoy is an assistant professor in the Elementary Education Program and director of the Alaska PT3 grant. She came to Alaska to teach elementary school in rural Alaska. She has developed and taught education technology courses foundation, and methods courses at the university level. Pablo Cantu, technology coordinator for the Yupiit School District, teaches in Chevak, Alaska and provided technology assistance during the course.

Ongtooguk and McCoy met several times to prepare for changes to the class. The meetings were not structured nor were the instructors compensated for course redesign. They discussed alternatives and changes to course assignments to integrate technology. The ETSA provided the basis for the technology skills. The instructors were not aware of the impact that would occur when the two courses were merged.

Students (n=28) in the second cohort began the program in June, 2001 in ED 478: Issues in Alaska Native Education., The redesigned, technology rich course was team taught by a content specialist and a technology specialist with assistance from a rural educator. ED 478 required students to use a website to access readings about traditional Alaska Native education and other topics that affect Alaska Natives. Students read and responded to the readings using Blackboard, an online course management software. Students developed collaborative projects that utilized a variety of technology skills. Content structure included at least nine readings and responses, video, web research, guest speakers and class discussion.

Technological skills emphasized in ED 478 included: pre-assessment of technology skills, Internet tools; search strategies, site evaluation, information literacy; simple web page and bookmarks; basic word processing; simple spread sheets and graphs; using databases; graphics, movie basics; and computer operations and troubleshooting. Additional skills were added to the second summer session class.

Students had limited access to technology during the first two weeks of the class. Access to the computer lab was limited because it was being used by another class in the afternoon. Access to technology became more available at the beginning of the third week of class. As part of the Alaska PT3 grant, iBook computers were distributed to all students for their use during the year. Technology support was provided in the School of Education computer lab by lab aides, the rural educator, and the technology instructor.

It was a challenge to integrate two very different classes in an unfriendly scheduling format. Class met four days a week for three weeks (12 sessions) in June from 9:00 AM to 12:30 PM. During the first week course content was featured and technology was limited to introduction to Blackboard, email, and Internet strategies. During the second week, technological skills were emphasized and content was given more limited time. Video was used to illustrate traditional skills and also introduced as a technology. The final week was content heavy with most technology support provided after class hours. When it became evident that students would be unable to complete the collaborative web site project, they were given an additional week to work on it.

Findings

In typical classes, the instructor and students spend class time checking to see what was learned from reading and discovering other perspectives. In-class time was a precious commodity in this compressed class. Blackboard allowed instructors and students to make much better use of class time. This was Ongtooguk's initial experience using Blackboard to support instruction. Students learned about each other when they posted what they had learned from their reading on Blackboard and read postings by other students. Class time was spent on challenging each others perspectives and learning from those different perspectives. This took the discussion to a higher level. The instructor could ask probing questions like: "Is that important?" "How do you know?" The cooperation and collaboration that occurred in this class was a good model for prospective teachers. Our goal was to encourage them to not be solo teachers. Cooperation and collaboration is rarely modeled by instructors in the university but we did. The following posting from the Blackboard Discussion Board illustrates student communication.

Think Different Thread Posting to Blackboard by T: "The study of history sure does come from a lot of different angles. The old constructs like social Darwinism get blown out of the water for their racism and moral content and I wonder if there are other constructs to replace them with, ones that facilitate our understanding but without so much moral and cultural overlay. I am constantly being reminded to "think different" and that's a good place to start. I want that to underlie how I go about my teaching career. I think a lot of what has been discussed in class is relevant well beyond the confines of AK Natives issues. It makes my desire to teach more keen and the responsibilities that come with it seem greater. Two things that I put together was the progression of ANCSA and the People of Kauwerak. After a Disaster, it was

Ekeuknick and his Power of Imagination that leads his people to adapt and survive. He "took pride in all that he was doing because he saw each man was necessary for the living of the whole" In the same way, the AFN used the power of their collective imagination after a heap of disasters to adapt and survive in the modern world. ANCSA is their legacy."

Response to T from K: "It didn't occur to me to see the parallels with Kauwerak. You are absolutely right. As we've seen throughout this class once again the culture of Native Alaskans teaches respect for the ways of the past while adapting to the changing world around them."

All readings were posted online on the Alaskool web site (Ongtooguk, 2001). The level of class was much higher than if the readings had not been readily available. However, the development time for a comprehensive web site was enormous and included addressing issues of: securing copyright permission, time to post readings to web site, and other development matters. Many expenses associated with the development of a web site were funded for the Alaskool web site with a prior grant. This gave us a no-cost head start developing the course because the resources were already available.

The use of technology helped make the quality of student writing much stronger. Writing was not done only for instructor but as part of a shared experience. In many cases, written responses to reading more thoughtful than those from students in previous classes who responded only to the. Ongtooguk found when a student's response surprised him, he could easily refer to earlier responses to gain perspective.

Students spent a lot of time in their responses on native/non-native issues in education. Non-native issues were not the same as native issues. These issues can be tricky to deal with and potentially explosive in the classroom. Students saw model of respect for different opinions and participated in working together in a constructive way. The modeling of discussion of important but difficult issues in classroom provides good lessons for potential teachers. The usual model is to teach to the boring by having students confined to safe topics. Our model allowed students to engage in tough issues in safe boundaries. Student reflections indirectly showed positive response to being challenged. The following threaded discussion shows how students dealt with sensitive issues.

Issues Thread Posting to Blackboard by S: "One of the things that shocked me most was realizing that the purpose of school was to make natives less native, Assimilation, and this is still how school works for the most part. Oh my goodness, what a horrible revelation. The entire purpose is cultural genocide. It still exists, we still teach it!!! It made me clearly see why to many school seems worthless. Why one would not want to attend. Now there is a goal, to attempt to change this. To no longer teach things we are not aware of. Along with this I really find one of the most important things I am learning is that content without context means nothing. That motivation is everything. To this same thread was the last few moments of class today, the classroom should be a good, safe place to disagree. How true, classrooms are where we should teach people how to disagree in a good way. It is not important to always win someone over, but to clarify your own position. Without knowing all sides of an issue how can we make anything but uninformed choices? I have a lot to think about."

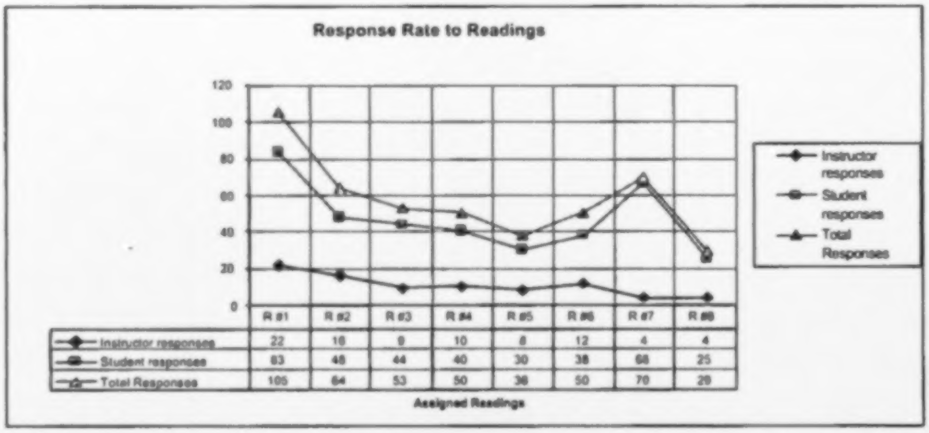
"Today, helped me understand the ANCSA paper, where and how things happened. Federal Indian Law and working within the established system is brilliant. The Native Land Claim is following the law! Why is this not out there in public knowledge? I understand the emotion behind the issue and the passion of all involved, but this must get out there, to all!"

Response to S from R: "Consider this though: To an educated Bostonian being Native meant that you were part of a culture which in the long course of human history had not managed to learn to write, do mathematics, discover the true nature of God, plant gardens and farms, build tall buildings, organize orchestras, build ships, travel around the world, invent the wheel, the plow, sails, smelting, glass, or paper. Native were superstitious and pagan, they lived in homes with dirt floors, they often starved to death. Wouldn't any caring Bostonian want to make a Native less Native, for his own good? And once that attitude was formed, when would it logically change? At what point would you expect our hypothetical Bostonian say, "They are far enough along, we should let them run their own lives?"

Response to S from C: "I, too, have a problem with assimilation. How can we have this huge melting pot without assimilating? And how can we maintain our wonderful diversity if we do? The more diverse we are, the more ideas, approaches, ways of thinking, and variability we have to adapt to changing environments. We need to keep all that we can. But today we are losing this diversity at an increasing rate. An article in the Daily News today stated that we are losing one language every 2 weeks! It is just too easy to accept the default (English) and not worry about our native tongues or cultures and just assimilate. I have a renewed interest now in relearning my first language!"

The class provided a demonstration of the promise of technology. Students learned of the usefulness of tools in content classes. Blackboard was used as an organizing tool. Students were able to log on to Blackboard and click a link to the Alaskool web site or the ETSA web site; links to additional web resources; an outline of class activities and readings with links. A powerful part of technology (Blackboard and email) was the ability to capture and record class interactions including tracking changes of ideas and development of issues. The course was much more documented than a traditional course.

The use of technology can be labor intensive. Ongtooguk went into class thinking he would respond to each student. The time needed to monitor and respond to discussion was very consuming. He never had time to walk away during the entire time, as opposed to a traditional class where once the in-class time is over, you are finished until the next class. There were 580 postings to the Blackboard Discussion area to 12 forums. Eight forums were used to post responses (n=459) to class readings. The remaining four forums were used for more general purposes. One was used to introduce students to Blackboard and to other members of the class. Others were available for general questions and for students to post resources they wanted to share. The final forum allowed students to post anonymously to provide suggestions for changes to the class. Table 1 illustrates the response patterns to the readings.



	R #1	R #2	R #3	R #4	R #5	R #6	R #7	R #8
Instructor responses	22	16	9	10	8	12	4	4
Student responses	83	48	44	40	30	38	66	25
Total Responses	105	64	53	50	38	50	70	29

Table 1: Maps the number of responses to readings posted on Blackboard by students and the responses to students from instructor for each assigned reading.

Blackboard allowed the instructor to spend more time than the three weeks indicated in the class schedule by responding to students either on Blackboard or with email. Students posted their responses to readings prior to the next class session. Many students posted at 1:00-2:00 AM or 6:00 AM prior to start of class at 9:00 AM. Ongtooguk found he had to read the last set of responses at 7:00 AM or as time went on 6:30 AM. Instructors could be overwhelmed by the amount of discourse on the discussion board.

The college wasn't ready for technology. The logistical problems for use of technology were enormous. Many students did not have access to technology and when they finally did, many were not familiar with the laptops. The challenges of technology are illustrated in the following posting.

Overwhelmed? Thread Posting to Blackboard by E: "I can relate. I could barely understand what the assignment was today, let alone imagine how my contribution to our group site will have quality and content. Being unable to do homework outside of computer lab hours is also a major handicap for me and a handful of other students. I don't understand some of this tech language and the quick explanations in more tech language aren't always helpful. At one point today I was so far off of where the group was I just kind of glazed over and didn't even try to ask for help. Most Alaska native kids have probably spent a significant portion of their education feeling like I did today, only far more so. This may be just as important a lesson for me as how to make a web site."

Response to E from J: "Hear Hear. I'm with ya."

Response to E from instructor: "The sense of being lost - significant point of shared experience with many students. I am glad you brought this up as something important to recall as a teacher."

Conclusions and Recommendations

Students were given the opportunity to provide suggestions and recommendations for changes to the class. They offered many of the same ideas that the instructors had identified.

Review Thread (anonymous) Posting to Blackboard by A1: "I wanted to take a moment to say a few words about this class. I enjoyed it tremendously, It was thought provoking and mind blowing to some core issues I struggle with. I loved that Blackboard gave us such a wonderful opportunity to see what everyone was thinking about the articles and issues. I think it is a powerful tool to use in any class."

"My biggest concern and problem throughout the course has been the computer issue. I was one of the few who did not own a computer. I feel I was at a huge disadvantage, I repeat huge disadvantage, as all the readings and all the responses were via computer. I loved the computer part, but for me not having one meant reading and responding to articles and to other students was very difficult. To those who have computers, this may not seem a huge deal, but imagine taking away your car and then asking you to commute [30 miles] everyday, it would be more than inconvenient. I was told I would be given a computer for the year, so didn't purchase one, next time computers should be handed out in the beginning."

"That said, again I love the technology aspect of the class. All the amazing tools we are learning to use are going to enhance our teaching so much. I am thrilled to be learning it! And can't wait to set up my own classroom web page!"

"Finally, please make the class longer next year. There were many issues and topics I wanted to turn into discussions but with the shortness of time I always hesitated to bring them up. I have learned a lot and learned there is still so much to learn..."

Response to A1 from A2: "I think that the tech portion of this class should start the week before our content classes start, meeting at least three times, for maybe an hour an one half per class. ... We should be up to speed before we ever get into class. We have enough to do once we start. I understand that the previous class may still need their computers, but we could certainly use the lab to get started. Then the tech class should be a separate class that runs before or after Paul's class for an hour. ..."

"Technology had a positive impact on teaching and learning. It was evident the university needed to address access to technology issues. Because this is the beginning course of a year long cohort program, we would like to work collaboratively with others in the PTEP program to: continue the dialogue with students later in the year; make recommendations for the next cohort; and look at where the other parts of technology fit into the program. Students and instructors all felt that three weeks did not provide adequate time to adequately address the content and technology. A recommendation emerged that students learn some technology skills early before beginning the content. Perhaps some of the technology skills could be moved to the foundations and methods classes."

Before we teach the class again, we need more lead time to reconstruct the class. Instructors should be compensated to redesign the course. We learned that adding technology creates many unexpected changes that must be considered. Having the knowledge gained from the first session will help to develop a reading list ahead of time and review and possibly revise the ETSA model. Developing rules for engagement on the discussion board, including how and when instructors respond, should be a priority. At the conclusion of the class, provide time in class to summarize what we were trying to model.

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The Design and Development of an Interactive Web Site for Teaching and Learning About American History

Sara McNeil
Department of Curriculum and Instruction
University of Houston
United States
smcneil@uh.edu

Steven Mintz, University of Houston
Department of History
University of Houston
United States
smintz@uh.edu

Cameron White, University of Houston
Department of Curriculum and Instruction
University of Houston
United States
cswhite@uh.edu

Abstract: This paper describes the design and development of an interactive, educational web site for teaching and learning about American history. History teaching at both the high school and college levels persists in using traditional teaching methods, usually using teacher-directed approaches. Our goal is to develop new forms of history education that draw upon online resources and transform history teaching into a more student-centered, interactive experience.

Over the past eighteen months, the University of Houston College of Education and Department of History in collaboration with the Gilder Lehrman Institute of American History in New York and the Chicago Historical Society, has been developing an extensive array of historical resources for social studies and history teachers and students at the primary and secondary levels. Featured in the February 15, 2001 Wall Street Journal, the site is located at http://www.gliah.org. It contains over 1,500 active pages, including a comprehensive online U.S. history textbook; a searchable database containing the transcripts of over 600 primary source documents; glossaries, timelines, bibliographies, annotated hyperlinks, and essays on such topics as the treatment of American history in film and the history of aspects of private life.

The faculty participants--a historian who regularly teaches the large U.S. history survey class, a specialist in instructional technology; and a specialist in teacher education and social studies curriculum development--bring complementary talents to this project. These three faculty members work with graduate students and K-12 teachers to ensure that the materials designed will be pedagogically sound, meet state and national standards, and are motivating and interesting to students.

To help teachers meet state and national standards concerning content, pedagogy, and technology integration, the site contains classroom activities and handouts; lesson plans; and electronic lectures. It also serves as a portal to carefully evaluated historical resources on the World Wide Web including historical games, images, maps, music, newspaper articles, and speeches.

Our Website seeks to take advantage of the Web's communication, interactive, and search capabilities. An "ask the historian" feature, for example, allows students and teachers to pose questions to professional historians. Flash movies illustrate important themes in American history.

Instructional Design Model Used

The Reflective, Recursive, Design and Development model or the R2D2 model (Willis, 1995) contributed significantly to the process of design and development of this Web site. The R2D2 model is a non-linear instructional design model that promotes recursive, developmental planning, reflection, and collaboration among experts and participants. The R2D2 model is based on a facilitation model in which objectives emerge as the project is developed and are not "set in stone" during the design phase. A rather vague goal is accepted as the project begins, and the goals are negotiated and become clearer and more detailed as the actual development of the project occurs. There is also an increased emphasis on learning in meaningful, constructivist contexts.

A key component of the R2D2 model is that different parts of the development can occur simultaneously and can inform and change the design of another part. In addition, a collaborative, cross-functional team, rather than individuals working in isolation, drives the development of the project. Different project members often have interchangeable roles as opposed to the more traditional roles of instructional designer, programmer, and graphic artist, and contribute to emerging decisions, solutions and alternatives. These roles and activities often emerge as the project progresses and not from detailed flow charts and storyboards although there is a structure that guides the process. This structure gives this model its name – reflection and recursion.

Reflection provides opportunities for the development team and stakeholders to think about and reflect on both the decisions that that been made and also future decisions. The idea of reflective practice stresses the need to think about and revise ideas, plans, concepts and procedures based on "observation and analysis of what is happening in the practice environment" (Schon, 1991). As the project takes shape, feedback and other types of formative evaluation contribute significantly to the development process. This reflection by both the team members and other stakeholders is also a recursive process and occurs throughout the process. This model is an example of a participatory process since it provides the opportunity for all team members, stakeholders and prospective users to have a significant role in decision-making process.

This constructivist approach offers a significant improvement over more linear, sequential instructional design processes where individual team members may create various phases independently from one another. In addition, goals that are flexible and dynamic encourage opportunities for more interaction, creativity, and motivation among team members.

Many types of formative evaluation inform the recursive process throughout the project. Some assessments may be based on responses by content and design experts, while other feedback may be based on actual use by the target audience.

Initial Goals of the Project

In developing our site, we were guided by several goals:

Goal 1: To give students more meaningful, active learning opportunities through project-based activities using primary sources.

The Website gives students the opportunity to work with archival resources from the Gilder Lehrman Collection, on deposit in the Pierpont Morgan Library in New York, as well as selected materials from the Chicago Historical Society, items which were previously accessible only to scholars. It also contains extensive activities designed to promote active learning, including exploration guides that introduce students to working on particular historical topics; quizzes to test student knowledge; resources that link the past with current events and assignments involving maps, original documents, and statistical information.

Goal 2. To give University of Houston students the opportunity to participate in designing and developing online exhibitions and instructional materials for primary and secondary students and teachers.

Creating the site has been a collaborative process in which faculty members and students have had the opportunity to work closely together, combining their skills, knowledge, and energy. This process has been mutually beneficial. Students who had sophisticated computer skills have learned a great deal about history and research methods. Faculty members, in turn, have learned a great deal about the kinds of active learning strategies that work most effectively with today's students.

Goal 3. To carefully assess how online history resoources can be most effectivel incorporated into K-12 classrooms.

Many teachers do not know how to effectively incorporate Internet resources and primary source documents into their teaching. In social studies, technology is often used as an add-on, available when the "real work" is finished, or as a reward for good behavior. This projects has sought to develop a database of activities that will allow instructors at the introductory college and secondary levels to incorporate these resources in their courses; to train prospective teachers to use technology effectively in their history classes; and to test these activities in an actual U.S. history survey class classroom.

Focal Points of the Instructional Design Process

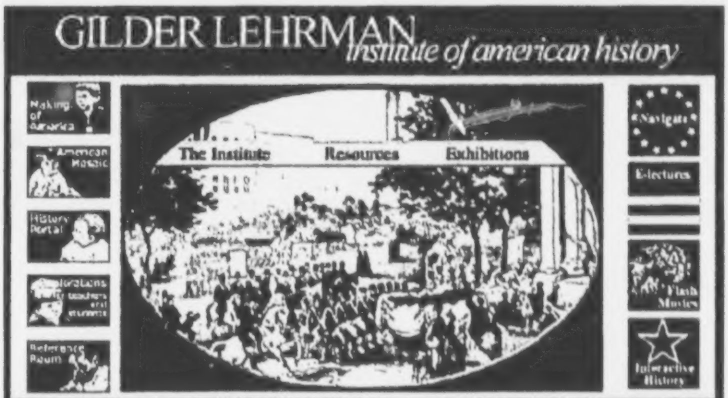
The principles of the R2D2 instructional design model, reflection, recursion, and participation, take place over the entire design and development process and provide three focal points: Definition, Design and Development, and Dissemination.

For this project, the Definition focal point provided a basic understanding of the users of the web site, in this case teachers and their students in grades 5 through college level and anyone interested in American history. The goals of the site were discussed collaboratively and were vaguely defined. These goals, as described above, became clearer and more detailed as the development progressed.

The Design and Development focal points are ongoing and involve all team members and an increasing sample of potential users. The design began with a vague plan sketched out and prototypes of the Web pages were created. Menus and navigation elements were developed as participants used the materials and more content was created. Feedback was solicited from both end users and content experts as the Development focal point continued. The process is very flexible and is driven by feedback and usability testing.

The Dissemination focal point is ongoing as well. The Web site came online in May, 2001, and content continues to be added. At the beginning of 2002, there was an average of 2,500 users a day on the Web site.

Unique Features of the Gilder Lehrman Institute of American History Web Site

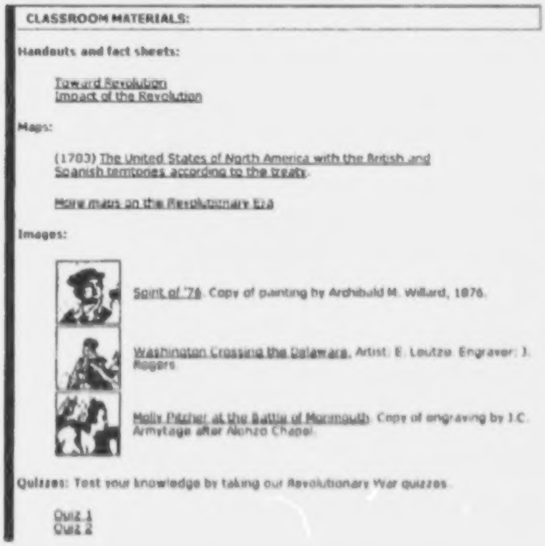


http://www.gliah.uh.edu

BEST COPY AVAILABLE

Dynamic Database

Our site, which complies with the latest standards for accessibility under the Americans with Disabilities Act, has a dynamic, database-driven design. Documents, texts, hyperlinks, and images have been placed in a searchable, relational database, and Web pages are generated dynamically using Cold Fusion. This approach eliminates the redundancy that plagues many web sites; allows the designers to change a single record and affect the entire web site; and gives all pages the same look and feel. More importantly, it allows users to request the information that they want, rathher than simply presenting the material in a rigid, predigested format. The website's Verity search engine allows users to conduct a keyword search of all text.



CLASSROOM MATERIALS:

Handouts and fact sheets:

Toward Revolution
Impact of the Revolution

Maps:

(1783) The United States of North America with the British and Spanish territories according to the treaty.

More maps on the Revolutionary Era

Images:

Spirit of '76. Copy of painting by Archibald M. Willard, 1876.

Washington Crossing the Delaware. Artist: E. Leutze. Engraver: J. Rogers

Molly Pitcher at the Battle of Monmouth. Copy of engraving by J.C. Armytage after Alonzo Chapel.

Quizzes: Test your knowledge by taking our Revolutionary War quizzes.

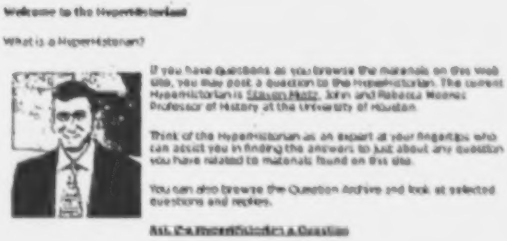
Quiz 1
Quiz 2

Content Materials

The Web site contains an entire American history textbook and over 300 annotated primary source materials. The site also serves as a portal for access to the history profession's major institutions such as historical archives, journals, societies, and institutes. A comprehensive guide to historical museums on the World Wide Web as well as living history museums and presidential libraries is also provided. Other resources include annotated links to audio resources such as speeches and book discussions by historians. Links to visual resources such as maps and historical images are included as well.

Interactive Materials

Materials have been designed to increase user interactivity with both primary source materials and with content experts. The site's Ask the HyperHistorian feature has been well received and provides users an opportunity to ask an historian a question about an event, a person, or an issue in American history.



Welcome to the HyperHistorian

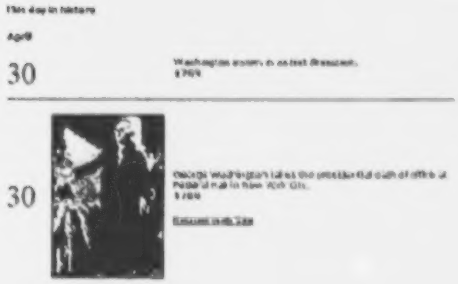
What is a HyperHistorian?

If you have questions as you browse the materials on this Web site, you may post a question to the HyperHistorian. The current HyperHistorian is Steven Mintz, John and Rebecca Moores Professor of History at the University of Houston.

Think of the HyperHistorian as an expert at your fingertips who can assist you in finding the answers to just about any question you have related to materials found on this site.

You can also browse the Question Archive and look at selected questions and replies.

Ask the HyperHistorian a Question



This day in history

April

30 Washington sworn in as first President.
1789

30 George Washington takes the presidential oath of office at Federal Hall in New York City.
1789

Unlike the "This Day in History" features that one finds in daily newspapers, our Day by Day in History provides images of the past and links to valuable online resources. In addition, users can choose to display only certain categories of events such as abolition and the American revolution.

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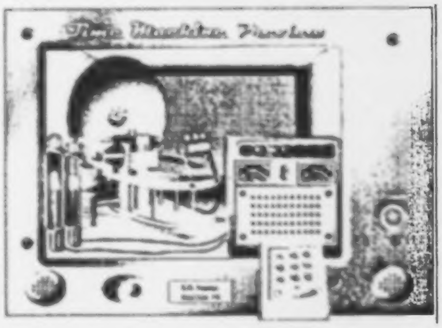
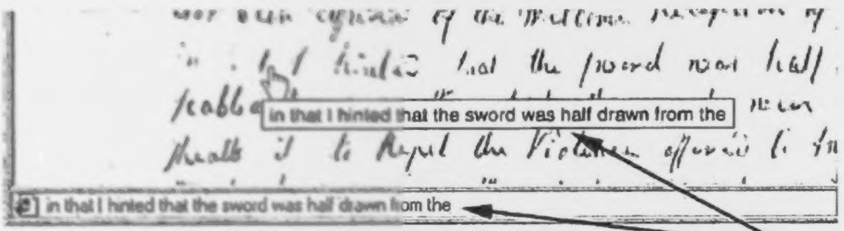
Flash Movies



A Time Machine created in Flash tests users knowledge of historical events and dates.

Our Flash movies provide an audio and visual overview of key themes in American history.

Primary Source Materials



in that I hinted that the sword was half drawn from the

in that I hinted that the sword was half drawn from the

Move your mouse slowly over the text of the letter. The translation will appear in these two areas.

Among this site's distinctive features are online exhibits on African American life at the turn of the century illustrated with an early form of photography known as cyanotypes and a java-script program which automatically transcribes an 18th century letter.

Summary

Learning American history not only requires students to master content, but also to learn how to think fourth-dimensionally – that is to understand that our society's values and institutions are the product of an ongoing process of change. Students should not passively absorb historical materials but they need to learn how to conduct research, how to evaluate and interpret original sources, including visual and auditory sources, and to understand how seemingly disconnected events of the past interrelate. By providing teachers and students with comprehensive historical resources, including research guides, primary documents, and original interpretations, we seek to transform history into a much more active, engaged process of learning through doing. By participating in this project, students

Even more important to us as the Web site itself is the process by which this site has been created. Students have been actively engaged in both designing and developing this site, experimenting with new ways of presenting and displaying information, and devising ways to transform history learning into a more active process.

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Making the Dismal Science Relevant with Projects and Handheld Computers

John Mergendoller, Buck Institute for Education, US
Jason Ravitz, Buck Institute for Education, US

One-half of the states require high school students to complete an economics course before graduating. For most students, this encounter with the dismal science is a frustrating one. Economics is a complex and difficult subject, and students often struggle to make sense of its abstract concepts and laws which seem irrelevant to their lives.

One way to make economic concepts more meaningful to students is to use it to analyze the world they live in. We have developed an example unit that focuses on the fundamental economic concept of "demand," and employs handheld computers to aid students as they interview their peers to determine the actual demand for certain foods and concert tickets. Once the interviews are over, the handhelds are used to graph the results and transfer the data to desktop computers for further calculations and analysis.

This session will describe the project and demonstrate software program developed for the handheld. Attendees that have handhelds will be "beamed" the program so they can try it out by collecting demand data from others in the session (or elsewhere). They will be free to use it in their classes when they return to their schools.

The Buck Institute for Education is working with teachers to integrate handheld computers in to the classroom instructional process. The session will end with a discussion of the ways handhelds can be used by teachers and students and the distribution of relevant text resources and www links.

Integration of Technology in Elementary Social Studies Teacher Education: Adapting a Curricular Model

Jeff Passe, University of NC-Charlotte, US
Tracy Rock, University of NC-Charlotte, US

Tanner and Tanner (1995) present a model of Curricular Sources and Influences to explain the development of the K-12 school curriculum. A graphic representation of their model shows the school curriculum in the center of a circle. Around the circumference of the circle are political influences, social influences, economic influences, and technological influences. These four types of influences affect each other as they help determine the decisions made by school boards, administrators, teachers, parents, and students. Specific examples of the four influences are governmental agencies, publishers and testing companies, professional educational organizations, and colleges and universities.

The Tanner and Tanner model (1995) appears to effectively describe curriculum development at the K-12 level, but may also be useful in understanding curricular changes at the university level. This study focuses on a series of curricular changes in a single course, Elementary Social Studies Methods, over a ten-year period. While there were many adaptations and adjustments in the course, this study will only examine attempts to integrate technology education into the course. The Tanner and Tanner (1995) model will guide the discussion.

Significant Stages of Curricular Change in Technology

1.*Get Ready!* In the earliest stage, the professor was the instigator of the curricular change. He wanted to alert the preservice teachers of forthcoming developments in technology (e.g., greater accessibility of the Internet) that would influence their elementary social studies classrooms. The nature of the change was limited to discussion because neither the university nor the students had access to the technology.

2. *Look at This!* When the federal government began to provide grants to universities for technology, the teacher education program used the funds to create a technology classroom. With this innovation, the professor (on his own volition) began to demonstrate some of the social studies applications of advanced technology (e.g., software to create time-lines.) Because the students still did not have access to the technology at home or school, there was no application.

3. *Get Your Feet Wet!* As an incentive to promote its new technology goals, an additional phase of state funding was offered to teacher education programs. The faculty leaders in technology used the funding too create computer labs in the College of Education. Now it was possible for students to access the technology even if they did not have the necessary hardware at home. The professor decided to require students to conduct Internet searches for social studies resources and use email to share their findings.

4. *The State Steps In!* The State Department of Public Instruction, concerned about reports of slow integration of technology in K-12 programs, began to require each teacher education program to demonstrate how it meets the state technology goals. In response, the teacher education professors met to assign competencies to each course. The social studies methods course expanded its technology integration with additional assignments and instruction.

5. *Take Your Work Home with You!* The personal computer revolution finally reached the point when, because of dropping prices and growing popularity, nearly every preservice teacher owned or had easy access to a computer. The professor began to encourage on-line submission of assignments by offering test point bonuses as an incentive. Most students were drawn to the incentive and subsequently developed considerable technological comfort and skill.

6. *Get Organized!* The computer revolution turned into a financial windfall for many companies. Several successful individuals and corporations invested their profits into foundations to promote technology education. Through this outside funding, professional organizations hopped on the bandwagon to create new organizations, conferences, and journals. In the field of social studies education, a group of young faculty developed a project to expand technology integration in their field. The professor of the methods course became involved in this project, and received further stimulation and training in technology. These experiences were translated into new components of the methods course, such as GSI and listserves.

7. *Here Comes the Test!* Dissatisfaction with the progress of technology integration in K-12 programs led the state to develop a testing program to force students to meet the competencies. After a series of invalid and unreliable assessments, student anxiety reached its peak when they learned that failure on the state test would delay their teacher certification. The testing program was then replaced by a plan to have each university develop its own assessment. The faculty responded by creating a simple form for students to demonstrate the technology competencies. They were required to meet 18 of the 24 competencies to graduate. In response, students in the methods course eagerly sought the technology education that was offered by the professor.

8. *Report Card Time!* The Department of Public Instruction began to survey teacher education graduates concerning the quality of their preservice experiences. The results of these surveys, combined with various test results, were incorporated into a "report card" that would be shared with the public. The university did not do as well on the first few reports as it would have liked. Technology was the main weakness. Interview data indicated that many recent graduates did not understand the competencies or felt that they received inadequate instruction. Further analysis revealed that many students took shortcuts in meeting the competencies, or sought out part-time faculty to sign off on their forms without providing evidence. In response, various administrators pushed for a new technology course that would be required for all preservice teachers. Because the proposed course would be taught separately, and not be integrated with the rest of the program, several members of the elementary education faculty, many of whom were strong believers in curriculum integration, were resistant.

In order to forestall the creation of a stand-alone technology component, the professors who taught the curriculum course and the social studies methods course devised a plan to integrate all of the technology competencies into their courses. Their proposal attempted to reduce the students' confusion, maintain control over assessment, and enhance the instruction in technology. Social studies methods became the primary course for technology integration.

Application of the Tanner and Tanner (1995) Model

The preceding saga fits the Curriculum Influences model, even though Tanner and Tanner (1995) designed it for explaining K-12 curricula. The curriculum of the social studies methods course appears to have been transformed by economic, political, social, and technological influences. The economic stimulus of state funding was an immediate influence on the use of technology in the course through the creation of technology classrooms and labs. After its initial economic impact, the political maneuvers of the State Department of Public Instruction, through its development of technology goals, testing programs, and report cards, became a major influence on the nature of the preservice curriculum. Social factors, such as the popularity of computers and the Internet, along with the university's public relations concerns, also played a role in shaping the curriculum. Professional organizations also played a significant role in the expectations and activities of the course. Of course, the role of technological influences cannot be underemphasized.

Implications

Integrating technology into the social studies methods course was not simply a function of adapting the technology for student learning. Professors must be cognizant of the social, political, and economic influences that advance or retard the process.

While economic and technological changes were helpful in transforming the course to the professor's goals, those influences may not continue to be positive. The downturn in the economy, particularly in the technology sector, may lead to a slowdown in student access to and interest in technology.

The political influences on education have been rapidly increasing over the past several decades. Recently, the power of the state has been expanding further into the domain of the university. Any curricular changes in teacher education must be planned with an eye toward the state's expected role. This may be the most crucial aspect of technology integration. Curriculum developers may not be well versed in governmental matters, and may have to change the ways they prepare for reform.

Real™ History: Using Multimedia Software to Introduce Historic Events and Promote Constructivist Principles in Secondary Social Studies Classrooms

Beverly B. Ray, Ph. D.
Idaho State University

Abstract: Real Media Slideshow™ Basic software can be used to promote hands-on, peer-to-peer learning and collaboration in a variety of secondary social studies classroom settings. Teachers and secondary students can use the software to create powerful multimedia presentations that illustrate key instructional concepts and themes. This paper will outline the steps involved in researching, storyboarding, and constructing a presentation that illustrates an historic event in the Real Slideshow™ Basic multimedia format.

Introduction

Motivating students to learn about history can be a difficult task for many teachers. Real Networks™ Slideshow Basic is a dynamic freeware application that social studies teachers can use to motivate and inspire their students by allowing them to experiment with multimedia design in ways that are both creative and constructivist in nature. Creating animations in Real Slideshow™ Basic involve students in their own learning, even as the process creates a powerful learning environment for students. Animations such as those created in Slideshow™ Basic are "highly effective tool[s] for illustrating a concept" or historic events (Roblyer & Edwards, 2000). The research and design process promotes critical thinking, problem solving, and cooperative group interaction. Students are able to construct their own understanding of an event as they research, plan, and create the presentation.

Literature Review

Teachers who use multimedia programs, such as Real Slideshow™ Basic, recognize that students have different learning styles, that all students can learn, and that all students can have expertise. Multimedia is a "fluid" environment that requires the student to make decisions and evaluate the process continuously (Roblyer & Edward, 2000). This environment forces students to use higher order thinkingskills (Marchionini, 1988). Students who may not find other learning activities motivating, may find working on multimedia projects engaging (McCarthy, 1989). Working together in small teams on Real Sildeshow™ Basic presentations can also promote cooperative interaction, thus increasing learning, improving social skills, and promoting problem-solving behaviors (Cooper, et. al; Johnson & Johnson, 1989/1990; Slavin, 1980).

Planning the Project

Step One: Review Real Slideshow™ Basic Presentations

Before beginning the project students should review a variety of Real Slideshow™ Basic presentations (see Figure 1). In particular students should focus on the amount of scripting, the type of images, and the amount of audio contained in various Real Slideshow™ Basic presentations. Teachers can download or link to Real Networks™ Slideshow™ presentations at Real Networks web site.

Clayton University's Real Network™ Slideshow Tutorial http://learningcenter.clayton.edu/fidl/realslideshow/default.html

Real Network™'s Tutorial (Video File)
http://ramhurl.real.com/smildemohurl.ram?file=marketing/tools/slideshow/tutorialplus2banner/start.smi

Sample Presentations
http://ramhurl.real.com/smildemohurl.ram?file=marketing/tools/slideshow/tldemo/start.smi

Download Real Network™'s Free Slideshow™ Basic Software
http://proforma.real.com/rnforms/products/tools/slideshowbasic/index.html?key=L43591004037252

Figure 1. Online Tutorials For Real Networks™ Slideshow and Real Slideshow™ Basic.

Step Two: Research the Topic

A major component of the process involves researching topics, locating resources, and analyzing resources to determine their appropriateness to this multimedia format. Using Internet sites such as the National Archives or the Library of Congress (see Figure 2), students should carefully select a few powerful images that relate to one key event or theme. Working with three to five carefully selected images and one audio filed is recommended for beginners.

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Library of Congress, American Memory (http://memory.loc.gov)
African American Odyssey, American Folk Culture, Baseball & Jackie Robinson, Civil War Pictures, Great Depression, Native American Culture, Presidents and First Ladies, Slave Narratives, Women's Suffrage Movement

National Archives (http://www.nara.gov)
Constitutional Issues, Pearl Harbor, Powers of Persuasion, Korean War, Women's Suffrage and the 19th Amendment

Figure 2. Online Sources of Public Domain Images and Audio Files.

Step Three: Storyboarding the Project

Students can use sticky notes, storyboard sheets, or concept mapping software to assist them in storyboarding their entire presentation before they ever begin working in Real Slideshow™ Basic. Ideally, students should develop their presentation frame by frame. Determinations about the sequencing of images and the inclusion of text should be made at this point. Students might want to end the presentation with a final screen that displays one or two hyperlinks to site t hat further illustrate the contents of the presentation.

Step Four: Working in Real Networks Slideshow™ Basic

Real Networks™ offers basic advanced tutorials online to assist users learning how to create Slideshow presentations (see Figure 1). Peer tutoring and the team aspect of group work will allow more technologically literate students to assist their peers in developing the presentations. When assigning students to groups for this project, teachers may want to assure that at least one team member has computer experience with various multimedia software. While Real Slideshow™ Basic is an easy to use program that even novices can use effectively, it is a good idea to have a basic set of directions available for students to refer to while working at the computer (see Figure 3).

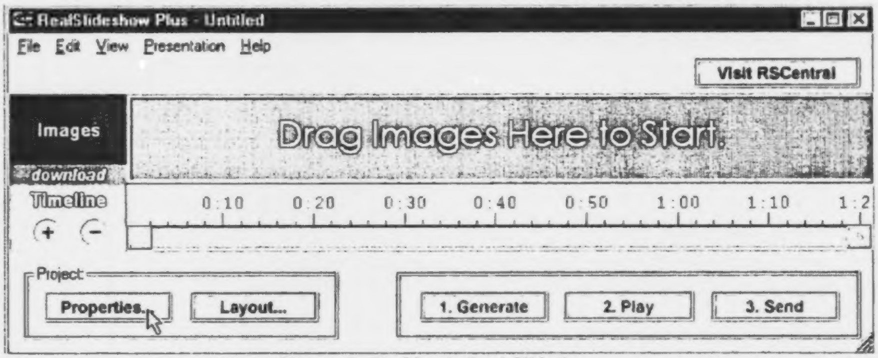

Figure 3. Working in Real Slideshow

Step Five: Publishing the Presentation

Once the graphics and audio files are inserted into Slideshow, the file should be saved to disk. The file can also be published to the Internet if viewing by a wider audience is desired. However, if copyright protected files are used, permissions should be obtained before publishing to the Web. Playing the file either from disk or online will require a media player, such as the free version available from Real Networks.

Step Six: Using Slideshow™ presentations in the classroom

The teacher should assist students in creating questions that lead to discovery. For each presentation, students should prepare a list of questions for the entire class that spiral from the basic to the complex (Teachers Curriculum Institute, 1998). The slideshow is the primary source around which student inquiry occurs.

Conclusions

Having students construct a multimedia presentation in Real Networks Slideshow™ Basic takes little more time than constructing a presentation in Microsoft PowerPoint™ or Hyperstudio™. But the benefits are just as great for students. Not only do students get experience in using multimedia software that is a popular standard on the Internet, but they also gain cognitive benefits from constructing their own knowledge of the historic events. This kind of project is more meaningful because it challenges students to research, plan, and create an original presentation. During the process, they exercise critical thinking skills while constructing their own understanding of historical events.

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Creation of an interactive slideshow challenges students to conduct historical research, make choices about the quality of media files included in the presentation, and learn how to plan, design, construct, and publish a multimedia presentation. Creating a Real Slideshow™ Basic presentation also allows students to reflect on the project by discussing what went well, what needs to be improved or revised, and what else can be done with the Slideshow™ Basic software

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Linking history, technology and teacher education: The Allen Parker slave narrative

Dr. Joy Neal Stapleton
Department of Curriculum and Instruction
School of Education
East Carolina University
United States
stapletonj@mail.ecu.edu

Joyce Joines Newman
College of Arts and Sciences
East Carolina University
United States
newmanj@mail.ecu.edu

Abstract: This is the story of how a slave born in 1838 is leading students and faculty at East Carolina University into the technologically-advanced 21st century. Allen Parker was a former slave from northeastern North Carolina who published a narrative of his life in 1895. Pursuing his story has led professors and graduate students in 2001 to integrate technology into their classes in History and Teacher Education as a natural part of the learning process. The Allen Parker Slave Narrative website is a doorway to his world, just as his narrative has been an opening to the world of 21st-century technology.

Introduction

As the Internet evolves, there is a growing realization that new technologies can help teachers move beyond traditional instructional strategies to more dynamic methods that reach a multitude of learning styles (Fraser, 1999; Clark & Cunningham, 1999). When approaching new technologies, teachers tend first to duplicate familiar, traditional forms of instruction. As they gain experience and their comfort level increases, they can move beyond traditional forms to use new technologies in creative ways (Fraser, 1999).

One effect of computer-enhanced instruction can be a revision of the traditional role of the teacher from authoritative expert to supportive guide. The teacher becomes a co-explorer with students (Kandies & Stern, 1999). In this student-centered learning environment, the student assumes more responsibility for constructing his or her own knowledge (Kandies & Stern, 1999). In addition, technology allows new forms of communication that change interaction patterns between students and teacher and encourage the development of a community of learners (Kandies & Stern, 1999). The possibility of communicating easily outside class meetings bridges the time lapse between in-class interaction which can extend, in some cases, up to a week. Such a transformation occurred with the Allen Parker project, which involved professors, teachers and students from two university courses in different disciplines.

This is the story of how a slave born in 1838 is leading students and faculty at East Carolina University into the technologically-advanced 21st century. Our project began with a traditional History course on slave narratives in American History. The class project was to research the accuracy and context of a narrative published in 1895 by Allen Parker, a former slave from northeastern North Carolina. Technology in the form of a website, a class listserv, email, digital cameras, and streaming video created a class synergy that transformed individual research efforts into a rich, collaborative historical discourse and allowed the class to move beyond expected results. Students in the History class published their research as an interactive, educational website that, in turn, enhanced learning and teaching of History for teacher education students seeking to teach social studies from multiple perspectives.

The next step in the Allen Parker project was to make the information available for teachers and students of all ages in Eastern North Carolina. A casual conversation between a student from the History class and a professor from teacher education generated the next phase of the project—collaboration between History and Social Studies students.

One of the goals of the advanced social studies class was that teacher education students use technology to transform their teaching. The professor modeled for them how classes can be student-centered and how they can require students to co-construct their knowledge through the use of technology. Students researched social studies information on the web and integrated that information into their teaching. Students were also encouraged to use historical information from the context of their communities in eastern North Carolina. They exposed their own students to the Parker narrative and used it to generate lesson plans that were placed on the web as a resource for other teachers.

Parker's story served as a launching pad not just for learning historical information from new perspectives, but also for showing the professor and students how new technology can provide new ways of interacting and learning. The transformative process began at the university level with professors and students whose learning experience was altered by technology. Through teacher education classes, it extended to elementary students in classrooms in eastern North Carolina.

Allen Parker

Allen Parker was born on a plantation in Chowan County, North Carolina, in 1838. Like thousands of his African-American contemporaries from eastern North Carolina, Allen Parker escaped from slavery to Union-occupied territory. After serving in the Union Navy, he migrated to the Northeast eventually settling in Worcester, Massachusetts. There he spent the last decades of his life selling popcorn and homemade candy for a living and watching his four children die in their youth from diseases no longer a threat today. He later joined the Worcester chapter of the Grand Army of the Republic, a fraternal organization for Union veterans, and made an extended trip to London in 1905. His obituaries in 1906 describe Allen Parker as "one of the best known colored men in Massachusetts." Although he never learned to read or write, in 1895 Parker published a short narrative of his life as a slave in Chowan County.

Allen Parker Leads Historians to Technology

Dr. David Cecelski, Distinguished Whichard Professor in the Humanities at East Carolina University during 2000-2001, discovered a rare copy of the Allen Parker narrative in a library in the Midwest. He designed a seminar course in which the students would focus on slave narratives from Eastern North Carolina, and would do a joint research project on the Allen Parker narrative to verify its details and place it within a historical context. Joyce Joines Newman, Instructional Technology Consultant for the College of Arts and Science at East Carolina University, was a non-traditional student in the class. She provided technical support to faculty and students as the Allen Parker project led them to incorporate more complex technology into their instructional strategies.

From the beginning, students themselves introduced technology into the History course through the establishment of a class listserv by one student and the creation of a web site for the Allen Parker slave narrative by another. This was done with consent of Dr. Cecelski who lacked technological experience himself but was receptive to the idea because of his student-centered teaching style. In the class were several non-traditional students who were extremely self-motivated. These factors allowed technology to become an integral part of the research and documentation process itself.

Technology altered class dynamics by facilitating a sense of unity and shared purpose among class members whose project was to verify the factual information in the Parker narrative and gain insight into its social and historical context. To do that, individual students accepted responsibility for researching different aspects of the Allen Parker story, using traditional research methods including spending hours alone reading dusty archived materials. Since each student was researching a unique but important area, each had to be successful and productive for the research to be complete. Each person had strengths within the project, and their weaknesses were ameliorated by the strengths of others. Class members also acted as peer reviewers. When there was a conflict of information or a difference of opinion about accuracy or interpretation, class discussion and consensus resolved the issue.

Communication through the listserv reinforced the learner-centered, proactive format of the course. Messages were channeled through the campus email system, which let students communicate their findings as they occurred, and allowed them to receive immediate compliments, encouragement and feedback, generating a class synergy that kept them moving forward in their project. This maintained the emotional momentum of the class between once-a-week meetings, defined a sense of purpose among class members, and created a stronger sense of group identity than occurs in many courses. Class field trips to Chowan County and the Peter Parker Plantation also strengthened group bonds and provided an opportunity for the use of additional technological tools. Members of the class made digital videotapes and still photographs which they posted on the website as streaming video and linked images.

At the end of the semester, as the class finished their research, Dr. Cecelski edited their annotations and they were posted on the Allen Parker web site in pop-up windows accessed through hyperlinks. These annotations provide supporting evidence, explanations and references for the narrative. It helped that Allen Parker turned out to be a remarkable subject for research and that serendipity frequented the project. Not only did the students locate the plantation where he was born, but it is still a working farm owned by descendants of the family who received the original grant from Lord Granville in the early 1700s. When they looked for Parker's pension records in the National Archives, they found not just a few pages of information. Instead, questions about his Naval service and the legality of his marriage had generated 177 pages, including depositions from family, neighbors, and doctors that provide an unexpected physical and personal portrait of Parker.

It was an exciting time as the students watched their bare bones research assume a fleshed-out form. The web site was developed as an educational resource providing social and historical context for the narrative--timelines, maps, images and original documents. There are links to websites with related images and information. Content derived from course lectures and readings, primary and secondary sources in libraries and archives, oral interviews, web research, interlibrary loan, field trips, contacts with community members, email, telephone conversations, and collaboration with faculty at ECU and other universities.

Perhaps the most interesting aspect of the Parker project in terms of using technology is that the technology reinforced the format of the class, which was a collaborative effort requiring the cooperation and active participation of each member of the group. While many courses that involve research require each student to work independently and competitively, this project relied on the sharing of information and the subordination of personal ego to the group's goals. The fact that individual contributions are not identified on the web site underlines the interdependence and collaboration among all class members. The web site presented research results as a complete and seamless visual product, which enhanced the sense of accomplishment by the group as a whole.

Allen Parker Links Teachers With History and Technology

Allen Parker's influence on students and faculty continued through collaboration with Dr. Joy Stapleton of the Elementary and Middle Grades Education Program and graduate students in her course on Teaching Social Studies in the Elementary School. Members of the class included full-time graduate students and teachers from elementary schools in the surrounding area. As part of a midterm exam each student developed curriculum-compliant educational activities based on information in the Allen Parker slave narrative. Posted on the Parker web site, each project includes an overview, standards, materials, children's literature, activities and references, making the site a collaborative, interdisciplinary effort and a resource for public school teachers throughout the state.

The course was designed to challenge teachers to become familiar with the supplemental social studies information that is available on the web and to encourage them to integrate the information and the use of technology into their lesson plans. Most of the students were aware of lesson plans on the web, but were not aware of the array of information that they could use to supplement lessons. The course utilized online modules, email communication, and extensive reliance on web technology including research activities and online course materials (in Blackboard courseware).

During the class, the web shifted from being just a resource tool for teachers to being a supplemental instructional tool for their students. The professor modeled good web sites and then sent students out on the Web looking for similar sites that could enhance instruction for their grade level. Students found that the web could serve not only as a source of information to enhance their lesson plans, but that there are many web sites designed as educational tools to be used by children themselves. For example, web sites that could complement the Allen Parker narrative ranged from sites tracing the Underground Railroad with concrete images of houses along the route to sites with simulations that involved decision-making and higher-order thinking skills. In addition to using the web as a resource, teachers published information on the web for others to use.

The Allen Parker project moved to a new phase with the addition of lesson plans developed for elementary school teachers. The addition of these plans made the Parker web site a more robust tool for teachers in eastern North Carolina. Teachers can now use the web site to integrate primary sources into their classrooms as well as to teach the potentially controversial topic of slavery and race relations.

True to the learner-centered nature of the project, students and faculty from the two courses came together at the end of the semester to learn from each other's experiences with the Allen Parker narrative. Educators questioned historians about community resources and research strategies. Historians asked about such rich historical information could be presented to young children in meaningful and creative ways. This event was recorded in 35 mm photos that were scanned and posted on the website.

Final Thoughts and Comments

The Allen Parker Slave Narrative Site is an example of how technology can transform teaching at all levels. The creation and use of the project web site changed courses for students of many ages. It was used as a vehicle to move to more technologically-enhanced forms of research and communication. There are numerous web resources for teachers who are interested in using computer-assisted instruction. For example, there are sites with electronic text collections, primary history documents from around the world, transcripts and audio for key historical speeches , documents pertaining to slavery, African-American history pages, digital images of African-American life, or excerpts from other slave narratives. The same is true for other ethnic communities as well as for other Social Studies topics.

We encourage teacher-educators to model computer-assisted instruction for their students through the use of web sites, communication, course software, multimedia, and digital imagery. Teachers tend to teach the way they are taught, so that such modeling will eventually result in a far-reaching transformation of the teaching and learning process, affecting not only university students but also the children they teach. Technology-based instruction has become more important as we prepare students to be competitive in this age of information. The Allen Parker Slave Narrative website is a doorway to his world in the past, but it has also served as an opening to the world of 21st-century technology.

Sample Web Sites

Virtual Jamestown: This site is an interactive collection of documents, maps, images and other resources relating to the Jamestown settlement.
http://jefferson.village.virginia.edu/vcdh/jamestown/

The Valley of the Shadow: Two Communities in the American Civil War: This site contrasts two communities as they experience the Civil War from opposing perspectives, one Northern and the other Southern
.http://jefferson.village.virginia.edu/vshadow2/

Documenting the American South: North American Slave Narratives: This site contains electronic texts of all narratives by fugitive and former slaves published before 1920.
http://docsouth.unc.edu/neh/neh.html

History and Politics Out Loud: This site contains a collection of politically significant audio materials, including speeches and radio broadcasts.
http://www.hpol.org/

U. S. Historical Documents Regarding Slavery: This site contains links to a variety of U. S. historical documents regarding slavery.
http://www.bungi.com/cfip/slavery.htm

Third Person, First Person: Slave Voices From The Special Collections Library: This site contains rare materials from Duke University collections on slavery in the 18th and 19th centuries.
http://scriptorium.lib.duke.edu/slavery/

Abolition and the Underground Railroad: This site consists of a virtual database with content related to elementary curricula.
http://lee.boston.k12.ma.us/x1/abol/abol.asp

Black History Pages: This site has links a variety of African American history sites.
http://blackhistorypages.com/

Digital Schomburg Images of 19th Century African Americans: This site contains a selection of visual resources on African Americans in the 19th century.
http://149.123.1.8/cgi-shl/vsc30b.exe/schomburg/images_aa19/toc.html?E+nyplbeta

National Geographic: The Underground Railroad: This is an interactive, experiential site about slavery that includes images, maps and a simulated journey on underground routes.
http://www.nationalgeographic.com/features/99/railroad/

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Using Digital Image Editing to Step Back in Time

Scott M Waring, University of Virginia, US
Tommy Fallace, University of Virginia, US

This session is geared towards Kindergarten through university level educators who are interested in integrating technology into instruction. The presenters will share their experiences with instructing elementary pre-service teachers from the Curry School of Education at the University of Virginia to use Adobe Photoshop in effective ways when teaching to elementary social studies standards. This group of pre-service teachers collaborated with fourth grade teachers in a local school to develop curriculum materials to teach the Virginia history Standards of Learning. Using Adobe Photoshop, the pre-service teachers superimposed digital images of fourth grade students taken with a digital camera into historical artifacts. The virtual history lessons were taught using the digital images of the fourth grade students as writing prompts to excite the students about the content.

With this workshop, the presenters propose to introduce Adobe Photoshop as a means of inserting digital images of people into digital copies of historical artifacts to make teaching history standards more meaningful. The participants will learn how to use digital cameras to capture digital images of themselves and make them ready for use in an image editor. They will then explore Library of Congress' American Memory photograph archive and learn how to efficiently use Alta Vista for image searching of historical images on the Internet. Once the participants have digital images of themselves and a historical photograph, painting, or image, they will learn the basics of image editing to superimpose their picture onto the historical item in Adobe Photoshop.

A Model of Professional Development for History Teachers: Technology Supported Discourse to Support Action Research on Technology Supported Discourse

Elizabeth Wellman, Ed.D.
Director of Technology Projects, California History-Social Science Project
University of California at Los Angeles
ewellman@ucla.edu

Jana Flores
Executive Director, California History-Social Science Project
University of California at Los Angeles
jsflores@ucla.edu

Abstract: In a professional development program conducted by the California History – Social Science Project, K-12 teachers' explore using discourse as a tool in their classroom. They are introduced to a model for discourse use, specifically on-line discourse, and develop supports for their students use of it. They then go back to the classroom and, using an action research model, implement the use of discourse with their supports. They report back to the group using an online environment. This online environment itself acts as their support and incorporates many of the same discourse tools and supports they are using with their students.

Introduction/Background

The California History-Social Science Project (CH-SSP), is a legislatively-mandated professional development program, one of nine California Subject Matter Projects, administered out of the University of California, Office of the President. The Executive Offices are based at UCLA, and oversee seventeen local sites across California. The CH-SSP is committed to improving the teaching and learning of history-social science for all students through: strengthening disciplinary content knowledge as outlined in the California History-Social Science Content Standards ; promoting the study and teaching of history-social science from a multi-cultural perspective; fostering historical inquiry through the interpretation primary sources, exploring cause and effect, creating historical narratives, and considering the nature of change; enhancing instructional strategies to promote accessibility to the discipline; promoting collaboration across grade levels; enhancing teachers' use of technology as an integral part of the instructional process; and developing teacher leadership.

The CH-SSP Teacher Researcher Initiative Project (TRIP) engages teachers in action research on the use of technology-based discourse tools to support historical thinking and understanding. This project has grown out of a teacher professional development project in 1999 and 2000 which encouraged the exploration of the use of technology in K-12 classrooms through the development of lesson plans. At the end of those two years we felt that, although the lesson plans were exemplary, the teachers were not approaching the use of technology from a perspective of the potential for fundamental instructional methodological change in their classrooms. As we examined our approach, we decided that the focus on lesson plans, a standard product of teacher professional development programs, was deterring from the teachers focusing on some of the fundamental instructional issues we were trying to engage them in. In 2001, we switched to an action research model, one that we posited would result in more reflection and experimentation. As a result of this paradigm shift, in January and August 2001, thirty-four teachers from across California conducted research in grade 3-12 classrooms with diverse student populations. Participation by the teachers varied, as about 20% were unable to finish their research. The rest finished their research and wrote papers. Of these papers, 60% focused on discourse and about 40%

focused on the use of multimedia in the classroom. Of those that focused on discourse, their results for students were also varied, however, there were across the board significant gains in student motivation, student participation and significant gains made by low performing and ESL students. This project has been modified in response to feedback from the teachers and will be repeated in January, 2002 to include thirty new teachers and twelve repeating teachers.

Purpose/Theoretical Perspective

The primary purpose of the professional development is to engage and support teachers to investigate instructional methods that support students' development of historical thinking and understanding, and to investigate using technology to support the instructional methodology in ways that could not be done without technology.

Fundamental to how we approach the professional development is our approach to history. We approach history as a discipline as opposed to a subject (Stearn, 1993). Discourse in the History/Social Science classroom supports students in externalizing thinking and in creating cultural supports for thinking (Bain, 1998). For teachers, this requires that they provide social assistance (scaffolding) to the learners to support the necessary competencies through which the historical thinking and understanding can emerge and be internalized (Vygotsky, 1978). Technology based tools can provide this assistance (Salomon, 1988). We model this approach with the professional development. We approach the teaching of history as a discipline. We engage in discourse with cultural supports to externalize the teachers' thinking. Action research provides for inquiry through reflection, it brings the unconscious to a conscious level (Schon, 1996). The teachers' understandings can emerge and be internalized. Technology tools are used to support this.

Discourse and action research are therefore, central to this professional development approach. We see discourse as a creative process in which a shared understanding is created (Bohm, 1996). To engage in discourse is to engage in both the disciplines of history and education. It is reflective and iterative in nature. It involves social assistance and the use of tools. Scaffolding is provided by the professional developers (facilitators). Tools are non-electronic (small group discussion, writing) and electronic (email, bulletin boards, chat, threaded discussion, electronic annotation).

Action research is also a process. It is a way to engage with classroom teaching and bring more of it to a conscious level (Hopkins & Antes, 1990). It is reflective and iterative in nature. Reflection encourages the challenging of ones existing theories and preconceived views of teaching (Kettle & Sellars, 1996). Action research involves social assistance and the use of tools. As with discourse, scaffolding is provided by facilitators (coaches) and tools are both non-electronic and electronic.

As elements of both of these processes we engage in reflection, collaboration and inquiry.

Technology Supported Discourse and Action Research

We see our professional development model as a system of people, practices, and technologies. The human activities are served by the technology (Nardi & O'Day, 1998). It's parts consist of facilitators, teachers and students; the practices of discourse and action research, in the disciplines of history and education; and the supporting technologies.

Teachers participate in online pre-institute discourse activities, then spend three days at UCLA starting the research process (see below). Back in the classroom, they implement their action research. Finally, they write up their results for dissemination. In total, this is a five to six month commitment.

The action research process consists of six overlapping stages

- First, they question their assumptions about the disciplines. Through online discourse before the institute and in person discourse during the institute, the hidden assumptions that we all have are brought to the surface.
- Second, they pose a problem (research question). They will discuss these with the other teachers and give other teachers feedback on their problems.
- Three, as each teacher focuses on one problem, one aspect of their teaching, the plan for the solution should emerge (research plan) and worked out collaboratively.
- Four, they will implement the action research plan in their classroom.
- Five, both qualitative and quantitative data will be gathered by all teachers, analyzed and shared with peers to assure the highest level of reliability and validity possible.
- Six, the process and the results of the action research are documented, peer reviewed and disseminated.

The first three stages of this process are the most difficult for the teachers and are the point where substantive scaffolding needs to be provided by the facilitators for the teachers. Primarily, scaffolding needs to be provided in the area of online discourse and in the conceptualization of the action research. In 2001, the scaffolding involved working in small groups and having consistent electronic contact with other group members and with facilitators using a variety of electronic tools including chats, email, and threaded discussion. These small groups worked independently. The outcomes of the groups varied tremendously, with the single most telling factor being the provision of scaffolding by the facilitator. This year, to provide a more uniform experience for the teachers, we have decided to have all of the participants work in one electronic environment. There is flexibility in this environment to break into groups, yet, still remain communicating with the larger group. Blackboard.com is the environment that we will be using. This environment allows us to engage in online discourse with the teachers to model the use of online discourse. In this environment, the teachers will engage in the same kind of discourse – discipline-based and related to activities – that their students will be engaging in. Scaffolding of various kinds will be provided by the facilitators. This will include providing supporting materials; developing both directed questioning and providing for open ended discussion of the research; providing prompts on thinking about the issues; and notification when responses are posted. This year, the scaffolds that are used and their success in assisting teachers to engage in both research and discourse, will be a research focus for the project.

Technology Supported Discourse in the Classroom

The focus of all of the action research plans is on some aspect of the use of technology supported discourse. Although in their research process the teachers may identify many problems, they are asked to focus on those which involve discourse as a solution. Their use of discourse as a solution uses technology as a tool. For the teacher, this expands their discourse tools in the classroom. How the technology is used for discourse, under what circumstances, with what scaffolding tools, and with which students is what each teacher explores individually.

The creation of teacher generated supports, or scaffolding tools, for technology supported discourse was an area that many teachers struggled with. For most of them, this meant developing supports of a type that they had never developed before. A wide variety of tools were used, from specific to general, sometimes without the teacher understanding that they were using them. For a databased discussion group, one middle school teacher used very explicit pull down menus with prompts for the students and reminders of what they should be thinking about when they are participating in on line discourse. These prompts were both discipline based and writing based. The disciplined based prompts supported the students in thinking like a historian. For instance, they remind the student to seek corroborating evidence for their conclusions. The writing based tools supports addressed how the students should be crafting their answers and what depth of answer was expected of them at various times. For a different form of online discourse – chat rooms - a high school teacher provided a different form of support. In this case, he provided real time scaffolding in an environment where the students were conducting a historical discussion. These prompts consisted of crafting the discussion, helping students stay on task, providing questions to help them expand, clarify, question one another, predict and engage in historical thinking and understanding. This form of online communication also seemed to require more scaffolding for appropriate responses and to keep the students from diverging from the focus of the chat. These teachers and others expressed in their papers the need they had to better develop these teacher generated support tools and to have more support in this activity. In response to this, the use of appropriate scaffolding in different online media, for different students, for different purposes is another major research focus of the 2002 work.

Preliminary Results

There are two areas of results. The first is the results from the professional development, the second is the results of the action research.

In 2001, twenty of twenty-six teachers submitted final papers, a much higher percentage than anticipated. Eight teachers will be submitting papers in December. The positive indicators for the professional development included:

- renewed enthusiasm for participating in discourse activities in their classroom,
- a deeper understanding of the nature of discourse activities,
- a change in the way they approach thinking about activities in their classroom,
- a change in the way teachers perceive their students, particularly low performing students,
- more perceived and actual choice of instructional methods and instructional tools.
- A greater understanding of the role of scaffolding supports in their classroom and a greater ability to develop and implement them to support online discourse.

For a number of teachers, they felt this experience completely changed the way they thought about their approach to teaching history. Most teachers felt some positive change in their thinking about historical thinking and understanding in their classroom.

There were a number of difficulties with the professional development. They included:

- The level of discourse between teachers was not as high as we had hoped.
- A number of teachers were very focused on multimedia for classroom use. These teachers tended not to explore the discourse issues.
- Inconsistent facilitator support across groups.
- Last minute technical difficulties with the planned online environment.

We believe that the environment, and the occasional lack thereof, was primarily responsibility for these results. Our belief is that the changes we discussed above will addressed these difficulties we have had.

The preliminary positive results of the action research, across teachers, were:

- Motivation to participate in technology-based discourse activities was much higher than to participate in non-technology discourse activities. There was nearly 100% participation.
- Non-technology discourse activities were positively affected, both in the level and amount of participation.
- Low-performing and English as a Second Language students showed the greatest gains in participation, understanding and their ability to express their ideas.
- A significant percentage of students used historical thinking and understanding.
- Misconceptions were diagnosed and mediated much early than in the traditional classroom.

In particular, we found the results with low-performing and ESL students to be unanticipated and very exciting. As a result, we are making this an additional research focus for the project in the year 2002.

There were a number of difficulties with implementing the action research, including:

- lack of principal and school support,
- lack of appropriate technology,
- lack of technical support at the school,
- competing demands on classroom time,
- competing demands on lab time.

These are difficult to address as they are out of the control of both the classroom teacher and the professional developers. We will be communicating more closely with the principals this coming year, to try to develop more support within the school environment for the teachers engaging in this research.

Results from eight more teachers are expected in December 2001. Thirty more teachers will be participating in January 2002. Their work is expected in May 2002.

Conclusion

Discourse is an important methodology both in professional development and in History/Social Science classrooms (Schon, 1983, Vygotsky, 1978). The traditional forms of discourse used in the classroom, in-class discussioin, small group discussion primarily, most facilitators and teachers find limited. By engaging in professional development which uses action research and technology supported discourse, teachers themselves become immersed in an iterative, reflective environment which encourages the externalization of their thinking. It also immerses them in the 'doing' of their discipline. This gives the teacher a solid experiential and methodological foundation on which to develop and expand, using cultural supports and technology as a tool, the forms of discourse being used in their own classrooms. This approach can open the teaching of history from a subject which teachers teach and students take; to a discipline, where technology supported discourse leads to historical thinking and understanding as core student processes.

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History Education Online:
A Critical Analysis through Focus Groups

Cameron White, University of Houston, US
Tony Talbert, University of Houston, US

Introduction

Meaningful, integrative, value-based, challenging and active teaching and learning are vital for effective online discussion. Powerful online teaching and learning suggests establishing a framework focusing on content, connectivity, and community (Brown, 1999). More specifically, this framework necessitates setting a positive learning environment, establishing a learning community, building in powerful pedagogy, establishing rights and responsibilities, using open-ended discussion and activities, and focusing on discussion organization and management. Vital needs for all involved that will also be discussed include establishing ongoing support and follow-up, social context for learning, communication, toleration, and intrinsic motivation (White and Weight, 2000). Essential components for effective online courses, appropriate netiquette, and the role of the facilitator will also be investigated.

Successfully integrating technology in social studies classrooms is a vital issue facing social studies educators. Unfortunately and all too often, problems occur when social studies teachers are presented the new technology, expected to implement it, then left to battle alone with their own issues regarding effective integration. Nevertheless, technology skills are now essential for social studies teachers and students and technology provides innovative potential for meaningful teaching and learning.

Online teaching and learning is relatively new in teacher education and especially in our schools. Only in the last few years has there been even minimal research and literature regarding issues, trends and effective teaching and learning online. There is even less research in the merging of online courses and social studies education. Perhaps a key issue is ensuring effective learning in an online environment. Jonassen states that there are four paramount attributes of constructivism that facilitate an effective learning environment including: (1) providing opportunities to foster personal construction of knowledge; (2) setting an appropriate context for learning; (3) facilitating collaboration amongst learners; and (4) facilitating learning and collaboration through conversation (1995).

Issues dealing with learning via technology (online teaching and learning) suggest developing a constant awareness regarding dialog, discussion, and discourse as we hope to establish collaborative learning communities. Research suggests that online teaching and learning can encourage otherwise silent students to participate, can promote the ideal of serious dialog regarding comments, can facilitate discussion on issues and themes that are unlikely to be approached effectively in classrooms, and can facilitate the development of collaborative learning community (Weisser, 1997; Parkyn, 1999; Swartz and Hatcher, 1996). Parkyn (1999) suggests specific pragmatic details vital for effective online learning including detailed instructions and expectations, monitoring, etiquette, and equal involvement of all (including the instructor).

Within a social studies framework, an online teaching and learning must focus on knowledge, skills, and attitudes related to social education. It must also address the components of powerful social studies teaching and learning including approaches that are meaningful, integrative, value-based, challenging, and active. The ultimate goal might be the transformation of social education to a student-centered, problem-based, critical analysis focus (White, 1999). History education at both the college and secondary school levels persists in using traditional teaching methods, usually using teacher-directed approaches. The goal of this project is to develop new forms of history education that draw upon online resources and transform history teaching into a more student-centered, interactive experience. The objective is to give students more meaningful, active learning opportunities through project-based activities and the ability to integrate new technologies into their coursework.

Technology-based curriculum and instruction offer a way to help students develop the skills characteristic of history as a discipline: the ability to conduct research, to analyze primary sources, to weigh evidence, and develop coherent interpretations. New technologies offer a cost-effective way to give students access to primary sources and to create a multimedia projects.

For the past year, professors at the University of Houston in both history and education have collaborated to develop a comprehensive collection of online history resources drawing upon original scholarship and the documents and images in the largest private collection of American history documents, the Gilder Lehrman Collection, on deposit at the Pierpont Morgan Library in New York. Featured in the February 15, 2001 *Wall Street Journal*, the site is located at http://www.gliah.org. It contains over 1,500 active pages, including a comprehensive online U.S. history textbook; a searchable database containing the transcripts of over 600 primary source documents; glossaries, timelines, bibliographies, annotated hyperlinks, and essays on such topics as the treatment of American history in film and the history of aspects of private life.

The site, which complies with the latest standards for accessibility under the Americans with Disabilities Act, has a dynamic, database-driven design. Documents, texts, hyperlinks, and images have been placed in a searchable, relational database. \Among this site's distinctive features are online exhibits on early African American life illustrated with an early form of photography known as cyanotypes and a java-script program which automatically transcribes an 18th century letter.

The lacking element in this site has been pedagogical. Many teachers do not know how to effectively incorporate Internet resources and primary source documents into their teaching. In social studies, technology is often used as an add-on, available when the "real work" is finished, or as a reward for good behavior. These occurrences are due in part to the assumption by administrators and teachers that the training needed to implement technology effectively is too extensive and too technological or, on the other end of the spectrum, that the training can be done with one long and usually unproductive in-service session quickly forgotten as the year progresses. A false over-reliability or even blind acceptance of technology in schools also causes these issues.

Many well established teachers ask why they should use technology in social studies when there are successful methods already being used within their classroom? The issues presented in this paper focus on making social studies a more powerful and meaningful experience through technology integration in hopes of meeting students learning goals and meeting the needs of facilitating a critical and active citizenry. What society demands our children be able to do when they leave the educational system is much different from what it was as few as ten years ago. They must be proficient in using technology and understand the implications of its use in the future as well as how it has effected us in the past. Social studies teachers must modify the old style of teaching to fit the new way of learning. Social studies is not just about covering content; it is about analyzing content and developing social skills and attitudes, all with a critical thinking and problem solving focus.

Technology also has the ability to make learning exciting and worthwhile, allowing students to interact with the computer as well as other students while observing and acquiring the most current information on places they would otherwise never experience. We, as educators sometimes fall into a trap of anesthetizing the students ...[There's] not enough stimulus (Sizer, 1992). Implementing technology can wake up those sleeping students as well as promote a motivation to learn independently. We focus too much on extrinsic motivation to ensure learning; perhaps technology integration can facilitate a movement toward more intrinsic motivation. This should be the goal of every social studies teacher and can be developed and fostered quite effortlessly in a technological classroom.

The role of technology in social studies teaching and learning can be much more meaningful and powerful. If we are truly interested in promoting a social studies that goes beyond traditional transmission to a more transformative knowledge, skills, and attitude development that facilitates an informed and active citizenry, then technology must play a more central role. Many of the excuses that pervade successful social studies technology application including content coverage, time, availability, training, and traditional praxis should be addressed. There really is no excuse if we keep in mind the ultimate goals of social studies education.
This project attempts to provide the connection between the wealth of documents and resources at the Gilder Lehrman site and actually using them in a classroom.

Many well-established teachers ask why they should use technology in history courses when there are successful methods already being used within their classroom? The suggestion is not to change the instructional methods that work, but making history a more powerful and meaningful experience and meet the changing needs of society and future leaders. What society demands our children be able to do when they leave the educational system is much different from what it was as few as ten years ago. They must be proficient in using technology and understand the implications of its use in the future as well as how it has affected us in the past. History teachers must modify the old style of teaching to fit the new way of learning. History education is not just about covering content; it is about analyzing content and developing social skills and attitudes.

The Project

One of this project's major objectives is to ensure that instructors at the secondary and college levels are able to meet state and national standards concerning content, pedagogy, and technology integration, including Texas Essential Knowledge and Skills; Texas Technology Applications for Teachers, and the National History Standards. Program curricula has been designed that support these standards and base student assessment on these standards through a variety of means such as online quizzes, rubrics, and student-centered projects.

This project has three primary goals: (1) To develop a database of activities that will allow instructors at the introductory college and secondary levels to incorporate these resources in their courses; (2) to educate prospective teachers to use technology effectively in their history classes; and (3) to test these activities in an actual U.S. history survey class classroom. The participants--a historian who regularly teaches the large U.S. history survey class, a specialist in instructional technology; and a specialist in teacher education and social studies education, have brought complementary talents to this project.

The project established support for the development of an ongoing focus group including teaching of middle and high school American History. These participants initially worked with faculty members to ensure that the materials designed would be pedagogically sound, meet state and national standards, and be motivating and interesting to students.

The seven participants are meeting once a week for approximately an hour. The initial charge is to explore the project web site in detail. Participants were asked to meet twice and engage in "getting acquainted" activities. Subsequent meetings dealt with generally discussions regarding technology in history education, history education, and the status of teaching and learning in general. Additional meetings focused on general web site discussions and specific discussion on various web site components.

Eventually participants decided that web-based interaction would enhance project development, evaluation, and application. Consequently, web-ct was employed for weekly sharing and discussion and real time chats were conducted twice a month. Web-ct also enabled various postings, web development, and web application ideas.

Evaluation

Data from formative evaluations were collected through a wide range of procedures and instruments, including questionnaires, performance assessments, examination of student- and teacher-produced products, learning and teaching journals, observations, interviews, focus groups, video and audio recordings, anecdotal records, and open-ended critiques. Progress toward accomplishing project goals and objectives has been disseminated on the project Website and through a formal report.

Project activities and research are in the process of being developed and disseminated by the project directors, other local, state, national and international social studies faculty and students, in a number of ways. These include, but are not limited to, (1) creating and presenting professional development workshops and seminars offered to local school campuses, districts and education institutions; (2) developing and presenting progressive critical constructivist teaching and learning models that integrate multimedia technology and the social studies at conferences and forums including the Texas Council for the Social Studies, National Council for the Social Studies, and other progressive general education organizations; (3) engaging in field based research and co-authoring manuscripts for journals, monographs and books; and, (4) the uploading of all projects developed to ensure local, state, national and international availability via the Gilder Lehrman web site for downloading.

Following are initial questions provided to participants to facilitate discussion (some are obviously demographic needs):

Gender – 5 M, 2 F
Subjects taught at present – 7 Am. History
Grade – 3 8th grade, 4 11th grade
Years teaching – 3 with 2 years or less, 4 with more than 2 years
Degree – 6 working on M. Ed., 1 working on Ed. D,

Personal use of internet – all use daily
Use of internet in teaching – 4 use daily, 2 weekly, 1 less often
Positive features of technology in education – variety, research, resources, information access, interest level, graphics, can go beyond the text
Issues with technology in education – information overloads, tech as a tool, availability, support, censorship,tech for tech sake, effective integration
Positive features in schools – increased access
Issues in schools – TAAS, accountability and achievement, content for content sake, costs
Positive features of history in schools – cultural awareness, social skills, learning skills, critical thinking, exploration, beginning to move beyond transmission of facts
Issues with history in schools - coverage, textbook, testing, too much reductive knowledge: essential knowledge privileged over contemplation of the issues; in other words, most students are not expected to, nor are capable of, actually making history, they can only memorize it

Specific questions addressed during various discussions of the focus group (with sample responses) include the following:

How can the site assist in teaching American History?
Can give quick reference to historical eras, events, people and times; organized around a chronology that provides links to previous eras; quotations from teacher section offer lesson warm-ups, great access to resources

What specifically does the site offer in assisting your teaching? Same as above, speeches and primary sources

Critically analyze each section of the site.

What are the best / poorest features of the site?
Best: structure; everything is well formed and easy to navigate, site page
Worst: primary source documents; site does not allow creation of history because it lacks a broad selection of documents that all students to form their own opinions; the site pre-interprets the knowledge so that it becomes just another textbook, home is "messy"

What needs improvement?
Primary source documents (see above)
Teacher section: sample lessons needed; links to educational sites based on that (whichever) subject/era/etc. or links to documents or to other knowledge bases (I hate to mention it, but the CNN site does this very well. Thought it keeps the viewer within its base – not a great thing – it provides heady connections and multiple source offerings.)
More links needed

What themes are present? What themes are missing?
Needs better articulation with state and national standards / themes (History, NCSS), integration with other social studies disciplines

What issues are present? What issues are missing?
Multicultural, popular culture are present, examples of controversy
More with controversy, alternative views of history, more issues in history, more with calier history needed

What are the best ways to integrate the site in schools?

Design a course so that the students are critiquing the site. Give students research responsibilities so that they decide the validity and shortcomings of the site. Use the site as a project resource, learning station for project development

What lessons / units can be added?
see above

Conclusion

We are at a crossroads in social studies and history education, and the struggle continues. Should we continue with a transmission approach or move toward history and social education for transformation? Technology has a huge role to play in determining the direction. The increased and effective integration of technology in history and social studies education must continue to be addressed.

Web sites such as Gilda Lehrman (http://www.gliah.org) can only be as effective as those who design them and apply them. The ongoing focus group of teachers has continued with discussions and applications of the site in hopes of improving its design and application. We must allow all stakeholders input into integrating technology as a tool for history and social studies integration

The internet has the potential to play a great role in improving history and social studies education. Increased access to information is one thing, but what we do and allow students to do with that information will truly make the difference.

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SPECIAL NEEDS

Selected Technology-Infused Thematic Activities for Elementary and Special Education Teacher Education Programs

Cindy L. Anderson, Ph.D.
National College of Education
National-Louis University
United States of America
clanderson@wi.rr.com

Kevin M. Anderson, Ed.D.
Dept. of Instruction
Kenosha (WI) Unified School District No. 1
United States of America
kevander@kusd.edu

Abstract: This paper is a description of various techniques for integrating technology skills into thematic units for use by pre-service teachers in teacher education programs involving elementary and special education preparation classes. Numerous software titles are highlighted as appropriate for use by primary and upper elementary/middle level students in integrated lessons. Also provided are ideas for using literature and writing skills in activities involving math, science, and social studies. Activities for using spreadsheets, databases, and graphing software are also described for use in collaborative and cooperative instructional settings.

Introduction

Reform efforts in schools have included the development of standards that school districts use to develop curriculum and instructional methodologies (Anderson and Anderson, 2000). Organizations that developed these standards began by making them disciplinary specific (Daniels and Bizar, 1998). Increasingly, schools that focus on authentic activities are finding this classification inadequate for effective use with students (Daniels and Bizar, 1998). School districts today that are attempting to utilize authentic instruction that integrates technology in the classroom are adapting their instructional methods to accommodate both technology and thematic approaches for their lessons (Pastorek and Craig, 2000). The technology becomes a tool to enhance the multidisciplinary environment (ISTE, 2000). In an effort to begin exposing pre-service teachers to more authentic instruction that includes the integration of technology, several sample activities have been successfully developed and used by the authors in teacher training programs, including elementary education methods courses and special education methods courses. These activities have been used in teacher education classes as a demonstration of how teachers can develop technology-integrated lessons emphasizing authentic learning. Beginning with the selected content gleaned from national academic standards in content areas, the lessons integrate technology in a seamless fashion and result in teaching products that can be used by the pre-service teachers in their own classrooms. These lessons also provide pre-service teachers with an opportunity to demonstrate the ability to use instruction reflecting the ability to teach to academic standards, mastery of pre-service teacher technology standards, and mastery of pre-service beginning teacher standards. These lessons also serve as a satisfactory element for pre-service teacher portfolios demonstrating mastery of content and technology standards. For each of these lessons, the teacher educators would involve the pre-service teachers as sample elementary or secondary school students and walk them through the lessons, discussing a variety of ways the lessons could be used with their own classroom students during practicum experiences or student teaching.

Integrated Lessons Using Technology

English/Language Arts

Two activities in the area of reading and language arts are described here, one for primary students and the other for older students. The lesson for younger students focuses on integrating science into the language arts, while the lesson for the older students integrates several subject areas to accommodate the model of different teachers for different classrooms. For the younger student, the instructor begins by reading a science-based picture book to the students that illustrates how animals look and move. A discussion with the children about how different animals in the story look and move follows the reading of the story. Next the teacher collects vocabulary words for animal colors, words that describe how different animals move, words that describe different animal body coverings, and finally, words that describe the size of different animals. The children then choose an animal of their own of which they will write a description, so that the other students can guess their animal. To do this story, they create a word web with *Kidspiration* (Inspiration Software) using the correct words from the earlier word bank for color, movement, covering, and size. This web is used to develop the story that describes their animal. Finally, they use *KidPix Studio* (Broderbund) to draw a picture of their animal. If desired, the children can also write their story in *KidPix Studio* using the typewriter function.

For the older children, the teacher could use a work of literature such as *The Adventures of Huckleberry Finn* by Mark Twain. This book is available in software format from Don Johnston Inc. for use on the computer by students needing a simplified version. Students may investigate the social relationships of people from different ethnic backgrounds during Mark Twain's lifetime as an integrated social studies/language arts activity. Using word processing software, the students would be able to write a newspaper column or an editorial expressing the local views of race relations appropriate to the time period. For mathematics integration, students would be able to use a spreadsheet such as *The Cruncher* (Davidson) or *Excel* (Microsoft) to chart and graph distances and times traveled by Huck Finn on the river. Both of these programs allow the development of graphs that may be used to support a newspaper article about travels on the Mississippi River. As a science integration, students may use a database program such as *Filemaker Pro* (Filemaker) or *Access* (Microsoft) to keep track of different kinds of wood that might have been used for building rafts. Students could experiment with various woods in the lab to test for floating ability, the volume of water that was absorbed, and how much weight wood of varying degrees of wetness could support. This database information could then be used in writing an article on how to build the best rafts for use on the river.

Science, Math, and Social Studies

These lessons integrate math, science and social studies into lessons that can be done in collaborative or cooperative groups for student of all ages and abilities. As is the case for most integrated lessons, reading and writing skills are fundamental for the successful completion of the project and provide the framework for the description of results generated. For example, one lesson may begin with the CD-ROM of the fable *The Tortoise and the Hare* (Broderbund). After reading the story and exploring the CD-ROM, the students can discuss the elements found in a fable and make a flowchart of the elements using either *Kidspiration* or *Inspiration*. *Amazing Writing Machine* (Broderbund) may be used to write fables based on group discussions. *Timeliner* (Tom Snyder Productions) may be utilized to make a visual representation of the order of events in the fable. Programs such as *Geography Search* (Tom Snyder) and *Mapmaker's Toolkit* (Tom Snyder) are useful for exploring and designing pictures of the geographical regions in the fables. For a more localized map for younger children, *Neighborhood Map Machine* (Tom Snyder) or *KidPix Studio* may be used to draw maps based on the areas in which students live.

Science and math explorations based on *The Tortoise and the Hare* can investigate speed and friction. Knowing that the tortoise and the hare traveled at different speeds and rates, students can devise practical analogies for classroom experimentation. For example, students can use two 2-liter soda bottles to correspond to the tortoise and the hare. One bottle should be empty and the other one half full. Students should predict which bottle will travel the farthest and which will have the greatest speed at a preset distance from the bottom of a ramp. They should also predict which bottle will behave more like the tortoise or the hare. These predictions may then be recorded in *The Cruncher* or in a graphing program such as *The Graph Club* or *Graph Master* (both from Tom

Snyder). The bottles are then rolled down an inclined ramp, with the students measuring both total distance covered and the time taken. They may also calculate the speed of each bottle at certain distances using their measurements. Using multiple measurements, students can graph and discuss the reasons for the results, noting that the friction of the sloshing water in one of the bottles probably impacted the results. Finally, students may write up a final lab report describing their observations and measurements.

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E-learning as a facilitator in special education frameworks

Sari Bar-On, Levinsky College of Education, I L

Students in teachers colleges take courses for better use of computer skills. Yet in practice, it transpires that the work models applied at schools are outdated for the most part:

- Use of computers is limited to a rigid time frame according to the class setup.
- A great deal of use is made of rigid educational software for drills, especially in kindergartens.
- Teaching of computer skills is not carried out in a comprehensive manner
- Many subjects are learned without computer work to begin with.
- Little attention is given to the social and therapeutic computer-assisted interaction

A new initiative was taken at the Levinsky College of Education, in the Special Education Department: The methodology course is planned for distance learning.

The site and its activities were open and accessible to all Special Education Department students. Several class meetings are held for active experimentation, discussion of syllabus and enlightening reflective and social thinking. In addition, we met for close on-the-job training. Computer skills are being taught while exposing the students to an interactive learning environment and tutoring them in their practical work.

The students experience the difficulties of acquiring skills concurrently, while learning new subjects. Such an experience is common in the learning process of young children, and in special education. Students are encouraged to share their feelings, thoughts, empathy and comprehension during class meetings, as well as in chat and discussion group.

Our assumption is that inculcating computer use as part of the teaching process would help students, by way of modeling, to plan similar work formats with their pupils. This knowledge is particularly important to special education teachers: computer-related teaching of children with learning disabilities and emotional and social difficulties, assists in interactive learning, organizing information and building up learning skills, thought processes and known environment.

Examining the students' practical work techniques in the wake of this course we found that there was a greater use of computers in instruction, use of the computers in an interactive manner and integrating them as an additional teaching method in the lessons. Improvement in social interaction was observed by the stuff in the classes and kindergartens. Few younger children with different communication deficiencies revealed new patterns of interaction.

A content analysis attributes the success to a number of factors:

- The basic concept of combining teaching and alternatively learning: relevant subjects through computer-related activities. The students learn it all -- communication skills, self-awareness, empathy, how to collect and process information and how to execute tasks -- while learning topics relevant to their or practical work.
- Modeling as a basis for planning the students' both learning and teaching activity.
- On-the-job training and supervision follow up the process of learning the relevant subjects and computer skills.
- The creations of professional discussions in various learners' communities to which the students have complete access. The students regarded themselves as part of a professional group.
- Placing the responsibility of learning and communication in the student's hand.
- The change of teacher-student interaction towards mentoring and collegial relations.
- Sharing of feelings in a supporting group
- Better options for allocating students' learning span according to learning styles and time limit.

A "ripple effect": Computer uses spread among additional college lecturers and new work models were adopted in the practical work frameworks. The impact on the mentors and college lecturers had not been foreseen but is a welcome outcome, with a positive influence on the educational system.

BEST COPY AVAILABLE

Educational IT:
How Students and Employees with Disabilities can AccessIT

Sheryl Burgstahler, Ph. D.
Affiliate Associate Professor, Director of DO-IT (Disabilities, Opportunities, Internetworking and Technology), Co-Director AccessIT (National Center on Accessible Information Technology in Education)
University of Washington, U.S.A.
sherylb@cac.washington.edu

Lyla Crawford
Outreach Coordinator, AccessIT (National Center on Accessible Information Technology in Education) and DO-IT (Disabilities, Opportunities, Internetworking and Technology)
University of Washington, U.S.A.
lylac@u.washington.edu

Abstract The National Center on Accessible Information Technology in Education (AccessIT) at the University of Washington serves to increase the access of individuals with disabilities to electronic and information technology in educational institutions at all academic levels nationwide. It is funded by the National Institute on Disability and Rehabilitation Research (NIDRR) of the U.S. Department of Education and is located at the University of Washington in Seattle. This paper promotes the use of accessible technology, provides examples of accessible electronic and information technology, and lists useful resources.

The National Center on Accessible Information Technology in Education (AccessIT) at the University of Washington serves to increase the access of individuals with disabilities to electronic and information technology in educational institutions at all academic levels nationwide. It is funded by the National Institute on Disability and Rehabilitation Research (NIDRR) of the U.S. Department of Education and is located at the University of Washington in Seattle.

Access to electronic and information technology, from telephones to computer software, is essential for people with disabilities to fully participate in today's high tech world. The increasing use of technology presents remarkable opportunities for people with disabilities. However, it presents new accessibility challenges to those who have sensory, mobility, learning, and other disabilities. If we do not address these challenges and assure that electronic and information technology can be used by everyone, the potential for technology as a great equalizer will go unrealized. The new Center develops and disseminates materials, training, and technical assistance that facilitate adoption of policies and practices leading to the increased use of accessible electronic and information technology in educational settings.

Examples of Accessible Electronic and Information Technology

Following are examples of accessible electronic and information technology in education.

- Accessible web pages allow students with disabilities, including those who have sensory impairments, to access information; share their work; communicate with peers, teachers, and mentors; and take advantage of distance learning options.

- Accessible instructional software (on disks, CDs or other media) and documentation allow students with disabilities to participate side-by-side with their peers in computer labs and classrooms as they complete assignments; collaborate with peers; create and view presentations, documents, spreadsheets; and actively participate in simulations and all other academic activities.

- Accessible telecommunications and office equipment makes communication and educational administrative functions accessible to everyone, including those with mobility, visual and hearing impairments.

Goals and Activities

AccessIT helps educational institutions make electronic and information technology accessible to all students and employees. In so doing individuals with disabilities can benefit from all technology-based educational and school-related activities. AccessIT facilitates the implementation of policies, procedures, and practices that promote the procurement and use by educational entities of accessible electronic and information technology that applies universal design principles and meets recognized standards.

AccessIT works nationwide with NIDRR-funded Disability Business and Technical Assistance Centers (DBTACs). By providing training, support, dissemination materials, and technical assistance to the DBTACs, AccessIT utilizes and builds on this existing infrastructure for information dissemination and technical support. AccessIT also provides information and training to educational institutions through its web site and presentations at educational events.

- AccessIT's web site is growing to become a resource for educational entities and their constituents for information on accessible electronic and information technology. The web site will include accessibility checklists, case studies, best practices, frequently asked questions, and links to resources, and case studies, all tailored to applications of electronic and information technology in education.

- AccessIT conducts training sessions and presentations at major educational, disability, and technology conferences to inform target audiences about how to make informational technology in education accessible to individuals with disabilities and of the availability of resources from AccessIT and of technical assistance from the DBTACs.

These types of activities benefit:

- Policy makers, including school principals, district directors, technology directors, and others who develop policies, guidelines, and procedures regarding planning for and procuring electronic and information technology;

- Implementers, including educators (both in general education and special education, precollege and postsecondary), computer lab personnel, library staff, and others who implement electronic and information technology and support its use by students, teachers, and other employees; and

- Students and employees with disabilities, as well as their families and advocates, who use or should be able to use electronic and information technology.

Conclusion

Electronic and Information Technology open doors to education and employment for those who have access. Assuring that individuals with disabilities can benefit from these opportunities, electronic and information technology at all academic levels must be accessible to students and employees with disabilities.

Resources

To learn about accessible electronic and information technology, consult the following resources:

The Adaptive Technology Resource Center - http://www.utoronto.ca/atrc/
Training, consultation, and information to help both educators and users with adaptive technology.

Center for Applied Special Technology (CAST) Universal Design for Learning http://www.cast.org/udl/
Resources, research and examples to assist in the design of learning materials and activities for all learners.

Closing the Gap - http://www.closingthegap.com
Information on computer technology in special education and rehabilitation.

DO-IT - http://www.washington.edu/doit
Resources on AT and IT for post secondary education, one of the AccessIT partners.

Equal Access to Software and Information (EASI) - http://www.isc.rit.edu/~easi/
Resources on AT and IT including technical assistance and training, one of the AccessIT partners.

Information Technology Technical Assistance and Training Center (ITTATC) - http://www.ittatc.org/index.cfm
The ITTATC promotes the development of accessible electronic and information technology by providing technical assistance, training and information.

The National Center on Accessible Information Technology in Education - http://www.washington.edu/accessit
Resources, knowledge base, case studies, promising practices and events regarding accessible electronic and information technology.

National Center for Accessible Media (NCAM) - http://ncam.wgbh.org/
Research and development facility dedicated to making media accessible to people with disabilities.

Section 508: The Road to Accessibility - http://www.section508.gov/
Resources for understanding and implementing the requirements of Section 508.

Trace Research and Development Center - http://www.trace.wisc.edu/world/
Works on ways to make standard information technologies and telecommunications systems more accessible and usable by people with disabilities.

UW Center for Technology and Disability Studies - http://uwctds.washington.edu/
Resources on AT and IT including technical assistance and training, one of the AccessIT partners.

Web Accessibility Initiative (WAI) - http://www.w3.org/WAI/
Promotes accessibility of the Web through guidelines, tools, education and outreach, and research and development.

Assistive Technology Basics in Education

Terence Cavanaugh, Ph.D. Curriculum and Instruction, University of North Florida, Jacksonville, FL USA.
tcavanau@unf.edu

Abstract: Currently in the USA about 150 million people are impacted by cognitive or physical disabilities in some form. And, according to some researchers, approximately half of the entire planet's population, which is an estimated three billion people, are affected by disabilities. Because of the large and growing number of individuals in schools who have special needs and the number of laws and rules that apply to assistive technologies, assistive educational technology is growing in importance. Assistive Educational Technology is the theory and practice of design, development, utilization, management, and evaluation of processes and resources that are used to increase, maintain, or improve functional capabilities of individuals, with or without disabilities, for learning. As more regular education teachers teach mainstreamed students, they need understanding of how assistive technologies can support student learning.

Assistive Educational Technology

Disabilities rights leaders have said that the application of technology will be the equalizer ofthe 21st century (Flippo, Inge and Barcus, 1995). Through the use of assistive technology (AT) devices, many students can decrease their isolation and become an important part of a regular classroom. AT is a basic tool in the educational process for any individual who may be experiencing a disability. Screen readers that read aloud the text on the screen or web page can overcome barriers to accessing electronic information encountered by students who have vision disabilities. Captions can overcome barriers for students who have hearing disabilities. Some access solutions that use principles of universal design are built right into the hardware or software of most computers and programs (RESNA, 2001).

Assistive Educational Technology (AET) is the theory and practice of design, development, utilization, management, and evaluation of processes and resources that are used to increase, maintain, or improve functional capabilities of individuals, with or without disabilities, for learning (Cavanaugh, 2000). The distinction between assistive and educational technologies is becoming less clear as the concept of universal design is incorporated into conventional technology. As educational technology develops toward universal design it will go beyond just providing various forms of access to existing methods and materials; and will incorporate AT approaches and accommodations in the application of teaching for all individuals. This will have the impact of changing the learning goals, the teaching methods, and the means of assessment for all students.

What is Assistive Technology?

The Technology-Related Assistance for Individual with Disabilities Act of 1998 (PL 100-407) gave us the first legal definition of assistive technology devices and services. An AT device was defined as: any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities. AT then is a wide-ranging educational tool that is growing in its use and importance, and is required for consideration for all students classified with any form of disability and must be included on that student's individual education plan (IEP).

AT may be classified as high, middle or low tech. A high technology device usually requires electronics or microchips to perform some function, while low technologies usually do not require a power source. An example of the application of AT could range from having a computer read a book (high tech) to printing out the material in a larger font or the student using a magnifying glass (low tech) to read the required material.

Assistive Technology Categories

Along with levels of the technology, there are levels of how the necessary AT item will be applied in the school situation which are: personally, developmentally, or instructionally necessary (Judd-Wall, 1999). Personally necessary items are AT devices that are used by an individual that enable a learner to more effectively interact with his/her environment. While developmentally necessary devices help with an educational need based on some developmental delay, ideally would be improved or overcome, eliminating the need for the assistive technology item in an individual's future. Lastly, instructionally necessary devices are ones that modify the instructional process at a course or grade level, and do not need to be moved with the user as her or she progresses to the next level. Progressing from individually to instructional necessary, the materials used are much more likely to be shared among various students. This application of AT to all students becomes a basic component of universal design in education, by allowing any student better access or access in a more appropriate alternative format to the information being taught.

AT has the ability to increase student independence while at the same time advancing academic standing, as it can also allow increased participation in classroom activities by students with special needs, letting them have equal access to their school environment. Rehabilitation Engineering and Assistive Technology Society of North America (RESNA, 2000) has identified twelve different areas where AT can be used. Of the twelve, four are areas that would have a major impact in any school situation, include: Work Site Modifications, Instructional Material Aids, Seating and Positioning Aids, and Sensory Aids. The other AT application areas are Aids for Daily Living, Communication and Augmentative Communication Tools, Environmental Control Systems, Leisure Time or Recreational Adaptations, Mobility Aids, Prosthetics and Orthotics, and Vehicle Modifications, and also apply in some way to the school setting.

Making a Difference

According to David Rose and Anne Meyer (CAST, 2000) AT tools can make a significant difference for students with disabilities. AT tools can allow access to information and activities that otherwise are inaccessible. The other side of AT application is that the tools can also make information and resources more available to those who don't have a disability or have not yet been identified as having a disability. The exceptional education teachers are not the only ones who need awareness of AT applications. All teachers are likely to have mainstreamed students, and the purpose for AT is to allow and support the student in the general student population. Professional organizations including the International Society for Technology in Education (ISTE, 2001) and National Council for Accreditation of Teacher Education (NCATE, 2001) have standards for all teachers and administrators regarding AT that require teachers and administrators to use technology to support learner-centered strategies that address the diverse needs of students and apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.

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Using technology to facilitate the academic achievement of learning disabled students in general education classrooms

Jerrie Jackson, Our Lady of the Lake University, US
Jean Kueker, Our Lady of the Lake University, US

Abstract This presentation will describe and demonstrate a sampling of the many ways that technology can assist in meeting the needs of students with learning disabilities. Ideas for how to use one computer in the classroom will be discussed as well as to demonstrate CD-Rom software (Tom Snyder), graphic organizers (Inspiration), and Text-Help programs. This presentation will provide previews of programs mentioned, along with an annotated bibliography of software and Internet resources.

Introduction

In the day of inclusion, most students with learning disabilities spend much of their school day in the general education classroom. By definition, students with learning disabilities have normal intelligence or above, but often are frustrated in content area subjects due to problems in reading and written language (Bos, C. & Vaughn, S., 2002). Students may be very interested in science or history, but if the text is the only avenue of gaining information, could fail the course.

This presentation will describe and demonstrate a sampling of the many ways that technology can provide a means of accessing information and of providing means to assess the knowledge that a student may have but not be able to demonstrate through traditional means. Technology offers many avenues of providing an interactive way for a student to get the needed academic information without having the read the entire text.

CD-ROMs as a source of information

As long as a classroom has access to one computer, the CD-Rom becomes a tool that can provide access to current subject specific information in an interactive way. For instance, Dorling Kindersley markets numerous programs in the area of science and mathematics that offer the option of text being read and short video clips to illustrate a topic. By using a program such as this, a student is able to gain adequate information in an age appropriate way to allow him/her to be successful in the class.

Tom Snyder Productions offer many programs that integrate cooperative learning into the use of the software and supplementary materials. An example is The Great Ocean Rescue. Each team member has a role to play. Problem solving and higher order thinking is involved, but through the team and the information provided a student with reading problems could contribute and be successful.

Word processors with audio assist

Each year more and more user-friendly word processors that include speech capabilities are available. If the student early on accesses such programs as Read, Write, and Type, the written response becomes accessible. Also programs such as Text Help offers audio feedback options when just a few letters of a word are written. Now Text Help offers programs that are available so that multiple users can utilize the same disk, whereas earlier due to the software learning the style of the writer, each student needed a disk.

The use of the portfolio, the digital camera, along with such programs as PowerPoint, allow students with problems in reading or written expression to find success in a way that was not available before our "digital" age (SEDL, TAP into Learning, 2000).

Graphic organizers

One of the challenges that teachers face in the age of high-stakes testing and diverse-ability classrooms is how to cover the entire curriculum. Students learn lots of facts, but often they are not able to visualize how these isolated facts relate to each other. Connecting facts and seeing the big picture or concepts can be challenging for even experienced teachers. (Ellis, 2001). Graphic organizers and frameworks are effective research based strategies developed by the University of

Kansas Center on Research for Learning. Inspiration software has a variety of graphic organizers that can help teachers to frame information so that students see the relational understanding of the instruction. Graphic organizers also provide a means for elaboration and understanding how ideas hang together. This portion of the session will focus on graphic organizers as well as some tips on integrating technology and websites into the graphic organizers.

Internet

The Internet provides a tool that allows the student with learning difficulties an avenue to transcend traditional classroom tools that have previously brought failure. Through the web a student can link to many virtual trips and opportunities and access information about whatever venue "peeks" his/her interest. A list of Internet resources for teachers will also be provided. Evaluation of Internet websites is also important and tips for how to evaluate websites will be reviewed.

Infusing Instructional Media into Preservice and Inservice classes

Those of us who thrive on the wealth of opportunities provided by instructional media need to remember that many in preservice and inservice classes may not have access to technology in their classrooms. Also in certain areas the use of the computer as an instructional tool is just gaining attention. In poorer school districts, a current computer in the classroom is only beginning to happen. Also among teachers, varying levels of expertise as well as desire exist. As preservice and inservice educators, opportunities for them to experience and complete projects involving instructional technology helps them realize the potential for the use of technology in their classrooms. They can also become advocates for accessing different forms of technology for their campuses and classrooms (enc focus, 2000).

This presentation will provide previews of programs mentioned, along with an annotated bibliography of software and sources.

Bridging the Divide for Special Needs

By

Maribeth Montgomery Kasik, Ph.D.

Abstract

Educational Applications of Microcomputers for Teachers of Students With Special Needs are a critical factor in addressing the Digital Divide. Educators often have access to computers, but allow them to sit idle for fear of what to do with them. Access to quality education is about who has and who does not. This gap is often wider for those dealing in special education settings than regular education. The presenter teaches a graduate level computer application class for teachers of students with disabilities. The presentation will highlight the success of the course as well as present samples of student technology projects.

Dr. Kasik will present the curriculum of the course: Educational Applications of Microcomputers In Special Education as well as utilize the techniques she uses for teaching the class to graduate students at Governors State University in Illinois.

She will provide participants with resourceful Internet sites as well as demonstrate student power point presentations and created websites.

ENHANCING SPECIAL TECHNOLOGY INSTRUCTION: IMPROVING METHODS for TEACHERS in GENERAL EDUCATION

Valerie Larsen, Ph.D.
Assistant Professor of Instructional Technology
School of Education
Indiana University South Bend:

Terri L. Demmon, Ed.D.
Instructional Strategies Coordinator,
University Center for Excellence in Teaching (UCET)
Indiana University South Bend

Abstract: *Indiana University South Bend's School of Education endeavors to develop motivated and committed educators to meet the needs of regional elementary, middle and secondary schools. In keeping with its continuous improvement goals, faculty initiated an effort to enhance and further integrate the role of technology in its year-round teacher training. We provide a brief overview of the content, nature, and concerns with our approaches toward introducing preservice teachers to adaptive technology. We next describe the role of adaptive technology in the current program with special emphasis on exploring instructional strategies, techniques and methods that can enhance the learning for all students. The Special Education program is reevaluating its curriculum to align with new state standards. At the same time, the general education curriculum has expanded its venue to address inclusion of special needs, exceptional, and at-risk children. Additional program analysis is in process via surveys, focus groups and interdepartmental discussions.*

Introduction

Indiana University South Bend's School of Education endeavors to develop motivated and committed educators to meet the needs of regional elementary, middle and secondary schools. In keeping with its continuous improvement goals, faculty at the IUSB School of Education initiated an effort to enhance and further integrate the role of technology in its year-round teacher training. As we redesign our programs to align with new state standards, we are expanding our focus to enhance special technology instruction for special needs and other diverse populations. In this paper, we provide a brief overview of the content, nature, and concerns with our approaches toward introducing preservice teachers to adaptive technology and the various contexts in which those introductions occur.

Review of relevant literature

Over time, the lines between regular and "special" students have become less distinct to parents and educators as more students are identified in the hazy middle ground of these descriptions (Roblyer 2000). The capacity of technology to empower students with special needs, especially physically disabled students, has been well documented (Male 1994). The practical means for converting theory into practice introduced into the classroom include mainstreaming, inclusion, and collaborative teaching or co-teaching (Ainscow 1999; Wallacorsa, Bettencourt, & Zigmond 2000).

Teachers in general education settings are more likely to adopt technology tools that can benefit the spectrum of students in a classroom than they are to focus on special needs children alone. Technology tools available in many of these classrooms are flexible and can be adapted to the needs of individual students. (Wallacorsa, Bettencourt, & Zigmond 2000; Roblyer 2000). The importance of finding tools that general education teachers can employ for all the students in the classroom has been explored for concept-mapping and organizational tools (Lenz & Schumaker, 999). Janney& Snell (2000) describe other pragmatic approaches to the what, how, where, when, and with whom lessons are taught - curricular instructional, and ecological adaptations.

Laws, standards and recommended practices pertaining to educational accountability at state and federal levels are widely available. Modifications in adaptive technology within the instructional technology and special education curricula are driven by these regulations and guidelines (Overton 2000). Converting equal access legal theory into actual classroom practice includes strategies like mainstreaming, inclusion, and collaborative teaching or co-teaching. Both special and general educators need to be well aware of the range of special needs that can exist in a classroom. Teamwork skills and collaboration efforts between special and general educators are key to developing the instructional strategies that incorporate appropriate use of technology for special needs students(Ainscow 1999; Wallacorsa, Bettencourt, & Zigmond 2000; Vitello & Mithaug 1998; Vaughn., Bos & Schumm 2000).

Courses for preservice teachers

IUSB requires that all preservice teachers take an introductory course (W200) in instructional technology. Starting in the fall of 2001, incoming education majors are required to complete a three credit hour course on technology for teachers. Formerly a one-credit course for elementary majors, the course has been redesigned and particular methodologies are introduced that help address special needs students within a general education setting. Through discussion and reading, students explore the social, moral, and technological issues of educational computing, addressing such topics as adaptive technology (including special education in a general education setting), the gender gap, the "Digital Divide", and multicultural sensitivity. The course sections are oriented to either elementary or middle/secondary school audiences to better address the varying instructional strategies, techniques and methodologies appropriate to the school populations IUSB teachers will eventually serve. Throughout the course, the instructors emphasize the flexibility of many of the software applications by modeling ways to construct, modify, or develop lesson activities that can optimize instruction for various learners.

Major topics include introduction to operating systems on both Apple and IBM-compatible personal computers, integration of the microcomputer into the school curriculum, and evaluation of computer assisted educational packages. Students acquire an introduction to integrated software packages including word processing, spreadsheet, database and presentation applications, They are introduced to simple web design using Netscape Composer, electronic grade books, concept mapping (Inspiration), a multimedia authoring tool (HyperStudio), and evaluation of various software and utility packages and hardware commonly employed in P-12 education. As part of web authoring instruction, we illustrate the importance of using headers instead of font sizes to provide necessary information for the visually impaired population that uses text readers. With instruction in concept mapping tools, we explain the importance of visual information to learners at all levels as well as the flexibility of letting learners select images or outlined text as an organizational tool. Preservice teachers are trained to apply advanced Internet search techniques on various search engines to locate and evaluate lesson plans, instructional sites and WebQuests on the World Wide Web. The ASSURE Model (Heinich, Molenda, Russell, & Smalldino 2002) employed for evaluation of lesson plans is among the first of various models the students encounter during their years at IUSB. The students routinely access Oncourse, a proprietary, online course management application developed by Indiana University. Analogous to commercial products such as WebCT and Blackboard, Oncourse (Indiana University 2000) contains chat functions, mail, conferencing/discussion groups, and the ability to integrate online testing, Web authoring, and multimedia resources and other tools for Web-based instruction and/or instructional support.

Following analysis of the fall 2001 classes, we plan to further modify the course by including a competency requiring students to illustrate how a project would be adapted for special education students in categories such as physically disabled, learning disabled, etc. They will also be required to demonstrate how their projects address other diverse populations.

In another example of modifying courses to address special needs and diverse learners, a segment on adaptive technology is now included in the capstone course for preservice teachers on track to obtain the state Computer Endorsement for teaching. This course change resulted from the initial research and needs analysis completed in 2000 (and presented at the 2000 SITE conference) directly responding to weaknesses identified through discussions with advisory groups and stakeholders from area schools.

Content and focus of specific courses in adaptive technology

Since 1992, the IUSB School of Education has offered a technology course for Special Education majors (K400 for undergraduates, K501 for graduates). This course has a pre-requisite of Using Computers in Education (W200 discussed above), the common technology course for all Education majors. The K400 and K501 courses taught many of the same skill sets at a more advanced level. In the spring of 2001, the chair of the Special Education program offered a second section of the K501 course with a new approach. The course was re-designed to reflect more of the same topics that are covered in a capstone course within the Computer Endorsement program The primary skill sets in word processing, spreadsheets and databases were incorporated into the course, but not as a lesson on each topic, instead, word processing is assessed through papers requiring complex layouts, spreadsheets were assessed through case studies on planning field trips or grant money, databases skills were assessed through the development of IEPs within the database structure.

In the K400/K501 course taught for several years, students were exposed to various peripheral devices for special needs through teacher demonstrations. In the prototype course, students were responsible to demonstrate in class the use of various technologies designed for special needs students. These technologies were gathered from a variety of sources, some students had access to K-12 schools' equipment because they worked as aids and were given permission to bring the equipment to class one day; other students had special needs children and so were using such equipment in their homes for support in the child's education; another source came from the University, which provides equipment for special needs students on campus and, where feasible, instructional demonstration purposes. Two additional components were added to the course, software evaluation and staff development issues. The Software Evaluation component consists of activities starting with students contacting local schools to obtain copies of current software evaluation instruments used in schools, and then turning to literature to obtain additional examples of software evaluation instruments. After class discussions on issues to consider when selecting software for the classroom, students are divided into teams. With the materials collected in hand, each team works to design the best software evaluation tool to meet their needs. Once the instruments are completed, they are usability tested among the classmates. Each classmate writes a review of the software evaluation tool they used (not the one they developed), the reviews of each team's software evaluation tool is collected and shared with the respective teams. With the additional information to consider, the team revises their instrument and submits a final copy for grade. The staff development component consists of activities where students are required to complete library searches for articles on staff development, share the information with the class and submit summaries and reflections on the information gathered. The students are then divided into teams based on interests and skill levels on technology topics. Each team presents a one hour Staff Development Workshop for the class. The topics range from the American Disabilities Act and its impact on technology to Inspiration, Hyper studio, Educational Games, etc. These workshops provide an opportunity for students to learn the fundamentals or expand their experiences with a variety of software packages available in many schools, enabling them to focus on real world strategies for special needs students.

Special needs equipment and software at IUSB

Cost and compatibility of special needs hardware and software form a source of ongoing concerns. The relatively limited market for assistive software and hardware is sufficient by itself to keep prices high. The rate of change for operating systems and underlying personal computers or other large-scale digital software often results in compatibility issues. Several items purchased in spring, 2000 are incompatible with the Macintosh G4s installed in the education lab. Similar difficulties are anticipated with the spring upgrade to multimedia PCs in the same lab. The rapid changes in technology can also adversely affect resident equipment and software. Like other universities in Indiana, IUSB is facing severe budgetary constraints and the prospect of more draconian measures in the near future. One consequence will likely be careful attention to cost/benefit analysis where expensive purchases might benefit one or a few students or faculty.

The Office of Information Technology and the School of Education worked jointly to provide a variety of equipment that would be available for special needs students but also available for educational and instructional purposes. A partial inventory of the equipment includes Touch Screens by Edmark, IntelliTools, IntelliKeys, right and left hand keyboards, a trackball mouse, Window Eyes, ZoomText, a TeleSensory closed circuit television for text magnification, various types of switches, a Slim Armstrong mount, Discover Kenex, etc. We were also able to install copies of word prediction software (Co-Writer and Write Out loud). In addition to many of the items listed above, the Schurz Library also provides special needs students with access to voice recognition software (Dragon Naturally Speaking), a Kurzweil 3000 reader, and Open Book Unbound. Male (1994)

Limitations :

Many of the classrooms used by the School of Education faculty lack Internet connections. Installation of newer technologies was delayed for many years by university plans to move the School of Education. Now, severe funding cuts have left the faculty in classrooms with insufficient technology support. The IUSB Office of Information Technology (OIT) updated the infrastructure to the primary education building in summer, 2001 and is evaluating cost of Internet wiring and investigating some prototypes for wireless technology in some classrooms and the student lounge. Without scheduling classes periodically into the already-overbooked campus technology labs, it is difficult to model the technology integration. Several faculty members develop Web sites or employ Oncourse for web-based instructional support when the Internet is not available in a classroom.

Budgetary concerns, discussed previously, and faculty recruitment are also issues. Given the tight employment market for some years, there is ongoing concern about attracting sufficiently qualified personnel in the Special Education program and to a lesser degree, in the Instructional Technology program. In both programs, IUSB has been fortunate in acquiring a talented, dedicated pool of adjunct faculty.

Future Directions

In preparation for an upcoming NCATE accreditation, an education task force is conducting a needs-analysis of all stakeholders including area schools through the use of surveys, focus groups and inter-departmental discussions, including special education. Surveys were developed and mailed. An assessment grant has been obtained for analysis of the survey returns.

Faculty in the School of Education are gradually infusing newer technologies into their classroom activities. One of the critical roles of faculty is, of course, to model the use of technology in the classroom. We are attempting to model attentiveness to the needs of all learners throughout our courses by discussing diversity in the classroom, promoting visual and written literacy, and optimizing techniques, strategies and methods to reach a broad spectrum of students.

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Using Robolab Software and Lego Hardware to Teach Computing Concepts to Deaf and Hard-of-Hearing High School Students

James R. Mallory, MS, Associate Professor
Applied Computer Technology Department
jrmnet@rit.edu

Ronald R Kelly, PhD, Associate Professor
Research Department
rrkncp@rit.edu

National Technical Institute for the Deaf
Rochester Institute of Technology
United States of America

Abstract: Each summer, the National Technical Institute for the Deaf (NTID) offers a one-week workshop for approximately 200 deaf and hard-of-hearing high school students, called Explore Your Future (EYF). These EYF students sample a variety of activities that are designed to educate them on different career possibilities. The Holland model is used to help students understand the various career areas and skill requirements.

One of the author's of this paper was responsible for the "Investigative" Holland category and was charged to set up a technology activity. It is not difficult to set up an enjoyable activity that uses technology, but the authors' wanted to have an outcome assessment in place to see if the students gained both an understanding of what the Investigative type of career was and to see what technical concepts were learned during a 45 minute activity. The technical activity and its outcomes are described in this paper.

Introduction

Technical educators of the deaf often wonder if and how quickly deaf and hard-of-hearing students can learn concepts pertaining to computer hardware, computer software/programming, and interfacing the hardware to the software. For the summer 2001 EYF activity, one of the authors developed a 45-minute activity for deaf and hard of hearing high school students enrolled in the Explore Your Future (EYF) program. This activity was developed around Robolab™ software programs in conjunction with Lego™ toys equipped with motors, lights, touch and infrared sensor peripherals interfaced to the Lego RCX controller. The authors also developed a 10-question assessment that tested the students' knowledge before and after the 45-minute activity.

Although students enjoyed these types of activities in years past, nobody really knew if and how much information they learned about the career area and about the specific content being taught. This activity needed an assessment in place to measure the outcomes that showed how much the students actually learned. The current study was an attempt to implement an evaluation process for this EYF technology activity.

The Study

A total of one hour was allotted to this technology activity. This included the assessment and explanation that took about 10 minutes before and five minutes after the activity. The learning activity itself was 45 minutes, with only five minutes of explanation and 40 minutes of hands-on activities.

During the 45 minute activity, students had to: set up and connect the hardware input and output devices, including touch and light sensors; set up and connect output devices, such as lights and motors; interface the input and output devices to the RCX controller; select a correct Robolab software program to run their hardware configuration; download the correct Robolab program to the RCX; run the hardware using the software program which they downloaded to the RCX.

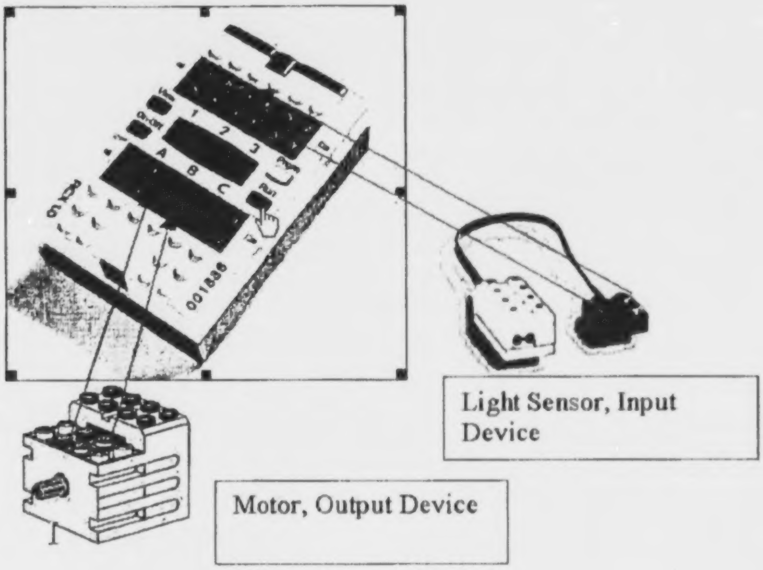
Light Sensor, Input Device
Motor, Output Device
A
B
C
1
2
3

Figure 1: Example of RCX Controller, Lego Hardware and RoboLab Interfacing

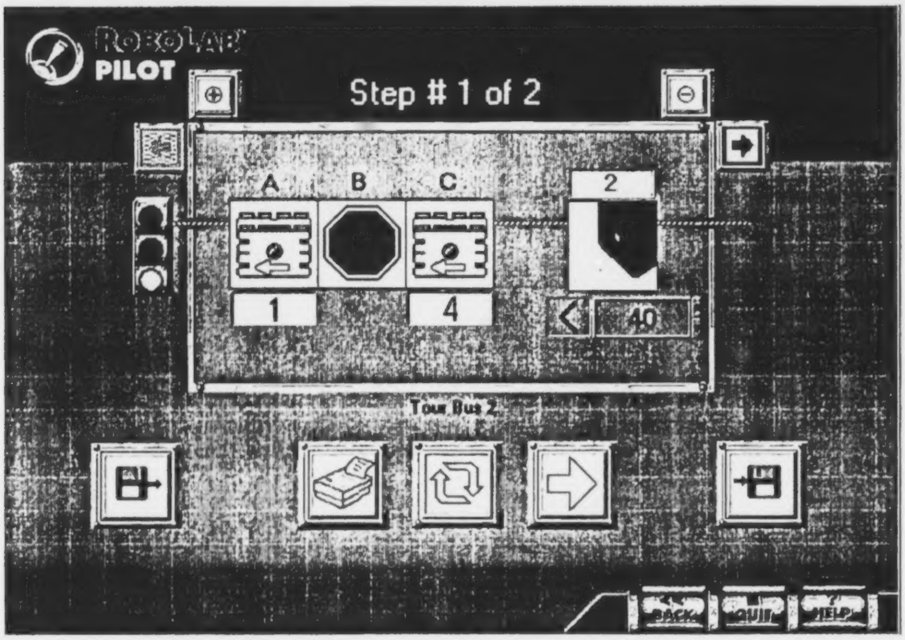
RoboLab
PILOT
Step # 1 of 2
A
B
C
1
4
2
40
Tour Bus 2
BACK
QUIT
HELP

Figure 2: Partial Robolab Software Program for EYF Activity
Two questionnaires were developed, one pre and one post activity that consisted of 10 questions on the actual programming activity plus 4 other questions to find out about student demographics. The questionnaire had to be very brief due to the limited time available for students to fill it out. The 10 activity

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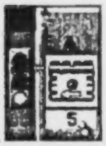
questions dealt with specific technical details, two about input and output hardware, four about the software and two questions about the interfacing aspects of the activity. The questions had various degrees of difficulty, some fairly obvious and some were quite difficult. Approximately 200 students were asked to fill out the pre and post activity questionnaire.

7.  What do these 2 software commands do?

? I don't know.
? Start the program, turn the motor connected at Port A on so that it rotates in this direction shown at a speed of 5.
? Start the program, turn 5 motors on until the program tells it to stop at point A.
? Go when the motor 5 starts to turn.
? Turn port A item on 5 times

Figure 3: Sample of One EYF Software Question on the Questionnaire.

Findings

There were 215 deaf and hard of hearing students (93 females and 122 males) who participated in the "Explore Your Future" program. The average age for females (17.3) and males (17.5) was statistically similar.

With respect to previous experience with programming, there was a statistically significant gender difference, $\chi^2 = 8.56$, $df = 1$, $p = .0034$. Only 4% of the females had programming experience prior to EYF compared to 17% of the males. Interestingly, there were also gender differences with respect to students' interests in pursuing an investigative programming career. A 2(male vs. female) × 2(pre vs. post EYF interest) repeated measures analysis of variance showed that males expressed a higher interest in an investigative field, $F(1, 199) = 13.2$, $p = .0004$. Furthermore, there was a significant interaction between gender and interest, $F(1, 199) = 8.1$, $p = .0050$, resulting from the fact that males actually increased their interest in investigative programming from pre to post EYF experience ($M = 3.0$ to 3.5 respectively). In contrast, females showed no change in interest from pre to post EYF ($M = 2.7$ to 2.76).

Regarding students' understanding as to what an investigative type of career was, there was also a significant increase in understanding from pre EYF to post EYF responses, $\chi^2 = 75.7$, $df = 16$, $p = .0001$. Prior to EYF, 44% of the students indicated they "did not know" compared to only 9% at the end of EYF. Similarly, only 34%indicated they understood that computer programming was an investigative type of career while 75% indicated this after their EYF learning experiences.

In terms of learning and knowledge growth relative to hardware and software, there were no gender differences for pre and post EYF responses on the hardware questions ($F(1, 217) = 1.6$, $p = .21$) and the software questions ($F(1, 191) = 3.6$, $p = .06$) and no significant interactions. As a result, overall student learning and knowledge growth were examined regardless of gender. There was a significant difference between the students pre-EYF survey responses for the hardware questions and their post-EYF responses, correlated $t = -12.88$, $df = 222$, $p = .0001$. Similar significant results also occurred for the students pre and post EYF responses to the software questions, correlated $t = -25.82$, $df = 193$, $p = .0001$. Table 1 shows the students' pre and post EYF mean responses and standard deviations for hardware and software knowledge.

	Pre-EYF Survey	Post-EYF Survey
Hardware knowledge		
M	.37	1.6
SD	(.7)	(1.3)
Software knowledge		
M	.35	2.8
SD	(.7)	(1.2)

Table 1: Pre and Post EYF Student Responses on Software and Hardware Questions

Another area of learning was relative to interface connections for input and output devices. For input devices, on the pre EYF survey, student responses indicated that 83% "did not know" with only 8% getting it correct. In contrast, the students post EYF responses showed that only 5% of the students "did not know" with 59% showing a correct response. No gender differences occurred. Similar growth patterns occurred for the question on connections for the output devices. The students pre EYF responses showed that 83% "did not know" and only 8.5% got it correct. At the end of EYF 58% got it correct and only 7.5% "did not know."

Conclusions

The students' pre and post EYF responses showed that a 45-minute activity using a Lego RCX controller and the related input and output hardware along with Robolab software can be an effective way to introduce computer software, hardware and interfacing concepts to deaf and hard-of-hearing high school students. Such an activity can also help clarify deaf students' understanding of an "investigative type of career," in addition to giving them a deeper informational basis for career decision-making when planning their college studies.

There was a statistically significant increase in pre and post activity results relating to the understanding of the investigative career category, regardless of gender. Prior to the EYF activity, 44% of the students stated that they "did not know" what an investigative type of career was compared to only 9% after the activity. Similarly, 35% knew that computer programming was an investigative type of career prior to participating in EYF, while 75% correctly indicated this after the activity.

The findings also showed a statistically significant increase in pre and post activity understanding of hardware, software and interfacing computer concepts, regardless of gender. For hardware input devices, for example, 83% of the students indicated that "they did not know" what an input device was, with only 8% getting the answer correct, whereas after the activity 5% of the students "did not know" with 59% showing a correct response.

This study uncovered some interesting gender differences among deaf and hard-of-hearing high school students. Prior to the EYF activity, only 4% of the females had programming experience compared to 17% of the males. There were also gender differences with respect to students' interests in pursuing an investigative type of career. Males increased their interest in investigative programming from pre to post EYF. In contrast, females showed no change in interest from pre to post EYF activity. These findings reinforce the need to have female role models helping lead these types of activities to further encourage more female participation in technology -related careers.

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Technology Integration into Special Education Coursework: Instructor-Focused and Learner-Focused Integration

Sylvia S. Martin
Special Education
University of Houston
United States of America
martinsy@cl.uh.edu

Caroline M. Crawford
Instructional Technology
University of Houston-Clear Lake
United States of America
crawford@cl.uh.edu

Abstract: Instructional technology within the area of special education expands the teacher candidate's opportunities to communicate with learners and their families. The support that can be available through the use of technology that aids instruction is an important element of the special education methods coursework; however, special education is an area that offers numerous assistive and adaptive activities and tools. Teacher candidates must have instructional technology integrated into the special education methods courses so as to further develop their instructional tools from which to choose, at both the instructor-focused as well as learner-focused integration levels within the learning environment.

Introduction

The integration of technology within a special education learning environment, especially significant within a methods course for teacher candidates, emphasizes the significance of technological tools associated with instruction as well as their appropriate and successful uses. The modeling of both instructor-focused and learner-focused uses of technology is of primary importance for teacher candidates. However, special education university faculty who facilitate special education methods courses may have not had the opportunity to research the integration aspects of technology at any significant length.

Special Education Areas of Coursework

Special education is a specialized area of instruction that maintains a stronghold within numerous areas of expertise. For example, special education not only focuses upon early childhood through secondary education, but the areas of focus also encompass the following specialized areas of influence: child development and learning; curriculum development and implementation; family and community relationships; assessment and evaluation; professionalism; and, application of technologies. From these specialized areas, the curricular scope and sequence is developed.

Supportive Learning Environment

As the topics of coursework are designed, numerous aspects within each of the courses must be fully developed. Expertise must be maintained within the areas of: instructional adaptation; multiple instructional strategies; motivation to learn; classroom management; assessment of learning; professionalism; and, universal design through technology. As may be gauged from the list of areas to be fully developed within the curricular scope, any entity that has the ability to aid in the dispersal of knowledge and aid the learner towards higher order thinking skills, is greatly desired. The instructional elements to be integrated into the learning environment, at both the instructor-centered level as well as the learner-centered level, are the following elements:

- Facilitator-Centered Elements
    - Philosophical Underpinnings: Behaviorist - Cognitivist - Constructivist
    - Clear Objectives
    - Comfortable Implementation
    - Assessment Methods
- Learner-Centered Elements
    - Clearly Articulated Expectations

- Time Allotment
- Conceptual Understanding
- Orientation: Process versus Product

But this is only at the teacher candidate's level of instruction. The teacher candidate is also offered the opportunity to delve into the technological tools available within the special education classroom environment. As a basis towards understanding the teacher candidates explore the instructional technology tools available, an initial review of significant areas of importance. These instructional design considerations are: learning environment enhancement; instructional implementation; ease of use; access, which may be further delineated as learner and the family support; and, monetary constraints. Once these areas are appropriately and successfully reviewed, then the instructional technology tools that are available and appropriate for the special education classroom environment are reviewed:

Hardware	Software	World Wide Web	Multimedia	Learning Styles
Bar Scanners Ergonomic Keyboards Ergonomic Mouse/Joysticks Touch Screen Monitors	Inspiration for Mind Mapping (http://www.inspiration.com/) Screen Reader Voice Recognition Text Resize Capabilities Closed Captioning Web Speech Recognition	Instructor-Generated Learner-Generated	Learning Environments Learner Products	Visual Auditory Spatial Kinesthetic

Teacher Candidate Research and Integration

As presented at nationally recognized teacher education conferences (Crawford & Martin, 2001), teacher candidates are beginning to develop an understanding of the forms and functions pertaining to technology and its appropriate and successful integration into the learning environment. Following are samples of technology that students implemented within the special education methods coursework:

- Loading the Dishwasher: the use of digital camera, graphs, tables, data collection forms, student-cropped photos to focus on action of loading so students with disabilities can use photos to follow steps accompanying directions in words include a literacy component.
- Going to the movies: movie World Wide Web sites, digital photos, clip art integration, data collection sheets, tables, charts, graphs.
- Going to the movies: Selecting a movie : newspaper ad & theater website; reading reviews on websites; accessing the "Connect" bus schedule at their website; mapping route to theater using Yahoo maps; Used Kodak picture program to crop photos, clip art. E-mailed a friend to join.Each of the steps the teacher candidates completed in order to develop a unit for

the special education learning environment offers real-world opportunities for skills development and procedural understanding pertaining to technology integration and skills.

Conclusion

In conclusion, the significance of technological tools at both the instructor level and the learner level, as well as process versus product within the educational environment, are imperative elements that must be emphasized within the special education methods coursework as well as PreK-12 learning environments. However, a strong focus upon instruction must be maintained in order to ensure appropriate instructional design of learning opportunities. The availability of technological resources has overcome the desire to "reinvent the wheel", which has been a major consideration over the previous ten year period, and now the focus must be revised towards the appropriate and successful integration of technology within the special education environment.

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TIPS: Technology Integration Projects Across Special Education Teacher Preparation Programs

Presented by

Trinka Messenheimer, Tara Jeffs, Alicia Bevill, &. Wm Morrison,
Bowling Green State University, Bowling Green, Ohio

Technology is being integrated into teacher education today, in preparing general educators and special educators, designing and planning program curriculum content, and impacting delivery at both the preservice and in-service levels (Ludlow, 2001). In order to meet today's societal expectations, special education teacher preparation programs are placing more emphasis on providing their graduates with competencies related to the infusion of special education technology (Langone etal, 1998). An impetus to establishing current technology standards and competencies for special education teacher preparation programs include influential entities such as The National Educational Technology Standards (NETS) an initiative of the International Society of Technology in Education (ISTE), The National Council for the Accreditation of Teacher Education (NCATE), Council for Exceptional Children (CEC), and many state licensing agencies (Ludlow, 2001). Federal and state initiatives (i.e. Preparing Tomorrow's Teachers to Use Technology, http://www.pt3.org) provide resources, skill training, and an investment in technological advancement that otherwise would not be possible.

Smith (2000) states "If we expect preservice special education students to be prepared to integrate technology in the K-12 environment they must see the technology (assistive and instructional) modeled by their instructors rather than simply being told about its potential and how it might be effective." (p 60)

One might ask the obvious question, Is modeling the use of technology enough? Recent research suggests the need to go beyond modeling and provide meaningful and real-life opportunities for hands-on integrated technology within the curriculum (Mesenheimer, et.al. 2001).

Preservice and in-service educators need to acquire technological competencies for implementing computer support in the learning process. These competencies can be achieved through meaningful technology integrated projects infused within methodology courses and field experiences (Ludlow 2001). Such projects would allow the preservice/ in-service special educator to design, plan, and implement technological tools and strategies into the instructional process. Jonassesn, Peck and Wilson (1999) states "student thinking is engaged by activity."(p 2). Integrated technology projects could be viewed as learning tools that can be used to help the learner construct their own meaning and assist in guiding the meaning making process within the learner. Where does one begin to integrate technology and authentic student projects within the curriculum? To what extent should the role of technology be emphasized in the curriculum and be required by the preservice /inservice learner?

This presentation highlights specific examples of meaningful technology integrated projects and related research that helps answer the above preliminary questions. Technology projects shared will include both assistive technologies and instructional technologies that can be utilized across computer platforms (Mac & PC) and across the special education teacher preparation curriculum. During this presentation presenters will share their technology integration into an array of disability areas (learning disabilities, behavioral disabilities, deaf education and early childhood special education) and related coursework.

Integrated Technology Examples

Integrated technology projects provided the opportunity for university students to apply fundamental theory with essential teaching strategies taught in special education courses to create an innovative mechanism for learning to take place. Through the implementation of technology, twenty first century preservice and in-service special educators can provide their learners with choices and activities that match their learning styles and specific learning needs. Such examples are briefly described below:

PowerPicture Books and Vocabulary Activities

Student-made PowerPoint Picture Books and interactive lessons created in MS PowerPoint provides interactivity through a customizable electronic learning. Developing a hypertext learning activity, pre-service teacher begin to go beyond understanding and apply technology to develop students' higher order thinking skills, motivation, and creativity.

iMovies and multimedia

Using iMovie students generate literacy projects that essentially come to life. Careful, planning of instructional outcomes and the assessment of these outcomes occurred. Collaborative learning activities provide the guidance and classroom environment to discuss principles of learning outcomes, benchmarks and assessment.

Web quests and Web-based Learning Environments

Experience and exploration are the cognitive backbone to preservice teachers projects involving the understanding and creation of webquests and existing web-based learning environments (i.e. www.literacyaccessonline.com).Student-created detail lesson plans, centered on the integration of innovative web-based learning tools provide new and innovative opportunities for student-centered learning in the special education classroom.

Assistive technologies

Taught in a stand-alone course and integrated within the special education methods classes, preservice special education teachers look closely at meeting the specific needs of the learner through the use of assistive technology. Through integrated assistive technology projects, preservice special educators discover their teaching passion and create a resource ready to be "carried out into the field" and provide to other educators, cooperating teachers, and parents on the "how to" integrate assistive technology within a particular content area or skill area.

Providing Learner Support through the Teacher Preparation Curriculum

Within the special education teacher preparation program students are taught and encouraged to utilize available technology resources on both on campus and within the community. The College of Education and Human Development Technology Resource Center is the first stop. The Technology & Resource Center is open 80 hours a week serving the 223 faculty, 47 Staff, and 4,905 students of the College of Education and Human Development. Usage rates at the Center averaged 1,570 patrons per week during the Spring Semester 2001, totaling over 25,000 patrons for the entire semester. Twenty-six education classes teach in the 2 computer labs. Students and faculty have a wealth of computer resources (hardware and software) and services to assist in building basic technology skills needed to generate effective technology projects. Computer labs and technology smart classrooms allow special education faculty and students to demonstrate technology and showcase and discuss hands-on technology projects and activities within the learning process.

Guidelines for Successful Integration

This presentation will also share essential guidelines that help assure the usefulness of technology integration into the special education teacher preparation curriculum. Listed below are a few examples of such guidelines:

- required assignments "force" students to practice technology and begin to develop skills
- learned to work and demonstrate across computer platforms, as students are stymied by this process
- created and bridged preK-12 schools and university program through partnerships that allow university students to "kid test" their ideas and refine the development process, thus allowing the preK-12 student with disabilities to clarify the problems.

In this session, participants will:

- Explore through demonstration, common technology projects, and real classroom examples of integrating technology into the special education curriculum.

- Exchange through an open discussion, other technology tips and strategies in using technology in classroom instruction and possible benefits to preservice and inservice special educators and in essence students with disabilities.

Participant Outcomes:

Through the implementation of technology, participants will be able to generate ideas and projects that meet their specific needs of their programs and provide the learners within these programs with choices and activities that will enhance the quality of special education.

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Bridging the Divide for Special Needs

Paper or Workshop to be prepared for Conference

By

Maribeth Montgomery Kasik, Ph.D.

Abstract

Educational Applications of Microcomputers for Teachers of Students With Special Needs are a critical factor in addressing the Digital Divide. Educators often have access to computers, but allow them to sit idle for fear of what to do with them. Access to quality education is about who has and who does not. This gap is often wider for those dealing in special education settings than regular education. The presenter teaches a graduate level computer application class for teachers of students with disabilities. The presentation will highlight the success of the course as well as present samples of student technology projects.

Dr. Kasik will present the curriculum of the course: Educational Applications of Microcomputers In Special Education as well as utilize the techniques she uses for teaching the class to graduate students at Governors State University in Illinois.

She will provide participants with resourceful Internet sites as well as demonstrate student power point presentations and created websites.

GIDL-PC: a Global Infrastructure for Distance Learning for the Physically Challenged

Dr. Warren Moseley
Department of Computer Science
Western Illinois University
Macomb, Illinois 61455

Abstract

This paper describes the prototype of a global infrastructure called GIDL-PC (Global Infrastructure for Distance Learning for the Physically Challenged). This system supports teaching and research sharing across interrelated disciplines focusing attention to the needs of the physically challenged (PC). Inter-linking of resources provides for a standards-based architecture-centric joint action global infrastructure. The goals of the project include developing new concepts to understand, analyze, invent research processes, and provide tools to help improve and manage knowledge and resource sharing.

Introduction and Background

The Americans with Disabilities Act of 1990(ADA) is a United States federal anti-discrimination statute designed to remove barriers that prevent qualified individuals with disabilities from enjoying the same employment opportunities that are available to persons without disabilities. ADA stipulates that employers must make reasonable accommodations for those with disabilities [1]. In order to accommodate ADA at the pace necessary to keep up with demands of industry, research must be shared through some standards and some common infrastructure.

In his yearly address to the National Academy of Sciences Dr. William Wulf,[2] suggested that progress in science and technology will depend on the participation of a global research community. In addition it will need broad public trust and support. The main goal of this research is to provide an integrated platform for educational research sharing for researchers and teachers working in the area of technological support for the physically challenged. Distance Learning provides a natural way for teachers to share information with each other, and with the participants in their classrooms especially when accessibility is an issue.

Resource sharing up to now has been through publications, conferences, and web pages. This project will extend the classroom past document and data sharing to integrated teaching and research communities that share documents, objects, data, hardware, lectures, power point presentations, multimedia presentations and software through standardized interfaces that simplify system usage.

Expandable repositories of material adapted to the physically challenged will provide a gowth foundation for sharing new plans, new research ideas and educational results. It will allow participation in real-time experimentation with subjects in multiple locations around the globe. Sharing reduces duplication of hardware, software and other costly resources.

Other Research Sharing Efforts

The idea of people sharing their information and ideas is not a new subject to the research community. Areas such as Law Enforcement[3], Education[4] and efforts such as the Center for Coordination Sciences[5] at MIT demonstrate large research-sharing efforts. Somehow the Software Engineer's supporting research for the physically-challenged have kept a local focus. Given a simple standardized robust infrastructure, research, teaching, presentations and resources can now be shared globally. This prototype infrastructure produces a distributed object reference architecture[6] [7] that is standards-based, and architecture-centric.

Moseley described a reference architecture[8] that serves as a context for design environments to create applications that allow the participation of people who are physically challenged (PC). This research is now extended to include the global community doing research for the physically challenged.

Some of tools and techniques used in GIDL-PC are the Unified Modeling Language(UML), web-based documentation (preferably the eXtensible Markup Language - XML[9]), OpenDoc, a CORBA compliant ORB with IDL (Interface Definition Language) as the preferred interface specification, and the World-Wide Web. IDL facilitates a multi-platform and multi-language. object interface.

Figure 1 shows a cooperative project between Western Illinois University in Macomb Illinois, St. Andrews Presbyterian College in Laurinburg, North Carolina, Abbot Laboratories in Laurinburg, NC, The Technical University of Ostrava in the Czech Republic, and The Techical University in Kaiserslauten, Germany.

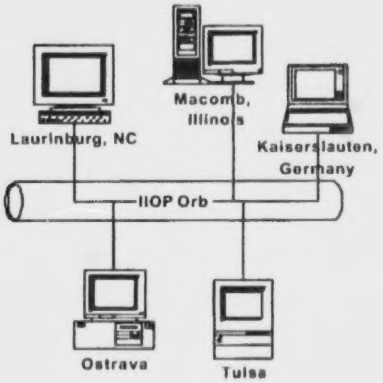

Figure 1

This research explores real-time object-based direct manipulative user interfaces[10] that are specially enhanced for the PC. The type of user interfaces used in Moseley's research[11] (eye-trackers, sensor-controlled processes, special hardware devices, etc) can often be prohibitive in cost when duplicated across platforms for distributed locations. Sharing the access to objects that control distributed devices provides a cost-effective means of research into this area.

This project goes deeper than just sharing documents and data. A researcher will access the GIDL-PC through the event services manager of a CORBA (Common Object Request Broker Architecture)[12] Compliant Object Request Broker(ORB). It was critical to the universal nature of this project that it be open and vendor neutral. The OMA(Object Management Architecture) of the Object Management Group(OMG)[13] is the only distributed component architecture available today that is open and vendor neutral.

GIDL-PC requires both time critical events and non-time critical events. For non- real-time transactions any ORB will suffice. There are several ORB's that support real-time services but GIDL-PC decided on TAO [14] as the standard for real-time events. In addition to sharing objects this project is sharing real-time location data via worldwide GPS Satellite Receiver. Software written by a researcher in Macomb, Illinois can be used by a PC person's wheelchair in the Czech Republic.

ORB's allows for connections of objects from the repository in any location to access the objects in any other location without knowing the location of the particular object. If not for research sharing through CORBA ORBs, each location would have to have duplicate installations. Duplication implies the possibility of configuration problems, as well as installation problems at either place in the project. As it stands now when the ORB places a request for an object one automatically gets the latest version.

A constant problem for emerging countries is the availability of resources. With the emergence of free ORB's such as TAO, ORB-it[15], JavaORB[16] the ability for these countries to provide excellent software development talent has increased the potential to produce cost effective solutions. The PC technology marketplace is not a volume-intensive market, and hence cost-effective solutions have not been prolific.

OMG – Object Management Group

In June 1995, an OMG-hosted meeting of all major methodologists[17] (or their representatives) resulted in the first worldwide agreement to seek methodology standards, under the aegis of the OMG process. The UML is nonproprietary and open to all. It addresses the needs of user and scientific communities, as established by experience with the underlying methods on which it is based. This standardization of the UML boosts the possibility of a global research sharing platform, in that the modeling process is now standardized, and is available under the vendor neutral and open nature of the OMG[18]. The parameters, vendor neutral, open architecture and standardization are essential to the success of such an effort.

The Unified Modeling Language (UML) is a language for specifying, visualizing, constructing and documenting the artifacts of software systems, as well as for business modeling and other non-software systems. The UML represents a collection of best engineering practices that have proven successful in the modeling of large and complex systems. It is important to the success of a project such as GIDL-PC to have a unified modeling language, and a unified modeling process. The approach to modeling promotes reuse and reduces duplication of effort.

Research Processes

Processes are viewed as being made up of activities that are inter-connected via dependencies along which resources flow. There are several kinds of dependencies[19] including flow (one producer to one consumer), fit (many to one), and sharing (one to many)[20]. Dependencies can be associated with coordination mechanisms[21], which are simply processes whose purpose is to manage that dependency. Dependencies and coordination mechanisms[22] represent a powerful abstraction mechanism for revealing the key features of a process while hiding implementation details.

The OpenDoc Vision

Apple Computers had a grand vision for the future of computing. It was called OpenDoc[23]. OpenDoc promised to end the age of bloated do-everything applications by providing an architecture where users could mix and match collections of highly focused "containers" or "parts" to suit their needs. Tough times hit Apple and they abandoned OpenDoc for economic reasons. Although OpenDoc in its original format is not used in GIDL-PC the concept is embraced in all aspects of its design and implementation.

Document Sharing is also important

Document sharing in GIDL-PC is also a very important component. The OMG is integrating XML[24] into the CORBA technical infrastructure, so that new XML-based applications will plug and play with current applications. This was the goal of the original OpenDoc effort. Document sharing is enhanced by the eXtensible Markup Language(XML)[25]. XML is an extension of SGML[26], the Standardized General Markup Langauage. In XML, however, you can define your own tags (hence the "eXtensible"). Each XML file is prefaced by a link to Document Type Definition that describes the tags it contains and how they may be used. The next version of Microsoft Office will use XML as its standard file format.

XML's goal is to facilitate the exchange of data and documents between applications (and platforms). It will make it easy to edit the same file in different applications, each one excelling at a specific task.

GIDL-PC is architecture-centric, and this center is CORBA. CORBA encompasses a series of standards and protocols for inter-process communication in a heterogeneous environment[27]. Using CORBA, researchers can easily write applications that can be tailored for multiple platforms at once, in any number of languages. It thus comes as no surprise that the CORBA specification has caught on so quickly as the standard for interprocess communication, particularly in the research community.

The Object Request Broker (ORB) describes a ``software bus", a mechanism which handles communication between distributed objects. The ORB allows for client-server interaction between heterogeneous objects distributed over a wide-area network with meta- information describing the objects in a system. Through a standard interface(IDL) an object may access other objects as a client without prior knowledge of their existence or location. Any object connected to the ORB can play the role of both a client and server object. That is, it can initiate calls to other objects and respond to requests for services from other objects on the ORB. See the figure below.

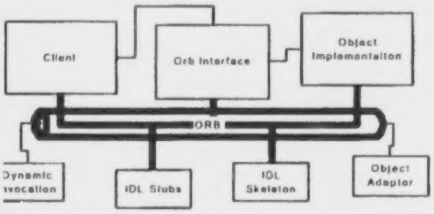

Figure 2

At the heart of every CORBA application are objects. Objects reside on various machines throughout the distributed environment and are tasked with performing duties defined by their implementation and interrelationship. In the standard two-tier architecture, the objects are often thought of as the servers in the system. However, unlike such standard servers, objects have the ability to move around if needed. Approximately one year into a two year research cycle, Western Illinois University joined this effort. The server objects were move from computers at St. Andrews Presbyterian College, and Abott Laboratories in Laurinburg, North Carolina without interrupting the flow of activities of the globally distributed researchers. For a research sharing effort such as GIDL-PC this is critical.

A client communicates to an object through an object reference. This is a pointer to the object that allows requests for operations and data access to be sent from the client to the server via an ORB.

Every object on the ORB must have an implementation. This implementation is code written to perform tasks on the server machine. In other words, the implementation is what does the actual work of the object. An implementation can be in any language. It is allowed to perform tasks supported by the language, operating system, and underlying hardware. GIDL-PC examples include wheelchair add-ons, digital manipulative devices, eye tracking mechanism and unique devices for each of the physically challenged. In addition to code designed to interface with a legacy library, it was necessary in GIDL-PC to have a common interface so that it was comfortable for the researchers to interface to the environment. KDE and GNOME[28] are Linux[29]-based user interfaces that are CORBA Compliant.

There are two common ways in which a client can receive an object reference by using interoperable object references[30] (IORs) or by using the naming service. Every object on the ORB has an IOR. The IOR is a global identifier string that identifies the machine on which its associated object is located and the interface that the object supports. If given the IOR for an object, a client can use standard function calls on the ORB to turn it into an object reference. With the information contained in the IOR, the ORB knows what type of object is being referenced and the machine to which all requests should be routed.

Wide Area Networking and GIDL-PC

The World-Wide Web and the ease of access to the Internet is now radically changing our perception of worldwide distributed systems. Such systems should allow us to easily share and exchange information. This also means that it should be easy to track sources of information, even if these sources move between different locations.

Wide-area networks, such as the Internet, offer further motivations for adopting an event-based style. For one thing, the vast number of potential generators of events creates an opportunity for the development of novel applications that can effectively fuse the information associated with different events. Moreover, many existing applications that are already designed around the notion of event interaction can be increased in scale through the global connectivity provided by a wide-area network. For example, a quadraplegic in Laurinburg, N.C needs support software for a robotic feeding mechanism to assist in serving food to this PC person. At the Technical University of Ostrava there is seminal research in the area of robotic feeding. Through GIDL-PC it is possible to demonstrate the feasibility of shared distributed robots and feeding mechanisms. In general, the asynchrony, heterogeneity, and inherent high degree of loose coupling that characterize wide-area-network applications promote event interaction as a natural design abstraction for a growing class of software systems.

The simplest way for a client to get the IOR of a server object is through the naming service. The CORBA COS (Common Object Services) Naming Service provides a tree-like directory for object references much like a file system provides a directory structure for files.

Object references are stored in the namespace by name and each object reference-name pair is called a name binding. Name bindings may be organized under naming contexts. Naming contexts are themselves name bindings and serve the same organizational function as a file system subdirectory. All bindings are stored under the initial naming context. The initial naming context is the only persistent binding in the namespace.

For an applet or application to use COS naming, its ORB must know the name and port of a host running a naming service or have access to a string initial naming context for that name server. The naming service can either be the IDL name server or another COS-compliant name service.

More on COS Event Services

GIDL-PC is a network-based software system constructed as assemblies of loosely-coupled components. A promising approach to supporting component-based systems is the so-called event-based or implicit invocation architectural style.[31] Under this style, component interactions are modeled as asynchronous occurrences of, and responses to, events. The CORBA event model[12] is the basis for events in GIDL-PC.

The CORBA Event Service introduces the concept of events to CORBA communications. An event originates at an event supplier and is transferred to any number of event consumers. Suppliers and consumers are completely decoupled: a supplier has no knowledge of the number of consumers or their identities, and consumers have no knowledge of which supplier generated a given event.

In order to support this model, the CORBA Event Service introduces to CORBA a new architectural element, called an event channel. An event channel mediates the transfer of events between the suppliers and consumers as follows:

1. The event channel allows consumers to register interest in events and stores this registration information.
2. The channel accepts incoming events from suppliers.
3. The channel forwards supplier-generated events to registered consumers.

Suppliers and consumers connect to the event channel and not directly to each other. From a supplier's perspective, the event channel appears as a single consumer; from a consumer's perspective, the event channel appears as a single supplier. In this way, the event channel decouples suppliers and consumers.

CORBA specifies two approaches to initiating the transfer of events between suppliers and consumers. These approaches are called the Push model and the Pull model. In the Push model, suppliers initiate the transfer of events by sending those events to consumers. In the Pull model, consumers initiate the transfer of events by requesting those events from suppliers. Both types are important to the GIDL-PC researcher and the users alike.

A key issue of event services is quality-of-service (QoS) in a real-time situation such as controlling latency, throughput and jitter end-to-end. In GIDL-PC we needed a communication model that not only de-coupled suppliers from consumers but simultaneously supports advanced quality of service (QoS) properties and event filtering mechanisms. The CORBA Notification Service provides a publish/subscribe mechanism that is designed to support scalable event-driven communication by routing events efficiently between many suppliers and consumers, enforcing various QoS properties (such as reliability, priority, ordering, and timeliness), and filtering events at multiple points in a distributed system.

Figure 3

In classic hard real-time systems the timing constraints are an integral part of the application. If these constraints are not met then the application is not correct. Speed or performance is not necessarily the issue. Predictability is. Speed and performance can contribute to meeting demanding timing constraints. However from a design standpoint the concern is that in the worst case situation the timing boundaries are not exceeded. Guaranteed behavior is required. Best effort is not sufficient. Average performance is not meaningful, but,bounded limits are.

For the real-time portions of GIDL-PC we chose the TAO's open source model[33] and configurable design to enable the developer to understand exactly the intent of the software, and to select only those elements that are required to solve the problem at hand. Figure 3 shows a diagram showing the real-time portions of the TAO ORB. TAO can be configured and compiled to exactly match the need of an embedded systems designer.

Foundation of the Research Processes

Because the focus of this project is research-sharing, it is important that the process that controls the interaction of research participants be based on a solid theoretical foundation. At the MIT Center for Coordination Science significant research in the area of coordinated processes[34] is being conducted. However, the foundation of these process are not based on a solid theoretical foundation.

To correct the ambiguity Vondrak introduced Interaction Coordination Nets [35] (IC-Nets) to represent a tool that provides for concurrent threads for coordinated process management and control. These IC-Nets provide a graph-grammar petri-net foundation for the coordination of networks. Vondrak[36] originally used these to represent steps in the development process, but has since extended these to include process interactions and coordination in actual programs. Moseley[37] extends IC-Nets to the area of coordinated process for people who are physically challenged. This includes interface processes as well as software processes.

The processes modeled using IC Nets are inherently concurrent and often distributed. Synchronization of object interactions is simplified by the visual nature of IC-Nets.

Importance of User Interface

As important as the theoretical foundations are for a solid support for GIDL-PC, the simplicity of the interface, and the consistency by which the researchers interface to the system are equally important. Simplicity of interface has become a consistent thread for the research for people who are physically challenged.[38] The GNOME Interface provides a simple connection to the CORBA foundation that is the underpinning of GIDL-PC. It utilizes the GTK+ toolkit which requires the use of the IDL as the mechanism of linking components to the GIDL-PC desktop. In order to execute a program built with the GTK+ toolkit one must define the interface of the program to the environment by use of IDL. This encourages a standard interface mechanism by using the toolkit.

It is important to GIDL-PC that the pieces (CORBA, XML, UML, etc.) fit together seamlessly. GNOME provides the functionality of network transparency combined with component technology with the IDL to the ORB, and also the extensive use of XML and it is resident on the researchers desktop.

Future Enhancements

Current continuing research for the physically challenged is not only important but has become law in the United States. Employers must make reasonable accomodations to the Physically Challenged by law stated in the ADA. It is the hope of this research team that this effort can become a standard vertical facility under the OMG auspice. Future enhancements will be to add a Trader Service. A CORBA Trader Service locates appropriate objects that provide the desired functionality at runtime. To provide this service, the trader service federates a local trader and remote traders by considering the traders or link policies.

Summary

The initial direction and systems prototype for GIDL-PC has been in Computer Science and Software Engineering Techniques for Effective Software Engineering for systems that affect the Physically Challenged. We hope to extend this sharing to included Electrical Engineers, Psychologist, Sociologist, and anyone interested in research for the physically challenged.

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The Numerical and Literary Six-Year Old, 125 IQ Dyslexic Explores IT and Opens Up New Avenues of Thought and Areas of Practical Experience for In-Service Education in a Bi-Lingual Environment

Daithí Ó Murchú
Principal, Gaelscoil Ó Doghair, Newcastle West, Co. Limerick, Ireland
Research Fellow in ICT and Education, Trinity College, Dublin, Ireland
Department of Education MIC, University of Limerick, Ireland
omurchu.ias@eircom.net

Abstract: Because of their learning difficulties, dyslexic children are often looked upon as being the lowest common denominator on the academic scale, or even regarded as problem students. Using traditional methodologies and new technologies, this project allowed students with specific learning difficulties to utilise, examine, explore, plan and design new thematic programmes which permitted them to go beyond the apparent barriers of the 'chalk and talk' classroom to experience the joy of learning and explore avenues of thought. The results of their work are now benefiting all students and teachers, at all levels, as the lowest common denominator has become the highest productive factor. One such child is Tom. His case study epitomises the path this journey has taken and together with his story, the programmes which eventually resulted from all our experiences.

Introduction

In 1999, as co-ordinator of a locally-based national *Schools Integrated Project in Technology* (SIP) concerning the development of oral and aural language skills at the primary (elementary) level in Ireland, it became apparent to the author that traditional methods of utilising and reinforcing language acquisition skills were failing to meet the needs of specific groups of children, especially in a bilingual (Gaelic/English) school environment. In a variety of schools, there were obviously highly motivated and intelligent students who seemed incapable of absorbing the information being presented to them, albeit by excellent teachers employing a variety of non-technological methodologies, and teaching styles.

Investigating the source of the barriers to learning with the students themselves, their parents, and their teachers, the author discovered that a significant number of them had been previously diagnosed by developmental and educational psychologists as being numerical and/or literary dyslexics with above average IQ. It was only on discovering this, that the possibility of exploring, understanding and incorporating more effective learning strategies in language/second language acquisition presented themselves. An old Irish saying tells us that God never closes one door without opening another. In the case of these dyslexic children, all we had to do was allow them to give us the keys to enter and perceive their realm of thought and learning to begin more effective communication.

Our project, SIP 056, was entitled "The Development of Oral and Aural Language Skills at Infant and Remedial Levels in Primary Schools, in both Irish and English, through the Medium of Full Multimedia Programmes and I.C.T., within the Guidelines of the Revised Irish Primary School Curriculum". (The term "Remedial Levels" refers to Learning Support.) The project undertook the task of addressing these challenges and presented both teachers and students, with a potential blueprint for the development of language usage. It was conceived that it might also open up avenues of practical applications for in-service education. Allied with this was the co-ordinator's belief that technology-enhanced language learning could be more fully utilised to increase the possibilities of this project.

Tom's Story

Tom came to our Gaelscoil (All-Gaelic, Bi-Lingual Primary School), at the age of five years, having already attended another elementary school. In consultation with his parents, he was referred for assessment, because of concerns over reading and language difficulties. Tom's cognitive functioning was assessed using the *Wechsler Intelligence Scale for Children III UK*, which yielded the following profile:

Cognitive Ability

Verbal Intelligence Quotient	126 Centile 96
Performance Intelligence Quotient	116 Centile 86
Full Scale Intelligence Quotient	125 Centile 95

Table 1: Tom's overall Cognitive Scores for the *Wechsler Intelligence Scale for Children III*

Strengths in Tom's cognitive profile related to exceptionally high performance in Comprehension, Vocabulary and Similarities Subtests. This suggested exceptionally high ability in verbal fluency, word knowledge, word usage, social comprehension, and logical thinking and reasoning. An exceptionally high performance was also recorded for the Picture Arrangement Subtest, which suggested particular strength in visual perception and the ability to plan ahead. In contrast, difficulties were experienced in the Arithmetic and Object Assembly Subtests, which were a measure of numerical accuracy, reasoning and mental arithmetic. Low scores suggested inadequate memory and poorly consolidated reasoning skills.

Literacy Skills

Assessment using the *Wechsler Objective Reading Dimension Test*, yielded the following profile:

Test	Predicted Score	Difference	Significance	Frequency
Basic Reading	115	34	P=0.01	<1%
Spelling	113	29	P=0.01	<1%
Reading Comprehension	117	45	P=0.01	<1%

Table 2: Tom's overall Literacy Skills Scores for the *Wechsler Objective Reading Dimension Test*

The above profile suggested that Tom's degree of underachievement was statistically significant and that he had a specific and severe disability in relation to reading, spelling and reading comprehension. The subtests also indicated difficulties in identifying and distinguishing rhyming pairs in word strings and delays in processing numbers. It was further discovered that Tom's learning style preference was towards a Kinesthetic and Accommodative Learning Style (Harthill and Busch, 1998). This led us to examine and explore areas of practical experience in understanding the various learning styles in second language classrooms both as in-service and on-line processes to more fully accommodate all students in language assimilation.

In summary, Tom presented with a significant and severe learning disability (i.e. dyslexia/specific literary difficulties) in relation to basic reading, spelling, reading comprehension, number reasoning, and number operations. The nature of his difficulties related to visual memory and sound processing.
When his participation in the programme was proposed and explained to him, his immediate response was; "Don't ask me to do this, Máistir (the students' Gaelic term for Principal). I know I'm no good at remembering words and doing things like that. The others are better." Tom's words would seem to typify the dyslexic's attitude to school and learning which McDermott argues is a natural by-product of the "schooling system (which) is inherently competitive.... the inevitability of failure is built into the system...By the normal line of reasoning, the child is the unit of analysis and the (learning) disability is a mishap that scars a child's road to competence", (1993: 237).

The Study

The original idea for this project, SIP056, came as a natural development from the experiences of the principal of a Gaelscoil, an all-Gaelic primary school, in the areas of language usage and development, and information communication technology. It has long been recognised that the Irish language in particular has failed to catch the imagination of students and teachers. One could go as far as saying that most students dislike having to study Irish because the traditional methodology behind its teaching has become outdated. This also could be true of the methodology behind the development of language usage in some English, bilingual and multilingual settings (Nunan, 1988, 1989).

Within the guidelines of the Revised Irish Curriculum, particularly in the areas of the development of the Irish and English languages, it is proposed that teachers would embrace a new perspective in,

> *"Promoting positive attitudes and developing an appreciation of the value of language -- creating, fostering and maintaining the child's interest in expression and communication -- developing confidence and competence in listening, speaking, reading and writing -- enhancing emotional, imaginative and aesthetic development through oral reading and writing experiences".*
> (Curaclam na Bunscoile, NCCA, 1999. English Language. Pp. 10-12; Curaclam na Bunscoile, Gaeilge, Teanga. Pp. 14-15).

Our project interpreted these curricular guidelines in a very simple way -- making language learning fun. We believed that through the identification of key words in the Irish and English languages, integrated into a thematic visual arts programme -- drama -- we could encourage children to develop confidence and competence in language usage. Not alone that, but by encouraging them to use I.C.T. (digital cameras, scanners, video cameras and multimedia programmes), we would place at their disposal a multitude of potential learning experiences, which would systematically lead them along the path of language acquisition and familiarisation. We also believed that if we succeeded with what may be considered to be the lowest common denominator in our schools (kids like Tom), from a language development perspective, then the project would naturally extend to all other students.

There have been some memorable milestones in our project to date, one of which was the identification and compilation of the key words used in Gaelic and English in the development of language skills. We examined, from a learning support perspective, the Dolch lists of words and in consultation with Tom, our staffs and other educational bodies, we supplemented these lists to include more modern words. We then divided all of these lists and words into both class and age group categories. From a Gaelic perspective, we looked at the work carried out in the early 1960s in the identification of the key words in the spoken language and, following a similar pattern of research, we compiled a comprehensive and yet not exhaustive wordlist. The project schools and others then tested these lists, to verify their appropriateness to age and class grouping, and their feedback allowed us to consolidate the lists. These lists are available for downloading at www.gaelscoil.com/site2002

Following that, we decided to design a full and inclusive, whole school programme in drama and phonetics, using the wordlists. The programmes in Gaelic and English, encompassed the various levels already recognised, allowing us to introduce language learning, in a fun and novel way, through the medium of eight themes which Tom and the other students had identified. These themes were:

Junior Infants – (4-5 years) - Our homes and families / Ár dtithe agus ár dteaghlaigh
Senior Infants - (5-6 years) - People in our community / Daoine in ár bPobal
First Class - (6-7 years) - Nature all around us/ An Nádúr, thart timpeall orainn
Second Class - (7-8 years) - Our school / Ár scoil
Third Class - (8-9 years) - Lots to do/ Rudaí le déanamh
Fourth Class - (9-10 years) - Customs and traditions / Custaim agus Traidisiún
Fifth Class - (10-11 years) - Local history/ Stair in ár dtimpeall
Sixth Class - (11-12 years) - Local industry and commerce / Domhan áitiúil tionscail agus gnólachtaí.

Using these themes, the word lists, and the drama and phonetic schemes, we implemented the programme of language development and usage, in the hope that the children would use their experiences to transfer their thoughts and their ideas into computer-generated, multimedia programmes in the quest for creative technology-enhanced language learning.

Microsoft PowerPoint was chosen as the medium. In essence, we the teachers, in partnership with the students and parents, sent Tom and his fellow students out into the environment to research these various themes: to take digital images, to build story lines around them, to present them in the drama class and develop the whole concept, so that their experiences could be integrated with the curricular aims and objectives of the Revised Curriculum in both Gaelic and English.

In the infant classes, the teachers introduced the word lists in a phased manner using the drama programme as the medium of expression. In the learning support classes, already having experienced the words in their drama schedule, the children were introduced to the various word and phonetic lists in a more formal and focused manner. The themes mentioned above were always utilised to help the children to focus on the possibilities of word usage. This was a very challenging task as the ability and age range of the students in question varied greatly, but in small group situations, the teachers were able to elicit responses from them without the students being under too much pressure. This proved to be very effective, and the teachers noticed that the responses of the students who were attending learning support were very positive in class.

The development of the programme has not been without its problems. As the old saying goes, *"Is fada an bhóthar gan casadh* -- It is a long road, which has no turns". The fact that many of the teachers had not experienced any formal training in the use of ICT and multimedia presentations meant that a detailed, logical and sequential programme had to be designed by the author to ensure that they were equipped with the necessary skills to develop and implement the project. The provision of substitute cover by the Department of Education and Science for the teachers involved facilitated the implementation of the training programme and the project in general.

Because of the extension of the programme to a selection of pilot project schools (small rural to large urban), it was occasionally more difficult for the smaller schools to find time to implement the project. This was due to the fact that some schools were sharing learning support teachers and in some cases, the same teacher was teaching multiple class groupings. At times this was found to be an advantage, as older children were able to mentor younger children, and peer to peer teaching was seen to be very effective, as the teacher was afforded the time to be a more creative support.

In summary, all the above has entailed many, many hours of research, evaluation, implementation, assessment, re-design and re-implementation of the various strands of the project. Moreover, the challenge of identifying the learning styles of the children with learning disabilities, which ""refers to a person's general approach to learning and problem-solving" (Reid 1995), and observing their learning strategies, which are "any specific conscious action or behaviour a student takes to improve learning" (Oxford and Nam 1998), dictated the manner in which the project and teacher in-service education evolved.

What Has Been the Impact on Teaching and Learning?

This project caught the imagination of the parents involved as they willingly offered their services to help with its implementation. This ranged from studying various words and themes with the children, to providing advice on the possibilities of implementing the chosen themes of the project and understanding their children's learning styles. With this came a sense of true partnership in education.

The manner in which the aims and objectives of the Revised Curriculum, with reference to the development of language skills, has been implemented in the schools, is undoubtedly one of the major impacts of our project on teaching and learning. The use of technology and multimedia has become a natural ally in designing programmes, which are student-driven, and therefore more interesting to them. The teachers, on the other hand, having seen the benefits to the students, naturally adapted their learning and teaching styles to the advantage of the children. So both the academic requirements of the Revised Curriculum and the fun aspects of language learning have been successfully fused together.

Tom and many of the other children attending learning support, have developed their own personal programmes using the words which they themselves felt most comfortable with and we believe that this is one of the major, unforeseen successes of the project. The infants, on the other hand, may have needed a lot more mentoring, but they totally enjoyed looking at their work and hearing their voices on the computers. Parents were able to use some of these programmes on their home computers, and therefore to enhance learning by complementing the schools' programmes. The teachers were presented with well-constructed exemplars, which allowed for as much creativity as they wished to input, in the development of both the Gaelic and English language programmes.

An unexpected impact of the project, was the demand from a variety of schools for access to the phonetic and word lists, the drama programmes, and the multimedia presentations. The possibilities for using the project in the teaching of minority languages and other major European languages in a bilingual setting, was also recognised, as it was felt that the project addressed language teaching methodology in a novel manner. Some students attending teacher training college at third level requested permission to try out some of the Gaelic programmes and they found these extremely effective in classrooms, encouraging schools around Ireland to request permission to download the information.

Conclusion

Language and its usage is one of the most important means of communication in the world. Our project continues to show us that this is a very complex and challenging area of the Revised Curriculum especially in a bilingual environment. In essence, the major contribution of our project to understanding children with learning difficulties, the process of education and new technologies is that they should not be mutually exclusive. Not alone that, but young dyslexic children such as Tom, are like natural sponges, absorbing at deeper levels through body and mind, and well able to handle the challenges of the technological world and an extra language, through the medium of a more traditional curricular area -- drama. Teachers also, when presented with a curricular framework for the development of language skills, were able to integrate their own knowledge with ICT, to creatively produce exemplars for the development of confidence in language usage, which could be emulated by any school. These facts lead the author to believe that the project will continue to develop after SIP and more importantly, be emulated and replicated in other local, national, and international settings to open up new avenues of thought and possibilities for in-service education.

Tom, as a literary six-year old 125 IQ dyslexic, with all of his academic problems, has shown that IT, when creatively integrated with, and connected to, his preferential learning style, can open those other 'windows of wonder' to boost self-confidence and enhance the learning experiences of students and teachers both inside and outside the classroom. The most significant remaining challenge for us, the teachers, is to continue our work and be satisfied that we shall probably never reach a stage when we can say that we have actually realised all the ramifications of our own learning curve when dealing with children like Tom, in a bilingual environment. They say that from small acorns grow great oak trees. We look upon our project from the point of view of the well-planted acorn and hope that the participation of other schools and organisations will continue to nurture it.

There is no doubt in our minds that this project has incredible possibilities and far-reaching implications for teachers, learning support in schools, in-service education in a bilingual environment and the development of language skills internationally. It is hoped that schools will download the information and associated links to the 'Avenues of Thought and Areas of Practical Experience for In-Service Education', at www.gaelscoil.com/site2002 and eventually design their own programmes and multimedia presentations. All that remains is a recent comment from Tom as he sat confidently at his computer; "You know Máistir, even my Dad thinks this is great fun, isn't it?"

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Enhancing Parent Teacher Partnerships Through Technology

Jane B. Pemberton
Dept. of Technology and Cognition, University of North Texas, pembrtn@tac.coe.unt.edu

Joyce Rademacher
Dept. of Technology and Cognition, University of North Texas, rademach@tac.coe.unt.edu

Tandra Tyler-Wood
Dept. of Technology and Cognition, University of North Texas, wood@tac.coe.unt.uedu

Maria Victoria Perez Cereijo
Dept. of Technology and Cognition, University of North Texas, cereijo@tac.coe.unt.edu

Abstract: This paper provides real-life examples of ways technology are used to enhance parent-teacher partnerships in special education. A framework for identifying the needs and strengths of families as they interact with school professionals regarding the academic and social progress of their children in the school setting is presented. The use of various technologies in the schools and how they fit into the framework is then described. The availability of technology to both families and schools is a key issue when making decisions about what technologies can best support collaboration between home and school.

Introduction

The availability of technology provides an opportunity to communicate with parents in different formats. It is important to individualize the technology choices for methods of communication and collaboration as partnerships are developed between home and school. Understanding the needs and strengths of parents makes it possible for teachers to individualize involvement with families, just as they individualize programs for students.

The Mirror Model for Parental Involvement (Kroth, 1985; Kroth & Edge, 1997) is built on the premise that parents are a heterogeneous group. Educators could use the Mirror Model as a framework for identifying parents' information needs and special strengths as they interact with school professionals regarding their children's academic, social, and emotional progress. The Mirror Model is depicted in Figure 1. In addition, technology options and uses range from low to high tech, and need to be carefully selected to match parents' and teachers' needs and skills.

The Study

Information on technology use in the schools was collected from graduate students enrolled at the University of North Texas. Participants were special education and general education teachers in both public and private school settings. We then sorted the information into the Mirror Model framework.

Examples of email communication were collected to describe how technology can be used to enhance parent/teacher partnerships. We selected email samples collected from teachers to illustrate how electronic communication fits into the framework provided by the Mirror Model. Specifically, we use the framework to categorize email messages that reveal parents' needs and strengths. We selected email because of growing accessibility of computers in homes, businesses, libraries, and schools. Teachers and parents can collaborate on a topic without coordinating when and where the communication takes place, as in communicating from different locations and at different times.

School and classroom web pages were examined based on the Mirror Model framework to determine if information needed by parents, was available. Phone and television systems used by the schools to communicate information to parents were also identified. We also examined teachers' and parents' use of portable microcassette recording machines and videotapes as other means of communication.

Findings

E-mail communication illustrates how the Mirror Model framework can be applied to authentic examples of parent teacher communication using technology. The various levels of the Mirror Model can be identified through actual samples. For Levels 1 through 4 there are parents' needs and strengths. For example, in Level 1 all parents need information regarding parents' and students' rights, school policies, and school events. A sample E-mail from John's mother to the special education teacher: *Will you tell me when Spring Break is? I also need to know about the next time for the parent training program on "Helping Your Child with Homework".* Level 2 of the Mirror Model relates that most parents need knowledge about their child's progress, school environment, and their child's friends are. A sample E-mail from Sue's father to Sue's special education teacher illustrates Level 2: *When I opened my E-mail today, I had a note from Sue's general education teacher. She said Sue is not turning in assignments. Will you check with the teacher? Could we get an assignment notebook going again? Thanks.* There are also E-mail samples of parents' strengths. For example, in Level 1, Steve's mother provides needed information to Steve's teacher. *Steve has new glasses, but does not like to wear them. Could you encourage him to wear them? I think once he gets used to them, they will be easier for him to wear.* Level 2 includes a parents' special information about their child. *Joe's been upset at home since his grandfather died last week. Our house has been filled with company and it is hard to focus or get any homework completed. Do you have any suggestions for us during this difficult time for Joe?*

Other technology uses were also examined and sorted according to the Mirror Model framework. Most uses were identified in Levels 1 and 2 on the Mirror Model framework. Parents need to know basic school information, school policies and procedures, calendar events, as well as how their own child is progressing in school, academically, socially, and emotionally.

Conclusions

E-mail messages collected and sorted in the Mirror Model framework shows that E-mail is a powerful tool for use in enhancing parent teacher partnerships. Parents have a direct line with the teacher, and the teacher and parent can communicate on an "as needed" basis. The availability of E-mail to parents and teachers is key when making decisions about its use.

Some web pages include daily and weekly reporting systems provided in a secure format for reporting student attendance, student progress and achievement. Parent support groups were also established through chat rooms on the Internet.

A list of web sites used in the schools that focus on particular issues can be provided to parents with specialized needs. The National Rehabilitation Information Center (NARIC, web site: http://www.naric.com) conducts computer searches for families who request information on disability organizations, funding opportunities, and products and devices. Parents who have expertise and strengths in particular areas can serve as resource people who can provide web addresses or search topics for particular issues. A parent could be referred to http://www.ldonline.org for additional information on the topic of learning disabilities. In addition, parents serving on school committees can use the Internet to broaden the learning experiences for the school community. Discussion groups such as SpedTalk@virginia.edu deal with a large number and variety of topics in special education, including special education law. They distribute information with funding they receive through the U.S. Department of Education (Turnbull & Turnbull, 2001). The NICHCY (web site: http://www.nichcy.org) disseminates free information about children and youth with disabilities and disability-related issues to families, educators, and other professionals. The Beach Center on Families and Disabilities (web site: http://www.lsi.ukans.edu/beach/beachhp.htm) conducts research and training to enhance professional practice, public policy, and families' quality of life.

Technology that is "low tech" should also be considered for some families and educators. Portable microcassette recording machines are easy to use and can relay messages, such as tips for homework completion or test taking, in a convenient way. Students and parents can listen together to the teacher's voice and record their responses. Students can record messages to homebound students, with the message content ranging from a simple greeting to an explanation of a homework assignment using a student's voice. A videotape is another means of communication. Many parents, including some cultural groups, benefit from the visual format for communicating and learning new information.

An option for enhancing parent/teacher partnerships is two-way audio/video desktop conferencing. These types of systems can be used for meeting at a distance for a variety of purposes in a convenient way. Accessing professionals, demonstrating teaching techniques, and conferencing can all be accomplished at a distance.

Understanding the needs and strengths of parents makes it possible for teachers to individualize involvement with families. The Mirror Model is one framework that can be used during the decision process. As technology options increase, it is important to individualize the methods of communication used. Effective parental involvement leads to improved teaching and learning in our schools. Technology offers opportunities for collaboration to facilitate the goals and desired outcomes of those involved.

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		WHAT	HOW
NEEDS			
Few	Level - 4	Therapy - intensive education and support	Provide or refer to counseling group therapy
Some	Level - 3	Skill training in management, interaction with system, child rearing	Conduct parent education groups; bibliotherapy, parent support groups
Most	Level - 2	Knowledge of child's progress, environment, friends; assistance in parent-home programs	Utilize notes home, daily/weekly reporting systems, conferences, phone calls, home visits
All	Level - 1	Parents' and children's rights, consent to test and place; school policies and procedures; school and class events	Develop newsletters, handbooks; hold conferences
All	Level - 1	Special knowledge of child's strengths and needs, family characteristics, and aspirations	Conduct intake interviews, hold conferences, utilize questionnaires
Most	Level - 2	Short-term assistance with projects at school, projects at home; special knowledge of world of work	Telephone for PTA's or parent meetings; talk to classes at school; assist with meeting arrangements; reinforce at-home or schoolwork; talk to classes at school
Some	Level - 3	Leadership skills, with time, energy, and special knowledge	Serve on parent advisory groups, task force, as classroom volunteers, tutors; write newsletters, engage in fundraising
STRENGTHS			
Few	Level – 4	Special skills, with time, energy and commitment for leadership training	Lead parent groups; work on curriculum committees; develop parent-to-parent programs

Figure 1: Mirror Model for Parent Involvement

From "The Mirror Model," by R.L. Kroth, 1985. *Communicating with Parents of Exceptional Children* (2nd ed.)., p. 10. Reprinted with permission of the author.

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Using Microsoft Word's Tracking Changes to Improve the Writing of Students with Special Needs

Description of the Project and Literature Review

Beginning in Spring 2000, Linda Miller-Dunleavy and Lynn Schultz, of Old Dominion University, (ODU), began work to develop teaching strategies using technology to improve the writing of special needs students. Their extensive and numerous teaching experiences, and their work in technology, suggested that by using a unique editing feature built into Microsoft Word, Tracking Changes, teachers could use existing software and new teaching strategies to enhance writing instruction. Tracking Changes is a rarely used tool imbedded in Word that allows editing marks to be entered on any Word document. While this is a business feature, the authors have developed several strategies for using Tracking Changes specific to the education setting.

The opportunity to learn has long been considered one of the major factors influencing achievement (Carroll, 1963). Minimal requirements for improving writing achievement should be to provide effective writing instruction to **ALL** students. Additionally, students will not become better writers if they do not spend a substantial part of most school days engaged in productive writing activities. Graves (1985) stated that students should write for at least 30 minutes a day, at least four days a week, as opposed to a national average of writing one day in eight. Since written expression is the most complex language arts skill, it is generally not stressed daily in instructional programs for students with special needs.

Recent research has suggested that students with special needs in middle and high school benefit when strategy instruction is integrated with word processing to teach written expression (Graham, 1991). Furthermore, strategy instruction in writing has been used to help students learn to better internalize and regulate the cognitive activities involved in effective planning, production, and revision of text (Graham et al., 1991) & (Deshler, & Schumaker,1988).

Project Implementation:

The Chesapeake Public School (CPS) system in Chesapeake, Virginia was selected to pilot and field-test the project during the 2000-2001 academic year. The teacher-participants included 11 special education teachers from this system. Ten of the participants are located in middle schools, which serve grades 6 – 8, and the eleventh participant teaches high school. Eight of the middle school teachers have classes for students with learning disabilities that are taught either in self-contained or resource classrooms. The remaining two middle school teachers teach either students with emotional disorders or a mixed classroom of students with emotional disorders and those with learning disabilities. The high school teacher teaches resource students with learning disabilities.

Beginning in the Spring 2000 and continuing through the academic year 2000-2001, several planning sessions and workshops were held to develop a plan of action. The team of ODU personnel and CPS teachers developed ways to use Tracking Changes in the classroom, and shared writing strategies that assisted their special needs population through the difficult writing process.

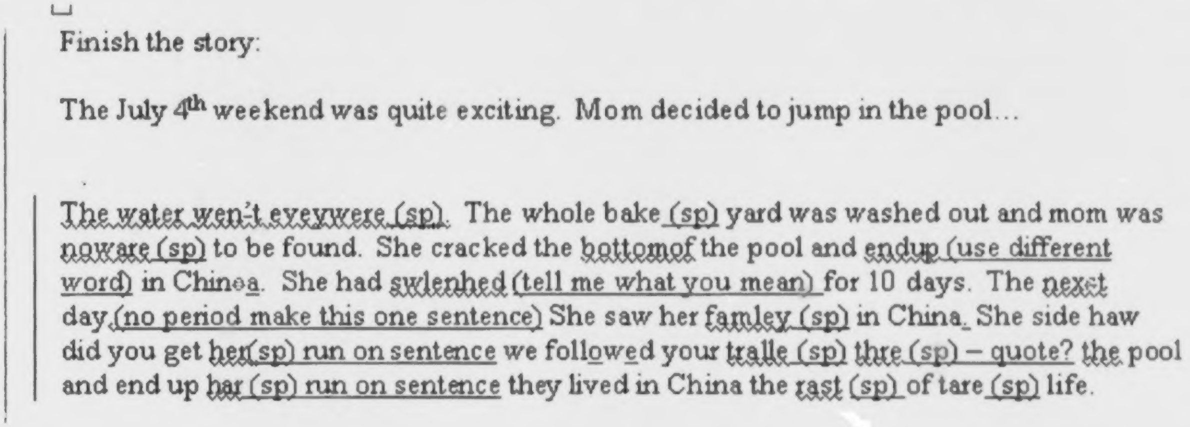
The importance of selecting specific strategies based upon "best practices" was highlighted during the first summer workshop. A specific learning strategy, **POWER (Plan, Organize, Write, Edit, Revise)**, was selected. Teachers selected different approaches for the **P**lan and **O**rganize stage of POWER based upon their classroom needs (e.g. webbing, four-square). Directions for using Tracking Changes during writing instruction were created and field-tested. All teachers used Tracking Changes for the **W**rite, **E**dit and **R**evise stages. A rubric was created and revised to evaluate different aspects of the writing process. A sample of the rubric and directions for Tracking Changes can be found on the project website: http://www.odu.edu/webroot/orgs/Educ/Misc/VETA.nsf/pages/tracking.

During the academic year 2000-2001, three dinner meetings were held with participating teachers for reflection, encouragement, and problem-solving, and each teacher was observed in their school setting at least once during the year. The project leaders found this to be an invaluable part of the experience; for without periodic support and reflection, this would become just another summer workshop.

The project continues in the 2001-2002 academic year, with seven of the original teachers returning. In addition, one regular education English middle school teacher, an additional middle school LD resources teacher, and two high school LD resources teachers have been added. Teachers will continue to collect pre - and post- writing samples, which will be graded using the rubric from the previous year. Dinner meetings and school observations will also continue.

Poster Session Activity:
The poster session will take participants through a **POWER** strategy session. This strategy, a process approach to writing, begins with the **Planning** and **Organizing** stages of **POWER.** Examples of the various individualized writing approaches and activities used by the teachers will be displayed.

Next, participants will examine sample documents using Tracking Changes to edit and revise writing, thus allowing them to observe both the role of teacher and student (**Writing, Editing, Revising**). Adapting the business function of Tracking Changes, which encourages all corrections to be entered, presents a challenge to teachers using this tool. A method was devised, tailored by each teacher, to use Tracking Changes to SUGGEST changes to students, thereby not making all corrections for the student.



Finish the story:

The July 4th weekend was quite exciting. Mom decided to jump in the pool…

The water wen-'t eveywere (sp). The whole bake (sp) yard was washed out and mom was noware (sp) to be found. She cracked the bottomof the pool and endup (use different word) in Chin~~o~~a. She had swlenhed (tell me what you mean) for 10 days. The nexet day (no period make this one sentence) She saw her famley (sp) in China. She side haw did you get her(sp) run on sentence we followed your tralle (sp) thre (sp) – quote? the pool and end up har (sp) run on sentence they lived in China the rast (sp) of tare (sp) life.

Preliminary findings:
The authors hoped to improve both quality and quantity of the writing processes and produce significant gains in outcome-based results for these students. Improvement was measured by scores on the writing rubric, with the ultimate achievement to result in an increase in mastery of Virginia's Writing Standards of Learning (SOL). Recently compiled data show a significant gain in 7 out of the 11 areas of the writing rubric. These seven areas represent the mechanics of writing. It was felt that the use of the computer and editing features increased student scores. Of the 4 areas not showing improvement, it is the opinion of the authors that writing strategies for Plan and Organize could be improved and emphasized.

Conclusion
Teachers need to introduce students to the entire process of writing from the initial idea generation to editing of the final draft (Issacson, 1995). The inclusion of Microsoft Word's Tracking Changes in the POWER strategy resulted in significant gains in writing skills of special needs students.

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Reading + Technology = Literacy

Sean Smith, University of Kansas, US
Steven Smith, University of Kansas, US
Mary Ann Petrich, Kansas City, Kansas Public Schools, US

This presentation will focus on the sustained integration of a hypermedia-based software application called READ 180. Integrated across Kansas City, KS Middle Schools, Read 180 has had a significant impact of student reading, both general and special education students, over the past two years. Data will be shared with participants concerning its effectiveness and its overall impact on the reading process.

READ 180 infuses the anchored instruction model researched by Hasselbirng and his colleagues at the University of Vanderbilt (Bransford, Sherwood, Hasselbring, Kinzer, & Williams, 1990; Hasselbring, Bottge, & Goin , 1992). Hasselbring and colleagues (1997) have examined the implication of READ 180 and its application to literacy development and the needs of the at-risk learner. In cooperation with the Orange County Public Schools, research has illustrated dramatic student improvement in the area of reading when instruction is anchored through multimedia applications. This presentation will also share findings from a study currently underway in the Kansas City, Kansas school district across seven middle schools.

READ 180 applies the components of anchored instruction benefiting from the interactivity of hypermedia. Hypermedia-based children's literature has several potential advantages for students with learning disabilities who are struggling to acquire basic reading skills. First is the motivational appeal of this body of software. For example, READ 180 with its dazzling graphics, realistic sound, and plentiful opportunities for interactions between the learner and the task, this type of software has the capability to capture and hold students' attention. As Erickson and Staples (1995) reported, even students with autism respond to the attractiveness of these programs with increased attention to the reading task. This level of motivational value may increase the probability that reluctant readers will persevere in their interactions with text. This would be a particularly valuable outcome because repeated readings of the same text have been found to be of value for students with learning disabilities (Sindelar, 1987).

Also, hypermedia-based children's literature offers students text that is speech-enhanced. Speech makes the text more accessible to readers or, in the words of Boone, Higgins, Falba, and Langley (1993), more cooperative. In addition, this software is a computer translation of children's literature. When transformed into computer-mediated "books," the quality of the texts and illustrations are preserved. Texts are typically heavily illustrated; also, they are often predictable and include narrative features such as repeated lines and rhymes. These features, like software speech enhancements, increase the cooperativeness of the text. Comprehension is aided because of the graphical cues and the predictability of the text. Also, if a computer-mediated book is used as a springboard for instruction in skills such as decoding, that instruction is easily "anchored," as Hasselbring and his colleagues (e.g., Bottge & Hasselbring, 1993) explain, to the student's experiences with that piece of children's literature.

This presentation will feature an extensive demonstration of the READ 180 software and how it has enhanced students with learning disabilities reading over the past two years. Data will be shared with participants concerning its effectiveness and its overall impact on the reading process.

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Providing an Online Instructional Medium for the Deaf

John Thompson, Ph.D.
Buffalo State College
Buffalo, New York
United States
thompsjt@bscmail.buffalostate.edu

Abstract: Deaf and hard of hearing students can benefit from participation in text-based online learning. Such online learning avoids the use of audio information, or provides captioning or supplies a written transcription for the course activities. Deaf students can then participate on an equal footing with their hearing counterparts. The special assistance that would normally be required in a traditional classroom setting for the deaf student is not needed. With reliance on web-based learning, those students with hearing loss are provided with a level playing so they can participate unimpeded with their hearing colleagues and have full access to their academic program. By providing an equal educational opportunity to deaf students, online learning becomes not only anywhere, anytime learning, but also learning for anybody.

Introduction

Online learning, or distance learning using the Internet, provides a medium that allows deaf and hard of hearing students in K-12 and higher education an equal footing in their classes without the inconvenience of an interpreter in the middle of the communication. Using the text-based medium of such online instructional platforms as Blackboard, deaf and hard of hearing students can participate without assistance.

The use of Internet-based online learning (OLL) presents faculty and students with multiple opportunities not found in traditional face-to-face (F2F) courses. Using web-based instructional platforms, classes can be run without incorporating verbal communication. Instructors can post course information such as announcements, assignments, documents (e.g., PowerPoint presentations), and grades for viewing anytime from anywhere by their students. A threaded discussion board can facilitate "asynchronous communications (non real-time) where students and the instructor post questions, answers and comments" (Lorenzo, 2000, ¶ 10). Synchronous (live, real-time) text discussions using a form of virtual, text-based chat also can play a role in the class (e.g., virtual office hours, group meetings). For course readings, students can be referred to selected Internet sites or use other Internet-based alternatives such as XanEdu's electronic CoursePacks (http://www.xanedu.com/). Students can submit their work via electronic communication, using e-mail and digital drop boxes.

With the addition of online learning, K-12 and higher education classrooms can morph into interactive "24-7" experiences in which deaf and hard of hearing learners do not need communication help from others. Students communicate with one another and with the instructor through their keyboards, mice, and the Internet, not needing to hear the other course participants.

Why Online Learning?

Online learning offers many conveniences and upgrades for students and teachers over the traditional face-to-face (F2F) class. These advantages include:

- *Anywhere, anytime learning.* No longer is the educational process confined within the four walls of the conventional classroom at a prescribed date and time. OLL permits, even encourages, a form of 24-7 education that provides maximum flexibility. Instructors can teach their OLL classes right from their own offices or even homes. Students can avoid the hassles of driving to the campus and trying to find a place to park by accessing OLL courses from office or home. While it may be frowned upon and discouraged by some employers, students do use workplace computers to connect to their OLL courses, mainly because of the faster Internet connections found in many school and office settings. Even web-enhanced traditional courses, which use OLL to extend the teaching-learning relationship beyond the F2F setting, benefit from 24-7 access to course information and online discussion groups.
- *Increased communication.* OLL provides additional opportunities for student-student and student-instructor interactions. Participants in OLL have opportunities to post and reply to communication threads about course-related topics. Questions get raised and answers debated that might well not have been in the F2F classroom. Shy students, or ones with disabilities such as hearing loss, do not have to worry about speaking up, being called on by the teacher, or having their answers understood. If a question is posed in a discussion board, the student has time to craft a response either directly within the discussion board or first in a word processing program and then copy it later into the discussion board. Web-enhanced OLL allows the teacher to post additional information and create study groups that extend learning beyond the confines of the F2F class. In web-enhanced classes, OLL can necessitate additional time and effort on everyone's part, but the learning is

enhanced with the resulting richer exchanges (perhaps more so than many F2F classes) among students and between students and instructor.

- *Heightened awareness of others.* The quick pace and instructional methodology of many F2F classes does not permit students and teachers sufficient time to get to know one another. With the back and forth replies in an online discussion board format over the duration of a course, however, each participant gets additional insights into one another. Information is gained from the written exchanges and additional contacts (teacher-student, peer-peer) among course participants, adding to the quality of the learning. Graduate students can find out about one another, creating more of a bond than exists in a typical graduate classroom where the students rush in from work and flee to their homes directly after class.
- *Time considerations.* Time is one commodity that students and teachers cherish. OLL prevents the telephone tag time-waster with reliance on e-mail and discussion forums. Students appreciate the more immediate access their teacher (if the teacher checks his/her e-mail with regularity). No queuing in the hallway waiting to see the instructor during office hours as OLL provides opportunities for virtual office hours. Instructors and students are at their keyboards miles apart, yet communicating individually or as part of a live, real-time group discussion. However, these communications come at the price of increased time and effort in web-enhanced courses, especially for the instructor who has to reply to individuals and the class over the Internet, as these communications are in addition to the regular F2F class meeting times. Web-based courses can save time or at least not waste time. Web-enhanced courses, while more enriching and beneficial, can add to the time commitment of faculty. But, based on the student response, the extra time can be worth the effort.

Personal Online Learning Experiences

This writer's own experience with OLL started with participating in a six-week training program operated by OnlineLearning.net. This organization manages OLL courses for UCLA Extension online and the University of San Diego (USD) continuing education online. After successfully completing the training program, an opportunity was offered to teach a six-week web-based OLL graduate course, Mainstreaming: Teaching Individuals With Special Needs in the Regular Classroom, for USD. Subsequently, additional mainstreaming teaching opportunities were offered this writer by USD. While the initial course had only 10 students, the other courses have had enrollments in the high 20s.

The mainstreaming courses are primarily for California teachers needing to "clear" their teaching credential by taking the course, which fulfills a state requirement for their teaching certification. Each student has been pursuing a master's degree in teaching. The students represent a wide range of teaching experience, including those teaching full-time for the first time, and an extensive breadth in grades and subjects (e.g., elementary, secondary, Spanish, GATE, band) found in public education. Since the instructor is located in New York State, teaching a California-based OLL course with a three-hour time difference can be a challenge. The asynchronous nature of OLL, apart from the real-time virtual office hours, allows the arrangement to be successful.

OnlineLearning.net uses Blackboard, which its promotion states is an "e-Education enterprise software platform that encompasses course management, academic portal, online campus communities, and advanced architecture allowing easy integration with multiple administrative systems" (Blackboard Inc, 2001). It provides a "skin" or shell that hides the programming underneath so that instructors do not have to do any programming, as they would if they were programming their own Internet sites for instruction.

> Blackboard's core features include content management that supports most common file formats in an easy click-and-point process, communication and collaboration tools to support individual and group communications as well as group project work, online assessment and testing tools, and administrative tools with which an instructor can easily build and manage a virtual classroom. (Rochester Institute of Technology, 2001, ¶ 5)

The instructor merely types, copies-and-pastes, or uploads text into the appropriate sections of the course's Blackboard site. Instructors and students communicate by exchanging replies in discussion board forums or by e-mail. The latter can be directed to specific individuals, mailed to sub-groups, or sent to the entire class from within Blackboard. The instructor has control of settings for the Internet site appearance and contents. Tests can be taken online. The experience for the students has been positive, as judged by their informal comments during the courses and by their formal end-of-course evaluations.

Besides working with the University of San Diego, this writer has taught online classes for Buffalo State College using the Blackboard infrastructure. The first course was a graduate course in educational computing and used Blackboard.com, which is a free service available on the Internet for anyone's use. This was a web-enhanced course as the students and instructor still met in a traditional F2F setting once a week for a semester. The OLL component of the course presented the students and instructor with opportunities as previously outlined. This OLL course was the first one for each graduate student. Again, as with the USD mainstreaming courses, after their initial skepticism, the students were enthusiastic about incorporating OLL into their course, perhaps because the course topic involved educational technology.

After this initial OLL course at Buffalo State, this instructor has taught five other web-enhanced OLL courses, including two for undergraduates, using Blackboard on the college's computer server. As one may or not expect, the quality and quantity of the discussion board forum conversations were higher in the graduate courses, although the undergraduates' discussions were engaging and with merit. The undergraduates enjoyed OLL, but their replies tended to be "short and sweet," while graduate students composed longer replies with more thought and substance. The only consistent negative comments were directed at the slowness of the Blackboard connection that was due to insufficient bandwidth and other technical issues at the college. Such problems are being addressed. Also, this writer is scheduled to offer a web-based OLL graduate course for Buffalo State College in fall 2001. This OLL course will be the first one at Buffalo State to rely on the State University Learning Network (SLN) for the delivery infrastructure.

Online Learning and Deaf or Hard-of-Hearing Students

Online Learning can be termed "deaf-friendly," if an OLL course steers clear of the use of audio information, provides captioning, or supplies a written transcription for that information. A deaf student is able to participate in a text-based online discussion without an interpreter clogging up the middle of the communication. By avoiding non-text information or providing text equivalent information, deaf and hard of hearing persons can be assessed on *what* they say rather than on *how* they say it. Using the Internet, people with hearing loss then have a level playing field with their hearing colleagues and full access to the academic program. Keyboard and mouse input constitutes the mechanism to facilitate communication among students and between students and the instructor. The instructor can post PowerPoint presentations, with slide notes or sans sound effects, onto a website or into a course infrastructure provider for easy anytime, anyplace access.

With text-based OLL, instructors do not have to adapt their instruction for deaf and hard of hearing students. The deaf student does not need special assistance "to become part of a mainstream educational setting" (Kinner and Coombs, 1995, ¶ 4). Time and expense do not need to focus on accommodations since deaf and hard of hearing students are on an equal footing in a non-verbal class. As long as the participants can read and type, no one knows if anyone in the course is deaf or hard of hearing. "Once appropriate access has been provided to the computer…students function as equals in the computer classroom, and their disability vanishes" (Kinner and Coombs, ¶ 5). No wonder that deaf and hard of hearing students feel more involved in OLL classes than in traditional F2F classes.

As such, online learning can provide fully inclusive classroom settings within the spirit of the least restrictive environment language found in the Individuals with Disabilities Education Act (IDEA). However, as the bandwidth of computer connections continues to increase, OLL will inevitably include fuller media communications featuring voice and video with sound in real-time, such as a streaming video and perhaps a "map with audio descriptions of historic locations which are activated by mouse rollover" (National Center for Accessible Media, Rich Media Accessibility, Frequently Asked Questions, 2001, ¶ 1). As this change occurs, OLL's "silent web era" will parallel the change from silent movies to talkies that occurred in the early twentieth century. Now in a new century, deaf and hard of hearing students will brace themselves for another "advance" in presentation technologies. The hope is that this time technology also will aid these students with web-captioning, embedded media, and other solutions, rather than shut them out.

Buttressing this hope will be Section 508 of Rehabilitation Act that specifies that "Federal agencies' electronic and information technology is accessible to people with disabilities" (Federal IT Accessibility Initiative, ¶ 5). Additionally, other government entities may follow New York State in adopting the "W3C Web Content Accessibility Guidelines as a means to provide optimal access to State agency web sites and the content therein" (Natoli, 1999, ¶ 4). As stated in those guidelines, websites should "provide content that, when presented to the user, conveys essentially the same function or purpose as auditory…content" (Web Content Accessibility Guidelines 1.0, 1999, chap. 6, ¶ 1).

For the time being, though, deaf and hard of hearing students will benefit from the text-based aspects of OLL, at least as represented by instructional delivery platforms like Blackboard. Online learning will not only be anywhere, anytime learning but also anybody. As one OLL deaf student put it,

> As a deaf adult, distance learning courses have opened additional opportunities and avenues that have long been available to my hearing peers….Besides allowing me to focus on learning as opposed to, say, wondering how much of the essence of a teacher's message the interpreter or note-taker has captured, distance learning provides a forum where deaf adults like me can share technical and non-technical expertise unhindered by language, negative attitudes, gography or distance. All told, distance learning gives me a fighting chance to stay current, competent and competitive in a fast-changing technological environment. (Lorenzo, 2000a, ¶ 16)

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CHALLENGING DECISIONS:
SOFTWARE SELECTION and the IEP PROCESS

Roberta K. Weber, Ed.D., Department of Educational Technology & Research,
Florida Atlantic University, USA, rweber@fau.edu

Jim Forgan, Ph.D., Department of Exceptional Student Education,
Florida Atlantic University, jforgan@fau.edu

Abstract: This paper provides a rationale for using an Individualized Special Needs Software Evaluation (ISNSE) instrument, designed with teacher identified criteria for specifically recognizing each student's individual need, when evaluating software to be included in the Individual Education Plan (IEP). The Individuals with Disabilities Education Act (P.L. 101-467) mandates that all students with disabilities, regardless of the severity of the disability, be considered for any assistive technology needs. Specifically, the law requires that each child's IEP team must, "consider the child's need for assistive technology devices [§300.346(a)(2)(v)], and reflect in the child's IEP both the nature and extent of the assistive devices and services to be provided to the child [§300.346(c)]." Software is considered a type of assistive technology. Thus, IEP teams should carefully determine if a child could benefit from using a specific software program and then document the number of uses on the child's IEP.

Introduction

Selecting software for any classroom use is challenging. But, for teachers of children with high incidence disabilities (learning disabilities, behavioral disorders, and mild mental handicaps), the task may be even more daunting when the Individual Evaluation Plan (IEP) goals are taken into consideration fully. The tremendous growth in the number of commercial software programs is staggering, which makes the selection process for a special education teacher even more time consuming and crucial. In order to attain the goals set forth in the IEP and provide positive student outcomes with technological integration, which is now expected and written in the national and state standards, teachers would need to be trained and competent in the software selection process. Purchasing software for the special needs classroom should no longer be left to a generalist or the media/technology specialist. Responsibility for the selection must now fall to the special education teachers who know the specific needs of each learner as well as how appropriate a program is, for meeting IEP goals. A review of numerous studies have been conducted to assess the software evaluation process with evidence showing that special education teachers often rely upon external evaluations as the most commonly used evaluation process. Results of the authors' study suggest an internal evaluation process is necessary and ought to be considered in the writing of IEPs (Forgan & Weber, 2001).

External Software Evaluation

An external evaluation of software is defined as one in which someone reviews the software program other than the student's teacher. External evaluations rely upon another persons' opinions. In most cases, the external evaluator of educational software does not have a special education background and certainly does not know the students' individual disabilities. Although external evaluations often provide the teacher with an overview of the software program, this type of evaluation does not encourage the teacher to evaluate the software with a specific child in mind.

Internal Software Evaluation

An ISNSE is a type of internal software evaluation (one in which the teacher completes the evaluation). This type of software evaluation begins when the teacher creates a mental representation of the student(s) likely to use the program, by focusing on the individual's characteristics and needs, before familiarizing themselves with the program features. After exploring the program thoroughly, the teacher completes an ISNSE instrument rating form with the particular students' needs in mind. This type of an ISNSE instrument evaluation procedure provides the teacher with powerful knowledge of the program and its relationship to the students' educational goals. A program that is suitable for one child with a high incidence disability may not meet the unique needs of all children with these disabilities. Thus, upon evaluating a program using an ISNSE instrument, teachers may confidently integrate the program into the curriculum to help each student master his or her IEP goals and objectives.

Including the ISNSE on the IEP

Sharing this information at the IEP meeting with the multidisciplinary team will help the members address the assistive technology component, as required by the Individuals with Disabilities Education Act (Public Law 105-17). Additionally, as the teacher completes this very comprehensive process using an ISNSE instrument, knowledge will be gained to provide a launching point for IEP team members and others to initiate dialogue about the appropriateness of the software for instructional enhancement. This process would be used to supplement the integration of technology for special education applications and could provide an additional measurable component for the IEP based upon the attainment of goals and objectives expected from the use of instructional software.

Existing Software Evaluation Models

A number of general software evaluation models exist which contain characteristics to assist teachers in evaluating educational software, but these models do not contain criteria special education teachers report as critical to consider (e.g., Bos & Vaughn, 1998; Lindsey, 2000). Taking into account the perspective of special education teachers is valuable since they interact with students and the software on a daily basis. The special education teacher also has the most comprehensive knowledge of students' educational performance and needs. The following introduction of the ISNSE model of software evaluation is based on characteristics reported in a study of 144 special education teachers as the most important criteria to consider when selecting software (Weber, Forgan, & Schoon, 2001).

Special Education Teachers' Software Evaluation Characteristics

Special education teachers of students with high incidence disabilities at the elementary level identified characteristics they viewed as important to consider when evaluating computer software. Qualitative data analysis revealed 10 major themes identified by the teachers. . Six themes were comparable to indicators described previously in the literature and four themes showed a discriminating influence addressing the special needs perspective and distinguishable from current evaluation criteria. These four themes were classified as: (a) individual instructional integration; (b) narration; (c) curriculum encompassing; and (d) teacher functionality. The special education teacher identified themes similar in other evaluation instruments to aid in software evaluation were addressed as: (a) welcoming; (b) sensory stimulating; (c) learner program design; (d) learner empowerment; (e) technology adaptation; and (f) diversity. A copy of the authors' Special Needs software Evaluation Scale (SNSES) is available by contacting rweber@fau.ed

Supplemental Software Evaluation Forms

The authors recommend using supplemental software forms to help in the identification of the learners' overall academic and social characteristics and to designate the frequency and duration of use. These forms were developed by the authors and could be modified to meet specific needs of the evaluator or the district. It is suggested that a supplemental software evaluation forms be completed to document the appropriateness of the selection for each learner.

Figure1: Student Characteristics

Directions: In order to use this form, first think about your child's unique characteristics. Read the list of characteristics and determine which descriptors relate to your child and place a check mark in each pertinent box or write in your own characteristics. Focusing on the child's characteristics helps with evaluating the software program and provides evidence that the software program can help meet their needs.

Figure 2: Recommendations Form

Recommending the Evaluated Program

A note of caution: some school districts are hesitant to write a specific software title on the child's IEP in concern that if the child changes schools, the new school might not have that specific software program. The school district may prefer to write a general statement about the type of software program recommended such as, "software to improve letter and sound identification." We strongly argue against this and suggest that teachers and parents require the specific software title written on the child's IEP. Overall, by using the individualized special needs software evaluation instrument in conjunction with the supplemental software evaluation form, school personnel and parents can discuss the assistive technology requirement for their child's IEP and make well-informed recommendations that assure the software programs the child uses are instructional, educational, and enjoyable.

Conclusion

Fortunately, federal law gives each school district flexibility in creating and utilzing forms to document the assistive technology component of the IEP. The model presented here for software evaluation is based upon the perspective of practicing special education teachers of elementary students with high incidence disabilities. This evaluation model was developed specifically for special education teachers and related service providers to use when evaluating the appropriateness of a software program for meeting an individual child's IEP goals. With the national focus on student and teacher accountability, teachers must be certain and able to document that the integrated use of technologies, including the effect use of software programs, are used productively which hopefully will lead to improved student outcomes. Using the Individualized Special Needs Software Evaluation (ISNSE) approach for assessment reflects the most up-to-date knowledge in software evaluation and incorporates teacher identified characteristics that are vital for individual instructional supplementation. Teachers who use this model for software evaluation can be confident their results portray an accurate evaluation of the program's features and value to enhance the learning process.

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Figure 1: Student Characteristics

School Name

____

Name of Student

____

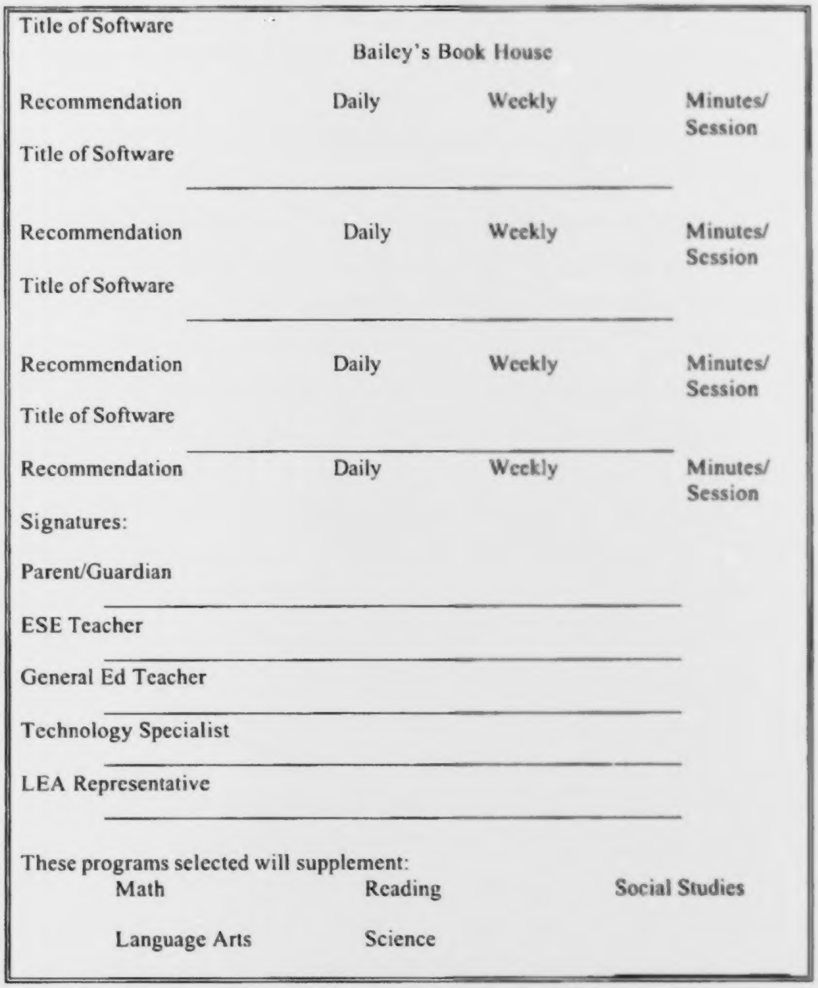
Student ID ____________________

Date ____________________

These programs are appropriate for students with the following characteristics:

- Short attention span
- Difficulty making friends
- Difficulty completing a task
- Difficulty expressing feelings appropriately
- Difficulty working independently
- Difficulty composing a correct sentence
- Spelling difficulties
- Poor reading comprehension
- Difficulty recognizing the names of letters.
- Difficulty recognizing the sounds of letters.
- Difficulty sounding out words.
- Confuses similar letters
- Difficulty understanding directions
- Difficulty memorizing and recalling information
- Mispronounces sounds or words
- Difficulty understanding figurative or literal language (e.g., "hold onto your hat")
- Difficulty with basic addition or subtraction facts
- Difficulty with basic multiplication or division facts
- Difficulty with math word problems
- Other ____________
- Other ____________
- Other ____________

Figure 2: Recommendations Form



Title of Software
Bailey's Book House

Recommendation Daily Weekly Minutes/Session

Title of Software

Recommendation Daily Weekly Minutes/Session

Title of Software

Recommendation Daily Weekly Minutes/Session

Title of Software

Recommendation Daily Weekly Minutes/Session

Signatures:

Parent/Guardian

ESE Teacher

General Ed Teacher

Technology Specialist

LEA Representative

These programs selected will supplement:
Math Reading Social Studies
Language Arts Science

Effectiveness of QuickTime VR as an Instructional Environment for Students with Special Needs

William R. Wiencke, Assistant Professor
Media & Instructional Technology
College of Education
State University of West Georgia
United States
wwiencke@westga.edu

Abstract: Virtual reality (VR) has been shown to be an effective tool to enhance and support a variety of educational activities. QuickTime VR (QTVR), developed by Apple Computer Corporation, is a technology for creating and moving through virtual environments. QTVR provides a number of advantages over "traditional" VR. These include lower cost of the development software as well as the hardware required to run it and it does nor require advanced training or programming skills. The study will evaluate the effectiveness of using QTVR as a virtual environment to train students with special needs in developing life skills.

Introduction

Virtual reality (VR) has been shown to be an effective tool to enhance and support a variety of educational activities (Andolsek, 1995; Maule, Oh, & Check, 1998; Taylor & Disinger, 1997). In addition to instruction, VR has also come into increased use in diagnosis and treatment of severe psychological and emotional disorders. Although effective, its use has been limited primarily due to the high cost of both the equipment required to create and participate in the VR world, but also the time and expertise required to develop the environments (Dunning, 1998).

QuickTime VR (QTVR), developed by Apple Computer Corporation, is a technology for creating and moving through virtual environments (Kitchens, 1998). QTVR provides a number of advantages over "traditional" VR. The cost of the development software is very reasonable at less than $400. It requires no advanced computer system to run, only a Power Macintosh running System 7.5 or later. Software for creating similar environments is also available on the Microsoft Windows operating system. Creation of the QTVR environment is relatively simple, requiring only the step-by-step instructions in the user manual, not advanced training or programming skills. Traditional VR environments are created by building a 3D model which the computer uses to generate the visual environment. Due to the complexity of this operation and the amount of possessing power required, the representations forfeit detail for economy of use. Consequently the virtual word resembles a low cost video game more than reality. In comparison, QTVR utilizes actual photographs to create its virtual world, making the scenes visually realistic. Lastly, Fully immersive VR requires costly technology such as head mounted displays (HMD) and movement tracking devices to allow the user to interact with the virtual world. QTVR movies only require the use of either a Macintosh or Windows based system and the free QuickTime Player for interaction.

QTVR creates VR environments by "stitching" together photographic images to provide either a panoramic view or a stationary view of an object which can be rotated and view from any angle. The QTVR movie allows the user to actively pan through the full 360^0 of the panorama. This provides the illusion of standing in one location and turning around to view your surroundings. Once these individual panoramas are created, they can be linked to allow the user to move from one to another by selecting "hot spots" or doorways (see Figure 1). The linking of multiple panoramas creates a virtual representation of a locality such as a school or historic site, which can be accesses remotely either over a local area network or the internet.

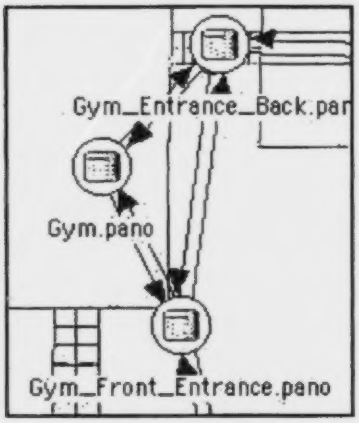


Figure 1. Example of Linked Panoramas

This paper will describe a pilot study currently underway to determine the effectiveness of QTVR as an instructional tool to assist students with special needs (mild to severe mental retardation) to develop life skills.

Uses of VR in Education

Currently the use of virtual reality in education and training can be divided into two general areas. First, it provides students with the opportunity to interact with environments or phenomena that would be difficult or impossible to work with in a traditional classroom setting. Examples of this methodology would be fieldtrips to distant locations measured both in miles and time (Pape et al, 2001), viewing biological, chemical, or physical reactions (Taylor & Disinger, 1997), and the visualization of complex data sets. The second use is when the students are actively involved in the design and creation of the VR environment. Activities based on this method promote a high degree of constructivism and cooperative learning environments (Roussos, Johnson, Leigh, Vasilakis, & Moher, 1996; Winn, Hoffman, Hollander, Osberg, Rose, & Char, 1999). Work with students with disabilities using VR technologies have included life-skill training for students with physical handicaps (Germann & Broida, 1999), students with severe learning disabilities (Neale, Brown, Cobb, & Wilson, 1999), and students with behavior disorders (Muscott & Gifford, 1994).

Project Description

The current project builds upon the work of Neale et al (1999), who utilized traditional VR environments to train students with special education needs in life skills. The VR environment provided very limited visual authenticity and required the development of 3D worlds representing a house and supermarket. The object of the VR training was to provide the students with multiple opportunities to work within a real life situation (e.g. shopping, cooking, etc) virtually before encountering the tasks in the actual environment. This is particularly helpful since it allows the students to gain experience without traveling to the location and encountering difficulties which may prove to be embarrassing, hazardous, or costly.

The current project utilizes QTVR to represent similar environments but will provide actual photographic imaging of the virtual world. If similar results are obtained it will show that effective virtual learning environments can be created utilizing the capabilities of QTVR. This would mean that educators could produce VR environments quickly, simply, and inexpensively.

The ultimate goal of the project is to create a QTVR representation of a local supermarket used by our school system to provide life skills training. The pilot study will determine if the subjects can interact with and learn from a QTVR environment. QTVR models will be created of the elementary, middle, and high school in the district (see Figure 2). The elementary students will begin using the model of their own school, one with which they already are familiar. After they are comfortable with using the system, they will begin to use the model of the middle school, a building they do not know. When they can locate specific landmarks (media center, gym, cafeteria, etc.), in the virtual environment, they will visit the facility and will be evaluated on their ability to successfully navigate the building in real life. The same procedure will be conducted with the students at the middle school except they will be evaluated using the high school as their test environment. This will be done to see if there is a difference in the effectiveness based on age/grade level.

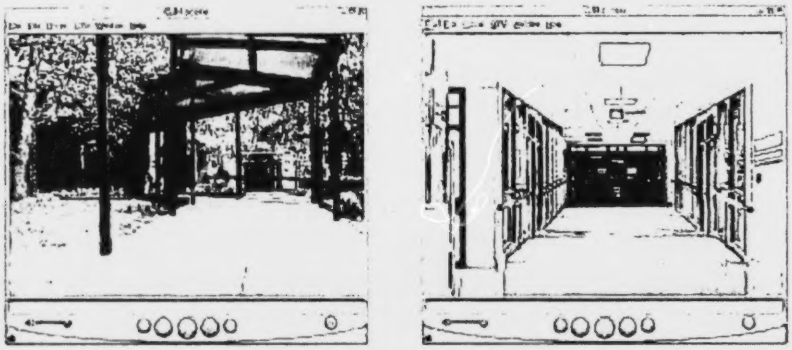


Figure 2. Examples of QTVR Scene at the Junior High School

If the pilot study shows success, the students will move up to using the supermarket environment. Other QTVR models will be created based upon the recommendations of district's special education teachers to meet the educational needs of their students.

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TECHNOLOGY DIFFUSION

SECTION EDITORS:
Dale S. Niederhauser, Iowa State University
Neal Strudler, University of Nevada, Las Vegas

Papers in the Technology Diffusion section address issues associated with the implementation of technology in educational settings from K-12 through Higher Education. Successful ways to integrate the use of various forms of technology continues to be a pressing concern in this area. Integration efforts operate at several levels. It is a primary goal in federal Preparing Tomorrow's Teachers to use Technology (PT3) grants, State offices of education are taking an increasing role in promoting technology integration in State-level technology plans, university programs are attempting to infuse it into their teacher preparation programs through stand-alone courses and in methods and student teaching, districts and schools are exploring ways to support teachers efforts at integration, and even individual teachers in the content areas are examining ways that integration can be subject-specific.

One of the central issues associated with technology integration is making good educational usage of technology a sustainable and ongoing reality. That is, technology becomes integrated into the culture of the classroom in a meaningful and productive way. A fundamental problem with previous efforts to integrate technology into U.S. public schools has been an emphasis on installing and maintaining the physical equipment, without ensuring the technology is effectively used to support and enhance student learning. Recent work has examined various ways to motivate and support teachers and teacher educators as they begin to provide technology experiences for students. Helping faculty understand how technology integration differs across content areas and grade levels is a valuable part of this process, as is developing familiarity with the available technologies, the types of support systems available to them, and how to cope when the physical equipment is inadequate. Projects designed to promote teacher development are essential if we are to realize technology integration goals.

One road to professional development for teachers involves building cooperative partnerships among the many constituents who have a stake in integrating technology into classrooms. Effective partnership efforts can take many forms. Pairing K-12 teachers with university faculty has been mutually beneficial for both groups. University faulty gain an understanding of how classroom teachers use technology with students and K-12 teachers can benefit from ideas and resources available through university settings. Classroom teachers can also connect with parents and the local community through technology and technology-related activities. Cooperative relationships can help K-12 teachers, parents, librarians, university faculty, and administrators help each other understand the vital role that technology can play in educating children in schools.

Technology diffusion is also concerned with the use of various tools in the learning environment—whether that is in a traditional classroom, or through a virtual online experience. Devices like handheld computers, or "palm Pilots" provide an exciting new option for teachers and students to use in collecting, manipulating, and representing data. Other cognitive tools like databases and computer-based concept mapping software provide opportunities for students to use the technology to develop higher-order thinking skills. Some of the greatest potential in technology diffusion is apparent in the use of the Internet to provide a virtual environment for students and teachers. The nature of the World Wide Web is such that it provides access to information and resources in a widely distributed fashion. This allows for the creation of virtual communities for sharing ideas and experiences, cooperative online learning activities, and web-enhanced teaching opportunities. Widespread Internet access will likely spawn a new and expanded vision of technology diffusion in education.

The papers in this section will provide you with many insights into the various aspects of technology diffusion. The authors address some of the central themes from their unique perspectives. This work is valuable in that understanding technology diffusion seems to be central to our efforts to integrate technology into the educational system and use it effectively in classrooms.

Faculty Technology Integration Project

Comfort Akwaji
Curriculum and Instructional Technology Department
Iowa State University
Comfortakwaji@aol.com

Abstract: This paper is a case study report on the creation and ongoing implementation of a faculty technology integration project at a small liberal arts college in the Midwestern United States. The project seeks to prepare faculty to utilize computer technology in curricula, develop technology integration mentors and to foster ongoing mentoring and constructivist relationships in a community of teacher/learners. Experience in the project thus far has shown that factors originating in such disparate areas as equipment resources, faculty academic backgrounds, software currency and instructional perceptions have strong impacts on the conduct and progress of the project. Additionally, project management issues with partners and staff, largely unanticipated, have arisen and created discordance in the project, especially with respect to building a community of practice culture among the facilitators and the participants.

Introduction

Technology integration in the curriculum is becoming more widely accepted and implemented at most educational levels. New concepts of classrooms and formal schooling have come of age with the advent of the use of computer and communications technologies like desktop publishing, presentation and spreadsheet applications, the Internet and virtual classrooms. Preparing instructors for technology integration at the tertiary level, however, is problematic. The provost of this small college has long sought to enhance, and in some cases inaugurate, the faculty's ability to use modern computer technology in their coursework as a result of numerous requests from the faculty. Consequently, I was asked to create a project for the faculty for the understanding, acquisition, and implementation of technology-based teaching and learning strategies. The project was to focus on faculty training and preparation along with the generation of a community of practice around technology skills acquisition, implementation and integration and the creation of a cadre of technology savvy mentors that would serve as resources for the faculty's initial training and as support for the maintenance of post-project efforts. At issue were concerns about the adoption and use of the technology-based strategies due to a litany of factors including faculty member age, attitudes toward technology and its use in coursework, experience and competency with computer technology, anticipated use of the strategies, time and facilities for the project's implementation and access to viable computer resources. Participants were asked to complete a pre-project familiarity, skills and attitude survey to inform the process of determining the appropriate initial level for the project content, and to provide ongoing qualitative evaluation for formative critique of the affective factors in the project as well as the project's effectiveness. Evaluation sessions are also held with the provost and project partners to ensure all are informed and current with the project's progress.

Project Definition

Creation of the project began with discussions with the provost. This particular aspect was very important in that this momentous change in how the college was to go about the practice of education was being initiated from the top of the administration. The provost asked me to generate and submit a proposal outlining the project's implementation process, the projected schedule of meetings (sessions) and their agendas, specifying what would be required of his office and the participants and listing the facility and computer resources required.

My project partners and I approached the design/definition of the project from Instructional Systems Design (ISD), Constructivist and community building perspectives. First came the analysis of the audience. At this initial stage of the project, we used some general characteristics of the group as benchmarks for strategic planning purposes, e.g., the fact that all participants possessed advanced degrees. Next we determined and established an overall goal and a purpose for the project. We then established the structure of the project, which comprised five phases; I, II, III, IV and V, each containing several face-to-face sessions. The project has just begun; Phase I is being used to introduce the participants to the project – including what to expect and what is expected of them, the review of theoretical foundations for the project, the generation and collection of the audience's entry data and the introduction and modeling of several technology-based applications for communication and collaboration. Phase II is for mentor recruitment and training as well as community building. Phase III, then, involves participant training in computer and computer-applications knowledge and skills, in association with their mentors, based upon the entry surveys and the identification of participant-chosen technology-based projects to be completed in Phase IV. Phase IV features the "hands-on, minds-on " application of their knowledge and skills by the participants, again in concert with their mentors. Phase V provides culminating exercises and acknowledgements. The participants were asked to maintain a journal of their experiences and reflections of the project's implementation, to be collected as part of the summative evaluation facet of the project, and to share such thoughts as they may deem appropriate with the facilitators and colleagues during the course of the project. Subsequent to fashioning the overall structure of the project I generated goals and objectives for each phase to provide bases for project performance measurements. Then came the deliberation and decisions about the best strategies for effecting the technology learning, for the support for the participants' project assignment activities and for post-project scaffolding of participant efforts in applying their new-learned facility. Based in part on Knowles (1984) work on adult education, we chose the one-on-one mentoring approach for both the in-project learning and post-project support. Finally, for project formative evaluation, we opted to use surveys for the collection of participant affective, perceived skill change and project improvement data at the close of each session, and to use interviews of the provost and department heads at the end of each phase. Summative evaluation will be effected via post-project surveys, interviews and observations.

Project Implementation

The inaugural session of the project was attended by more participants than expected. The extra number were at once a bane and a boon since increasing the size of the audience posed additional logistics problems, while at the same time serving to keep the ranks at the expected number, later on, due to drop-outs. The session comprised an introductory session using a MicroSoft PowerPoint electronic presentation, a discussion and the introduction of the first communications tool, "eBoard", via a PowerPoint presentation followed by a hands-on practice session. Interestingly, some of the participants balked at the requirement to do the hands-on portion. They explained that they had expected the project strategies to consist only of lecture style presentations from which they were to glean understandings about technology-based applications and interventions. This was a totally unanticipated issue that provided welcome insight into the need for ascertaining and addressing participant expectations in projects of this sort, as part of audience analysis.

Logistics was another issue. We had requested and received assurances of access to a number of machines. Instead we used a conference room where several computers, some older, and a digital projector had been set up. Few machines meant that participants accessed them in groups causing problems and affordances that generated interesting dynamics, e.g., there was only one mouse "operator" and, depending upon the operator's facility, learning the application was either facilitated or hampered. A constructivist dynamic surfaced when misunderstandings were assuaged by the expertise of others in the group. Additionally, computer shortcomings and comments by facilitation partners that drew negative comparisons between the resource capabilities at this institution versus Iowa State caused frustrations in that were not easily dispelled. Session evaluations pointed up the participants' satisfactions and disappointments.

Conclusions

Lessons learned so far in this project include the necessity for more enlightened audience analysis, more coordination among project partners, better resource coordination and modern equipment and applications. These issues were addressed in a meeting with the provost resulting in assurances of both logistical and coordination improvements. Some of these concerns could most likely have been mitigated through collaboration with others who have conducted similar projects.

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Saved by Blackboard: Web-Enhanced Teaching

Anisa Al-Khatab
Associate Professor
Eastern Kentucky University

Web-enhanced courses are selected by some faculty to develop the competence, self-efficacy, and technical skills required for designing and delivering on-line courses. A faculty who was using Blackboard as an enhancement in teaching a regular course was struck by a severe health condition that required hospitalization. The nurses' station in the hospital brought Blackboard technology to her rescue and successfully completed the course. This paper tells that success story of Blackboard rescue.

If It Is Broke, Then What?

D. Lynnwood Belvin, Ed.D.
Director of Educational Technology
Berry College
Mount Berry, Georgia
United States
lbelvin@berry.edu

Jennifer Leaderer,
Graduate Assistant
Berry College
Mount Berry, Georgia
United States
jleaderer@students.berry.edu

Abstract : A major problem schools face is the maintenance of existing computers. Several studies have examined a school system's technology capacity as defined as adequate technology, networks, electronic resources and support to meet the system's learning goals. This study examines the technology capacity of a group of middle schools in Northwest Georgia. Teacher perceptions of the school systems ability to adequately support technology and the effect that has on using technology as everyday tools for learning are examined. The quality of the technology available for classroom use and its impact on instructional methods are also examined.

Introduction

One of the many problems schools face is the maintenance of existing computers. Computers in schools are more often community computers rather than personal computers. Classroom computers usually experience heavy usage and habitually need repairs.

School districts are regularly swamped with repair requests, and repairs are sometimes delayed for weeks, or even months. This delay creates a problem for teachers who have developed lesson plans that integrate the use of computers in instruction. Unless teachers can be confident that computer glitches will be fixed in a day or two, they are unlikely to invest the time and effort to modify their curriculum to include technology.

Many districts have begun placing computer resource personnel in schools, with the goal of helping teachers use the technology more effectively. These specialists, often centrally trained, deal with a wide range of skills among teachers and dramatic differences in the specific needs of individual schools. The problem is compounded when these resource people must provide support to multiple schools (Odden, 2000).

Other factors in a school's technology capacity include adequate technology and networks. Classroom computers connected to the Internet have increased significantly over the past four years. The quality of technology in the classroom has also improved due to the fact that prices for technology have dramatically decreased over the same four-year period. School systems have purchased technology and connected classrooms to networks more than they have allocated funds for the repair of technology, software, and the training of teachers during this period of time (Solmon, 1999).

Study Demographics

The study identified five middle schools in Northwest Georgia. Locations ranged from small county schools to larger city schools. The average class was 23 students with teachers seeing approximately 100 different students per day. Most teachers in the study had taught twelve years with the most years of experience being thirty-one and the least being one. Eighty percent of the reported operational computers used some form of the Windows operating system, 16 percent were Macintosh and the remaining 4 percent were Apple //e. Sixty-two percent of the computers were connected to the Internet. In a recent national study the percentage of computers in instructional rooms connected to the Internet was seventy-seven percent (Cattagni, 2001). The study did not assess the quality of the computers found in the classroom and therefore many of the computers reported are obsolete for today's classroom standards (i.e. Apple //e's still in use).

Technology Access

Most schools reported having both computer labs and computers in individual classrooms with the average number of computers in lab being twenty-five and the average number in a classroom being less than two. Computer labs were also identified as being used by a special technology class rather than subject specific (i.e., reading, math, science, language arts, etc.). The placement of classroom computers was equally balanced in the major academic areas (1.5 / classroom) with no specific area averaging more computers than others.

Technology placement was also equally balanced between grade levels with no significant difference found between sixth, seventh, or eighth grade classrooms. The student-to-computer ratio based on average class size and average number of computers in a class is approximately 14 students to each computer. The student-to-Internet access is approximately 16 students for each computer. When lab computers and special education classes are removed from the total, the ratio changes to approximately 17 students per computer and 24 students-per-Internet access computer. The most frequent classroom computer to student ratio is 25 to 1. The most frequent Internet access to student ratio is 0 to 1 due to the fact that over fourteen percent of the classrooms have no Internet access. National trends for students per instructional computer with Internet access were 7 to 1 (Cattagni, 2001).

Technology Usage

Teachers were asked to identify how often they used technology with their students and specifically what applications were used and how often. Frequency of usage was defined as daily, weekly, monthly, once or twice a year, never, and not available. Forty-two percent reported using computers in general on a daily basis. The most common daily usage related to word processing (15 percent) and Internet activity (11 percent). Databases, Desktop Publishing, and Integrated Learning Systems were reported as never being used by a majority of the teachers. Other applications reported as never being used by a high percentage of the teachers were Spreadsheets (49 percent), presentation software (41 percent), and search engines (44 percent). The data on individual schools reporting using computers in general on a daily basis varied from seventy-two percent of the teachers at one school to twenty-five percent of the teachers at another. The school that reported the highest daily usage was the school that did not have a computer lab or special computer/technology class. Integrated learning systems and simulation programs were reported as either never used or not available in eighty percent of the classrooms. The percentage of daily use with students is much higher than any one application. Teacher productivity applications were not a listed usage on the survey since the intent was to measure how technology is used with students. Additional comments from several teachers detailing how they use the technology to prepare tests, scan tests, and store grades help to explain the computer in general usage being much higher than any listed application.

Student time on computers in classes averaged 1.5 hours per week. The range was from no time to as many as ten hours. The most frequent amount of weekly time was thirty minutes. All classrooms identified in the study reported having at least one computer. In as many as thirty-six percent of the classrooms it was reported that students spend no time on computers during the week.

Repair Time

In most schools the amount of time to fix the problem of a computer breaking down was measured in days rather than hours. The average number of days a computer was unavailable due to being broken was five days. The longest reported time for a computer to be in need of repair was thirty days. The average repair time for Windows-based computers was measured in days and the average repair time for Macintosh-based computers was measured in hours. The repair time for computers in labs was most often reported in hours as opposed to days for classroom computers. The highest average repair time was over seven days to fix the problem. The fastest repair time average was two days. National averages for repair time were reported to be 5.6 hours to 3.6 days for an average range of 53.6 hours to repair a broken computer (Solmon, 1998).

Sources of Repair

Maintenance to computers was most often provided by either local school staff specializing in that service (computer lab teachers, computer aids) or library media teachers. Classroom teachers provided technology support more often than district level technology specialists. Students and commercial providers were rarely if ever used to support technology. The sources of repair identified are very similar to a national study that found on average 68.5 percent of schools reported lab teachers or special computer staff provided technical support for the maintenance of technology (Solmon, 1998). The same study found that library/media teachers and classroom teachers to be the next level of support with students being rarely used (4.9 percent). Nationally, school districts provided greater technology support than found in the schools in the study.

Constraints to Technology Integration

When asked to identify the most frequent barrier to technology integration the most common barriers were too few computers in the classroom, not enough computer labs, and limited budget for technology. Broken computers in need of service were reported as a problem either occasionally or frequently by over 70 percent of the teachers. Other barriers that were reported as either occasionally or frequently impeding the integration of technology included obsolete technology (77 percent), too little or inadequate software (88 percent), and teachers' lack of experience with technology-oriented pedagogy (64 percent). Teacher lack of computer skills and student lack of computer skills were seen as never being a limitation by over sixty percent of the teachers. Teacher and administrator lack of interest in technology was viewed as never limiting integration by eighty percent of the teachers. The findings for this area are similar to national studies. In the 1998 Solmon report to the Milken Foundation outdated computers were seen as a constraint to technology usage by 63.2 percent of the states reporting. The percentages for lack of teacher training (31.5 percent) are also similar to the population identified in the study.

Study participants identified other constraints to the daily integration of technology in teaching. Such factors as pressure to prepare students for accountability testing, lack of freedom to install software, having only one computer for as many as twenty-five students, lack of access to the Internet, and a lack of on-staff technologist to repair computers and train teachers were provided in the additional comments section of the study.

Conclusions

Technology is often placed in classrooms in a top-down fashion with more emphasis placed on acquiring the artifact than supporting its daily use. Teachers are expected to make the classroom usage of technology a natural part of instruction. The study found that teachers on average had less than two computers in their classroom to share with an average of 23 students. In many cases classrooms had no access to the Internet and therefore the usage of the computer was limited to the installed software. Many teachers found the lack of software, low number of computers, and time to repair broken computers to be constraining in their ability to adequately use technology in their instruction.

Teachers did not see their skill or interest as a barrier to technology in the classroom nor did they perceive school administration as a limiting factor. The most common barrier was a lack of adequate funds to support technology and a limited number of computers with Internet access. The quality and quantity of the technology available for classroom use creates a negative impact on instruction.

The technology capacity of school systems has not been sufficient to adequately support teachers using computers as everyday tools for student learning. In order to increase system capacity the additional budgetary requirements to support, maintain, and replace classroom technology will be enormous. The challenge that districts face is finding cost effective methods to sustain and support existing technology as well as identify resources to obtain new technology.

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Developing Video-Based E-Learning Applications

Mario A. Bochicchio
SET-Lab – Dipartimento di Ingegneria dell'Innovazione
University of Lecce
Italy
mario.bochicchio@unile.it

Nicola Fiore
SET-Lab – Dipartimento di Ingegneria dell'Innovazione
University of Lecce
Italy
nicola.fiore@unile.it

Abstract: In the paper we present Lezi II, a tool to easily transform normal lessons or lectures into powerful multimedia applications based on a very simple and regular structure. The tool has been conceived and produced at our Lab to simplify the production process, especially for non technical users. Lezi II is extensively used in our computer engineering department to produce educational multimedia applications.

Introduction

In general, the production of hypermedia applications is a complex and expensive task, requiring both technical skills and communicative abilities. Nevertheless, some specific kind of multimedia production can give good quality results, even without specialized IT skills, and at low costs. We have concentrated on this particular field, with the aim to supply with a valid tool the teachers who want to publish their educational material easily and at low costs.

We can in fact observe that traditional lessons/lectures, when performed from good teachers, can be easily transformed in good quality multimedia applications for both on-line (the Web) and off-line (CD/DVD) distribution. The key point is that for a good teacher it's easy to speak, to explain using images and slides, to show objects, to write on the blackboard and to use his mimic to grab and hold the attention of his students. In our opinion this kind of educational contents can be effortlessly transformed in a very usable multimedia application based on the video of the lesson, on a simple and regular navigation structure and on a little set of user-friendly multimedia objects.

The Lezi II Tool

Starting from these requirements, and from an accurate bibliographic analysis, the project of a complete prototype, called Lezi, was started at the SET-Lab of the University of Lecce, within a large research project aimed to the development of innovative educational tools and applications. The prototype includes two distinct parts: the authoring part, suitable to create a new Lezi lesson, and the fruition part (also referred as "lesson player" in the following), used to navigate among existing lessons and to select and play the desired one.

Two version of the prototype have been produced, with the same functionalities, for both on line and off line operation. The off line version is suitable to create and/or use stand-alone Lezi lessons, most of all for CD/DVD production, while the on line version allows remote users on Internet to create and/or play Lezi lessons. At any time is it possible to port stand-alone lessons on the Internet and vice versa. The fundamental requirement, for Lezi, is a very high ease of use, so that it can be truly accessible even to users with very basic computer knowledge. This is essential for many good teachers or scientists who have, a great communicative strength and could easily offer high quality lectures and lessons.

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Experiences with Lezi II

In the poster presentation we describe both the Lezi tool and the experience we gained at the University of Lecce by using Lezi to produce various real courses and other teaching events (conferences, scientific seminars, on-line training resources, etc.) in different authoring situations.

The first experience we describe is based on the class of Informatica Grafica given by Prof. Paolo Paolini and Prof. Franca Garzotto in three Italian Universities (Milano-Lecce-Como 1999). In the lesson we can see a classical authoring situation: a teacher exposes his concepts in a classroom with a blackboard or with some slides. In the second example we describe the use of Lezi to document a preliminary meeting for a large research project supported from the European Community. Other specific real productions based on Lezi (on-line training etc.) are also described.

Conclusion

In conclusion, the idea described is very simple: it is possible to publish good educational multimedia applications developed by academic staff with very little technical effort, in a short time and with limited financial resources.

In our opinion, Lezi can enable a teaching staff without a specific technical preparation in multimedia production, but with valid contents and good didactic skills, to easily prepare good multimedia interactive lessons, both for off-line (CD/DVD) or on-line (the Web) purposes. More in general, the widespread use of Lezi II or other similar tools can effectively support the development and the use of educational multimedia contents into universities and into schools. Obviously, this kind of multimedia contents is not intended to replace the publications of professional editors.

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The Diffusion of Communication Highways Connecting Parents and Schools

Susan Borzych
Geraldine DiPalma

Parental involvement has continually been an important piece in the development of student learning and success in school. The increasing availability and access to the Internet provides schools with an effective way to communicate with the community via school web pages. However, there is still a large void in reference to timely communication between schools and parents regarding personal information, such as grades, attendance, demographic information, discipline, and health issues. New software programs are now being made available to address this void and provide timely information through the use of technology--specifically, the Internet.

Parental involvement is not restricted to a physical presence in the building but includes involvement outside school and in the home. With the increase in single parent homes, working parents, and situations that prohibit many parents from frequently visiting the school building and talking one-on-one with teachers and principals, it has become increasingly difficult for parents to stay current with their child's progress in school. If information about student progress were provided to parents on a timely basis--in a format that was easy to understand and access--necessary interventions could be provided that would help students experience increased success in and out of the classroom. These strategies would increase the probability of improved student performance on assessments and standardized tests. Information about assignments, projects, upcoming events, and due dates would require students to be accountable for their progress and would provide information to parents and guardians about a student's development and growth in the classroom. This would discourage excuses and claims of miscommunication amongst the involved parties, promoting increased interaction and understanding of expectations.

Critical to the communication between schools and parents is the inherent meaning, or the subjective perception of the innovation of communicating about student progress via the Internet (Rogers, 1995). The diffusion of this type of communication system is an "authority innovation-decision" that is subscribed to and made available by individuals in the educational system that possess the technical expertise to realize the inherent value that such a system would be able to provide (Rogers, 1995).

A large school district in the central part of the United States--a district of approximately 87,000 students, attending 165 schools--agreed to pilot the NCS software product ParentCONNECTxp for the 2000-2001 school year. The pilot took place at a newer high school serving approximately 1,500 students in grades nine through twelve in the west corridor of the district. The pilot project followed the district-approved process, which included piloting the web-based program for one year at a district school. At the end of the year, a feasibility survey was conducted with the staff of the school, and a survey was conducted amongst participating parents and guardians. The data were analyzed, and the resulting report has been made accessible to all schools in the district. The challenge of this pilot was to convince the parental population of the advantages of this type of communication and the value that timely information could provide for them in their quest to be effective parents and provide an adequate support system for their students.

The results of the surveys were very positive, and suggestions were reflective and reasonable. Parents valued being able to access timely student data on-line and felt that it was a positive step in helping students avoid pitfalls and be successful in their academics. Parents who received e-mail notifications for unexcused student absences, felt that early intervention was critical and beneficial in addressing student attendance issues. A recommendation has been generated, addressing the possibility of implementing the product district-wide.

This poster session will illustrate the results of the feasibility study and the parent survey and will address the possibilities and the restraints that accompany the accessibility of student information via the Internet, as well as address issues directly related to the diffusion of the software product amongst parents. This session will also address the structure of the socio-economic system, communication channels, social order and their association with the "s" curve, as well as the implementation of a new innovation (Rogers, 1995). Also included in the session will be technical information about installation issues, security concerns, hardware requirements, and software performance. CD's will be available that contain a PowerPoint presentation illustrating points of interest for those who might be considering implementing such a program.

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Developing a State Technology Plan to Promote State-Wide Technology Integration in K-12 Education: Preparing Arizona Students for Future Success

Jeannie Brush, CRESMET, Arizona State University, US
Donovan Evans, CRESMET, Arizona State University, US

Purpose

Constructing a framework for technology integration in Arizona K-12 will establish a "roadmap" enabling the state to consistently and coherently promote a coordinated state-wide infusion of educational technology in the K-12 education system. It will bring direction to and support for all activities that impact the integration of educational technology across Arizona elementary and secondary education.

A comprehensive state technology plan seeks to ensure that an educational technology vision is reached for every student, every teacher, and every school in the state of Arizona. It is intended to support and to align the growing movement of teachers, administrators, parents, industry and business leaders, and government officials that recognize the need in Arizona for a new comprehensive state educational technology framework. By integrating Arizona's many educational initiatives, a statewide educational technology framework has the potential to maximize resources, coordinate efforts, and guide all education partners to move in the same direction with minimal duplication or conflicting goals.

This paper will provide an overview of the Arizona K-12 technology plan, and describe the processes involved in developing the plan. These processes involved determining key stakeholders in the state, acquiring input from stakeholders to develop a framework for the plan, disseminating a draft framework to teachers, administrators, and business leaders in the state, and using feedback from these individuals to refine and enhance the plan. After the plan has been refined, key stakeholders will take the plan to the Arizona Department of Education for review and adoption. Each component of this process will be discussed, and the resulting technology plan will be described in detail.

Educational Technology is Important for Student Success

The use of educational technology is no longer the path to future success for Arizona children. It is the path to current success. If used appropriately, research shows that it enriches the learning environment leading to better student performance. Educational technology can:

- Allow learning to occur in ways not possible otherwise;
- Be a means for improving learning in all subjects;
- Expand students' creative abilities;
- Promote students' taking responsibility for their own learning;
- Impact at-risk student populations positively;
- Promote students' interaction with a larger community (e.g., discussions directly with experts, with other students working on the same or similar projects, etc.).
- Give students experience with modern workplace tools.

In short, technology, when implemented appropriately, has great potential to give Arizona K-12 students an enhanced learning environment. As an additional benefit, Arizona children will be exposed to and utilize technology that will better prepare them to enter today's society and economy as an active participant.

Providing Access to Technology

Educational activities that integrate technology in meaningful ways are useless if students do not actually have access to that technology. The significant enhancement to teaching and learning afforded by resources available on the Internet is lost if schools do not have the infrastructure necessary to deliver broadband voice, video, text and graphic data to adequate multimedia computers available in the classrooms. Thus, meeting professional development and student achievement goals relies upon the creation of a networking infrastructure and provision of adequate numbers of multimedia computers in every classroom throughout Arizona. This goal is even more crucial in the remote areas of Arizona where community resources are insufficient to provide students the opportunities that more affluent students in the more dense population centers may enjoy in their homes.

Since 1999, Arizona has made groundbreaking strides in this area. Initially, each of Arizona's 228 public school districts were provided enough computers to ensure a 1:8 computer:student ratio. The second phase of the statewide educational technology initiative will connect every network-able computer to a local area network (LAN). Also in phase two, every school in every district will be connected via a wide area network (WAN) with a district aggregation point that is then connected to the Internet with a broadband connection that allows transmission and reception of voice, video, text and graphic data.

This initiative is making an Application Service Provider (ASP) available to every public school at no charge to the schools until June 2005. The ASP will host school and teacher websites, e-mail services for staff and students, student information management systems, student assessment tracking systems, and teacher resource management systems. The ASP will enable schools to access productivity software, over 250 educational titles, (i.e., content, courseware, reference materials), and communications software. These resources will be available over the Internet, making them accessible to students, staff, parents, and teachers whether working from school or home. Students will be able to access their own work and the school district's software from any location that has access to the Internet.

As cutting edge as these initiatives are, they are only the beginning of a continuing challenge. Given the speed with which technology information systems are changing, this State Framework, covering all aspects of educational technology including provisions for assessment and updating, is necessary.

Components of the K-12 Technology Plan

Focus groups consisting of K-12 administrators, teachers, parents, industry stakeholders and university faculty determined twelve key issues that should be included in a comprehensive state framework. Review of other state educational technology plans and interviews with state technology directors helped determine the corresponding benchmarks of these components. These components were combined into the following eight categories following a stakeholders meeting:

1. Integrating educational technology into the curriculum
2. Professional development for teachers and staff
3. Pre-service training for teachers
4. Capacity, infrastructure, staffing, and equipment
5. Collaboration and partnerships
6. Equity of use
7. Review, evaluation, and accountability
8. Current and future funding requirements

Addressing these issues requires a framework of vision and implementation strategies. All of these categories may be considered interdependent, often with considerable overlap of concept and, where possible, shared use of resources. Each component is described in more detail below:

1. Integrating educational technology into the curriculum. The purpose of education is to help students think, learn, and achieve in new ways in and across disciplines. Educational technology is a necessity in fulfilling this purpose. Educational technology (ET) will help students in all subject areas develop and nurture the ability to access, to analyze and to communicate information. In every school there must exist a positive and supportive attitude toward ET. Six critical objectives for educational technology integration are:

- Build the foundation for the integration of educational technology within schools

- Address technology and content/curriculum standards complimentarily by teachers and administrators
- Structure the reward system to strongly provide the incentive for teachers and administrators to integrate educational technology
- Provide training for teachers and administration of all schools
- Align school educational technology plans with State Framework
- Assess student and teacher competency using state educational technology performance standards

2. Professional development for teachers and staff. Teachers must be comfortable using educational technology if it is to be integrated effectively into the classroom. Providing access to resources along with time and support to develop educational technology competency represents the most logical means by which to ensure effective curriculum integration. To develop teachers and administrators into confident professionals with the educational technology skills to use educational technology resources appropriately three issues must be addressed:

- Build an infrastructure to support the design and delivery of professional development for teachers and administrators
- Provide incentives and encouragement for teachers to engage in educational technology professional development
- Assume ownership of teacher and administrator roles as educational technology leaders and integrators

3. Preservice teacher training. Future teachers must enter their respective fields equipped with educational technology skills and experience. Teacher education programs are responsible for preparing future teachers to integrate educational technology. Teacher education programs must also work collaboratively with the school systems to ensure that student teaching experiences occur in learning environments that support the integration of educational technology.

4. Capacity, infrastructure, staffing, and equipment. Technical standards will provide a foundation for collaborative planning and support efforts among local, regional, and state-level groups, including the worthiness of the individual school educational technology plans and the ultimate success of the technical infrastructure at the local school buildings. Comprehensive plans regarding the required capacity and infrastructure issues include the following steps:

- Establish policies and procedures whereby the infrastructure for broadband Internet connectivity delivered to public school classrooms is regularly upgraded to provide capacity commensurate with state-of-the-art information systems delivery;
- Ensure that numbers and technological configuration standards of multimedia computers available in the public schools stays abreast of the increase in student enrollment and the increase in technological configuration standards as the industry standards advance,
- Provide affordable ET resources (people, professional development, technical support, etc.) to every school district;
- Create plan for equity of access to technology for all students, schools and districts, ensuring that resources are provided in an equitable manner throughout the state regardless of the socio-economic status or ethnicity of the students
- Provide for continued cost-effective delivery of curriculum software that is correlated with state education standards… not just technology standards (Objective 1.2)

5. Collaborations and partnerships. Educational technology plans are better poised to succeed if they include support and partnerships from state and community resources. These include universities, community colleges, libraries, museums, community resources, industry, and state and municipal governments. Successful partnerships and collaboration require a commitment to:

- Provide access to and aid in applying information that promotes collaboration and partnering, and;
- Build and highlight models of exemplary partnerships and collaboration

6. Equity of use. A comprehensive educational technology framework will ensure that all of Arizona's children will have equitable use to educational technology regardless of socio-economic status, race, gender, language, or special needs. The success of statewide equity of use relies upon the commitment to:

- Disseminate data widely regarding issues posed by ethnicity, minority, gender, and physical and mental ability, and
- Address equity of use issues in educational technology widely

7. Review, evaluation, and accountability of the framework. Educational technology is not stagnant; better and better hardware, software, and networks appear each day. Although this Framework is written in a rather generic way, any effective plan for educational technology usage must address the need to periodically update its elements. Regular review of progress in implementing a plan will ensure a timely pursuit of the goal of ubiquitous educational technology infusion in the K-12 system as well as an effective and efficient investment of public and private funds and resources. Of course, the ultimate goal of K-12 educational technology plans is to provide the resources and processes necessary for enabling students to meet the technology education standards. Thus, the ultimate accountability is that students make reasonable progress in meeting these standards. Three specific areas must be directly addressed:

- Maintain currency of the Framework
- Monitor progress in implementation
- Monitor student progress in educational technology use

8. Current and future funding requirements and sources. Providing the technical infrastructure, equipment, human resources, and professional development needed to implement educational technology into K-12 schools requires significant Funding Requirements and planning. Critical steps would include:

- Determine funding requirements
- Determine funding sources
- Acquire and allocate funding to meet requirements

On-line SITE Forums: Joining and Participating

Roger Carlsen, Wright State University, US
Niki Davis, Iowa State Univ & Univ. of London Institute of Ed., US

Abstract

Educators increasingly live more frenzied professional and personal lives. Yet, the demands to stay connected, collaborate, and learn continue to exert pressure on us. Participation on professional forums can provide educators with possibilities to rearrange their time while remaining intellectually and professionally active. Attendees of the initial sessions will be given a working knowledge and skill set for joining and participating on AACE forums. More electronic forums for educators are available and it is increasingly important to join and participate in on-line forums.

A follow-up session will be offered for initial workshop participants and on-line forum leaders. Once the skills and on-line protocols are mastered one may wish to moderate or lead an on-line conference. This presentation will provide attendees with handouts and follow-up support for participating on AACE forums.

Objectives

This presentation has two main objectives. First, this session will provide skill and knowledge for novices who desire to participate in on-line communities. Second, leaders and moderators will be provided with an understanding of techniques and responsibilities of their role as a leader of on-line communities. Follow-up on-line opportunities will be offered to all attendees of these sessions.

Intended Audience

There is no experience requirement for attendees for either of the initial sessions. This presentation is designed to provide individuals with the requisite skills and knowledge to participate in AACE on-line forums. There are also no prerequisites for participation in the either initial sessions.

Attendees to the second follow-up session should have attended the first session or been designated as moderators or vice presidents of AACE affiliated forums. Other forum moderators or leaders may attend the follow-up session.

Proposed length

Two 1 - hour beginning sessions beginning and mid conference.

Topical outline of the content

Note Well: This panel will primarily focus on AACE sponsored forum participation. Discussion of other on-line applications will be presented only if time allows and in response to audience questions.

Initial sessions for participants

- Different kinds of educational forums
- Why join an on-line educational forum
- Unique aspects of AACE forums
- Discussion of hand out materials
  - How to join AACE forums
  - Special considerations related to forums
  - Potential embarrassing situations to be avoided
- Where to find support

Follow-up session for leaders

- The forum leader's mission –

    - making the community work
    - Making the experience one that is enjoyable and useful
- Anticipating and resolution of forum member needs
- Selection of key participants
- Humanizing on-line experiences
- Getting support fast and when you need it

Instructor's qualifications

Roger Carlsen supervises or has developed approximately 100 on-line fora and conferences using various on-line products. Among his current duties are graduate educational technology advisor at Wright State University in Dayton, OH. He currently serves as moderator for Association for the Advancement of Computers in Education (AACE) announcements, moderator for Educational Technology Review, and supports on-line forums for the Society for Information Technology in Education (SITE).

His current has teaching responsibilities that include graduate courses in telecommunications, on-line education, and distance education. This academic year he is scheduled to provide in-service to 54 school districts. During the past 3 years he has prepared or supervised approximately 400 educational or corporate web sites. Since 1984 Roger Carlsen has served as an officer of 3 technology corporations.

Preparing Technology Proficient Teachers

Dr. Teresa Franklin
Instructional Technology-College of Education
Ohio University
USA
franklit@ohio.edu

Dr. Bonnie Beach
Math Education-College of Education
Ohio University
USA
beach@ohio.edu

Abstract: This paper presents initial findings of a U.S. Department of Education – Preparing Tomorrow's Teachers to Use Technology grant at a Midwestern university. The grant seeks to create models of technology integration in which a university faculty member and a K-12 teacher are paired together to create meaningful uses of technology in university content and/or education courses as well as in the K-12 classroom. Preservice teachers will be given opportunities to see examples of and to practice technology integration in the K-12 classrooms of participant K-12 teachers.

Introduction

As the United States enters the 21st Century, teacher preparation programs across the nation are assessing their capacity to adequately prepare new teachers to embrace the use of technology in the education of young people who will live in a global, information-based society. In investigating the status quo, recent studies have produced somewhat disheartening data. Relatively few teachers (20%) report feeling well prepared to integrate technology into classroom instruction (International Society for Technology in Education, 1999; National Center for Educational Statistics, 1999 January). Although technologies are increasingly available in K-12 schools, teacher professional development both preservice and inservice has not kept pace (International Society for Technology in Education, 1999). With the estimated need for 2.2 million new teachers over the next few years, it is vital that teacher preparation programs answer the call for change.

Studies have documented improvement in the amount and quality of course work in educational computing but have recognized that one required class is inadequate to prepare teachers to use technology effectively in the teaching/learning process (Hunt, 1994; Strudler, 1991; Wetzel, 1993). In addition to computing courses, it is recommended that preservice teachers need to observe appropriate modeling throughout their university course work (Kariuki, Franklin and Duran, 2001; Franklin 1999; Huang, 1994; Hunt, 1994; Gunn, 1991; Novak and Berger, 1991; O'Bannon, Matthew, and Thomas 1998; Strudler, 1991; Wetzel, 1993). Teacher education faculty need to serve as role models; their uses of, and attitudes towards, technology in the classroom will strongly influence the implementation of the technology by preservice teachers (Kariuki, Franklin and Duran, 2001; Franklin 1999; Barker, Helm, and Taylor, 1995; Huang, 1994; Handler and Marshall, 1992). Some researchers have even indicated that until faculty members participate at their own comfort level and use technology, the students they teach may fall behind in the 21st century (Mims and McKenzie, 1995).

Ohio University, located in the heart of Ohio Appalachia, is a major educational institution serving the southeast quadrant of Ohio. There are five regional campuses located throughout the region, in addition to the main campus in Athens. The College of Education accredited by the National Council for Accreditation of Teacher Education (NCATE), graduates approximately 600 undergraduate students per year who typically seek employment in Ohio schools. The University and the College had exerted some effort to entice faculty to use technology in the teaching/learning process. However, inroads had been minor. Students experienced somewhat random exposure to models of using technology in the teaching/learning process in their content and education classes. In general, faculty members had the technological knowledge and skills comparable to that of students completing the technology course. Furthermore, in field and student teaching experiences, students viewed only scattered examples of technology use by practicing teachers in spite of statewide efforts to infuse technology into the education of all P-12 students in Ohio.

Supported by the Ohio Legislature, SchoolNet, a statewide technology project, has encouraged and supported public school improvement efforts in the state by facilitating the installation and use of computer and network technology in Ohio's public schools. Complementary to the SchoolNet initiative, SchoolNet Plus provided districts at least one interactive computer workstation for every five K-4 students. However, in southeastern Ohio, where school districts are typically classified as poor/disadvantaged districts, the infusion of technology into the teaching/learning process has been progressing at a slow pace. Actual models of appropriate uses of technology have been scattered, at best.

In reviewing the situation described above, the Ohio University, College of Education identified the following needs with respect to technology use.

- The College of Education did not have a long-range, articulated technology plan focusing on the integration of technology in teaching and learning.
- Faculty members throughout the University only randomly modeled appropriate uses of technology in the teaching/learning process within content areas.
- Pre-service teachers had little opportunity to apply technology during field experiences.
- There was little communication among faculty who teach technology courses, faculty who provided content instruction, faculty who provided pedagogical instruction, and P-12 teachers who provide field and/or student teaching experiences.

The project activities are designed to improve teacher preparation programs at Ohio University through the infusion of technology into the teaching and learning. The project is a collaborative effort of the Colleges of Education, Health and Human Services, Arts and Sciences, the five regional campuses, and P-12 schools.

The Study

Data collection used a qualitative case study methodology in which graduate students and the project directors were assigned to content area groups composed of P-12 teachers, College of Education faculty, Arts and Science Faculty and Health and Human Services faculty. In the first year of the study, the groups were divided into the content areas of math, science, social studies and language arts. At least two P-12 teachers, two content area teachers, one College of Education methods teacher, an instructional technology graduate assistant and one projector director was assigned to each group. Data was collected from each group in the following manner:

1. University faculty responses to pre-project and post-project surveys were analyzed to determine changes in faculty perceptions about technology and self-assessment of skills in using technology. Faculty kept reflective journals of the uses of technology modeled in their teaching and responded to open-ended questions such as "How did your role as teacher change as you increased the use of technology in the teaching/learning process?"
2. Teachers, who participated in the revised courses, were given pre-project and post-surveys to determine changes in perceptions of the inclusion of technology in the teaching/learning process.
3. The instructional technology graduate assistants acted as mentors to their assigned group and provided technological support to the faculty. The instructional technology graduate students maintained journals concerning their mentoring of faculty and observational data throughout the year of the project. Tape recordings of meetings, minutes from meetings, graduate student field notes and observations as well as project director field notes, meeting notes and observational notes were triangulated to examine the outcomes of the project.

In addition all projects were submitted for review by each content group (math, science, social studies, and language arts) in which an evaluation rubric was used to determine if technology had been incorporated appropriately into each course syllabus and project. The faculty and P-12 teachers then field-tested the projects and course syllabus and a cycle of revision and review was completed a second time. When completed, the projects and course syllabus were placed on the web for the other content groups and the larger Department of Education: *Preparing Tomorrow's Teachers to Use Technology Grant* (PT3) to review.

Results

The *Preparing Technology Proficient Teachers* project provided faculty in Arts and Sciences, Health and Human Services and the College of Education opportunities to discuss a common question concerning "what teachers should know and be able to do when they leave colleges of education concerning content and technology". What was most interesting in this discussion was the common theme voiced by both the university faculty and K-12 teachers:

> *Teachers should look to their content standards and learned societies for guidance on what teachers should know and be able to do in both content areas and technology. These organizations provide a much more national and global view than a state organization. The people who make up the committees of these organizations often have a much wider range of experiences and education and typically are not politically motivated.*

Several K-12 teachers nodded agreement with the statement,

> *I never knew that university faculty worried about the same things that we [P-12] worried about. You guys have just as much trouble using the technology as we do!*

Some of the conversations about what "teachers should know and be able to do in the classroom" followed the line of classroom management and understanding how to discipline in the classroom. Most of the K-12 faculty indicated that the knowledge of content was not really a problem for the preservice teachers coming into their classrooms and that classroom management skills were more of a problem. The university faculty contributed that many of their students used PowerPoint presentations as part of their assignments so technology skills by students were increasing. Most university faculty felt that Internet searching and email skills were common practices by many preservice teachers. Both the university faculty and P-12 teachers reported that these technology skills were the result of the required technology course and experiences in P-12 due to SchoolNet funding.

Faculty and teachers were able to learn new technology skills that could be used to support the development of technology proficient preservice teachers and to model appropriate uses of technology in the Arts and Sciences content areas as well as the College of Education methods courses. One teacher stated the following at a presentation of "lessons learned":

> *I can't believe I learned so much in one year. I now have my courses on the web so students can access them at any time. I would have never been able to even think of doing this had it not been for this project.*

A university English faculty member stated,

> *I learned so much from the team members I had in my group from P-12. I saw the searching methods they used with their 6th graders and was amazed! I even borrowed a few ideas for my own literature class from them. And...we are creating an e-pal correspondence between my university students and the student teacher's class.*

The university faculty had an opportunity to use an instructional technology graduate assistant to help them learn new technology skills and to work with the development of new technology-enriched syllabi. University faculty members who participated in the project redesigned methods courses to include models of using technology in meaningful and appropriate ways in the teaching of mathematics, science, social studies, and language arts.

Conclusions

The P-12 teachers presented a wealth of insight into the current status of classroom teaching and technology use that was often unknown to the content faculty in Arts and Sciences and Health and Human Services. P-12 teachers, Arts and Sciences, Health and Human Services and College of Education methods faculty reviewed the content standards for each content area and the *NETS for Teachers* developed by ISTE. The ISTE standards were basically unknown to all participants before the project began and an evaluation of technology skills with respect to the *NETS* provided the participants with a review of their own skills with respect to the *NETS for Teachers*. P-12 teachers who participated in the project modeled the use technology in meaningful and appropriate ways in the teaching of mathematics, science, social studies, and language arts when preservice teachers are present in their classrooms as field students or student teachers.

A final outcome of project participants will be to develop an articulated plan to infuse technology into the teacher preparation programs at Ohio University, including common content courses as well as education courses.

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The Human Cognitive Functions and the Cyberspace: a Brazilian Point of View

Susane Lopes Garrido
Department of Human Science – Education
Vale do Rio dos Sinos University (UNISINOS)
Brazil
Susane@bage.unisinos.br
susanelg@terra.com.br

Abstract: This paper focus on questions related to the human cognitive after the appearance of cybernetic technology. Carried out by well-known professors of Education, it intends to consolidate an urgent need to deeply investigate the human cognitive functions that generate the learning in this new economical, political and social scenery around the world. A scenery created by the new relations within the knowledge, not only capable of broadening and changing one's way of thinking, but also capable of leaving one at his/her own luck and out of the process.

Facing the new paradigm of information/knowledge technologies, represented by the cyberspace involving the internet itself, the distance learning, the On-line learning, among others, we are once more going through a moment of big and meaningful changes. Changes that directly interfere/affect our behavior, the way we see the world, our relationships, our learning and therefore, our survival.

My questions as a University Teacher of the teacher training courses at Vale do Rio dos Sinos University (UNISINOS South of Brazil), refer to the reflections we need to do regarding the simple access to the information technology, that in the brazilian reality, does not guarantee a place in this scenery that appears. It is necessary to learn how to read it, to be able to integrate yourself, or re-create it.

Historically we know that certain events, phenomena of social-economical-technological order, promote the knowledge path that the humanity is facing at this moment. The old times metaphysics that was carried to the middle ages, did not correspond to the wishes of the new Man that was appearing, so the rationality did it. If the reason as the space for and to a change is the order, the new possibility of uniting the knowledge, being then ontology and the passive contemplation become excluded elements of the way the Man thinks and acts. Those transitions have always brought elements of exclusion being those generated by option or lack of conditions for the change. With the new technological paradigm that was born, we are again facing the fact that someone will be left out!

With the new technological paradigm that was born, we are again facing the fact that someone will be left out! But the issue is that today, even though we are not able to deal with a certain predictability of the facts, we are more aware of the existence of the changing process that we are going through. We can also conclude that the exclusion generated by the technology management nowadays will cause a deeper and inevitable impact than the changes of the past. Now, we can count on the speed the events happen, an element that before was not relevant in the process. If in the past we had centuries, years to establish a new order as well as time to adapt, nowadays this order changes every minute. " At every minute gone, new people access the internet, new computers are connected, new data is fed into the web. The more the cyberspace expands, the more universal it becomes, and the least united the information world becomes (...). This event is effectively changing our society life condition. However, we are talking about an unknown universal that intends to remain like that, because each new knot in constant expansion in the web can become a producer or a sender of new unpredictable information. And it can also reorganize part of the global conectivity by itself." (Levy, Pierre; 1998, p.1)

During almost all our philosophical studies, we have searched the control of knowledge, the control of wisdom. If before being UNIQUE was a possibility, now with "Descartes" the idea of fragmenting is better for controlling. And now that the control itself, not matter the choice, is not possible anymore because the fact that the knowledge is universal objects directly to the unification? What do we do?

We are facing a new paradox. Everything we have done so far was to better control/dominate, but now, the way of thinking changes.

This made me reflect about how we teachers of Universities facing this situation of many alterations, are developing with our students, cognitive functions such as memory, imagination, perception, comprehension, and logical thinking.

Are we providing knowledge to some, very few, in a politics of cognitive segregation? Or are we really preparing people to continue this process of knowledge management that is appearing?

About the Web – Cyberspace

For this type of analysis we first need to see the world after cyberspace. If the knowledge of frontiers, of cultures and from people finished then the possibility of relations became infinite. Then new information, new styles of thinking and the knowledge of simulations that do not belong neither to the logical deduction nor to the induction from the experience appear. (Levy; 1998).

If the individuality of the people and the knowledge gave shape to an era before, nowadays the collectivity and cooperation come naturally. What's more, the job market itself does not look for professionals who hold information or that simply execute their tasks anymore. The job offers in our days are for people who change information into knowledge; for people who take advantage of different resources and people to generate learning; for people who communicate using all the languages; for people who administrate their space and time themselves, we are talking about the entrepreneur.

But this person is not born ready, not even adapt easily to this new profile because of the individualist structure promoted by our educational system. This change is a social-educational process.

In this Digital Era, the Knowledge can not be mistaken by information. Using the Internet as a place of only bibliographical searches, or using CD roms, electronic books, and visiting sites as mere observers is a way of looking the paradigm today with the eyes of the metaphysics of the past. (Ferreiro, E.: 2001)

The information itself does not have characteristics of days before. A sender can be the addressee, a mediator, the end or the middle of a message, and from this point everything can start again with another order. This is what Roy Ascott defined as a flood, a flood of information. (In: LEVY; 1998)

The WEB gives the information/knowledge a new, atypical, collective, not temporal meaning, different from everything we have known so far. Everything has been changed forever, the language, coding and decoding signals and symbols. For instance, we take the reading in the Occident. Done and interpreted structurally from the left side to the right side, this reading gets a new dimension now, the depth. The Hypertexts do not allow us to only read in the two-dimensional plan. Either we get in the universe of hyperlinks or we will not be able to decode the messages interconnected.

If the hypertext generates a new structure of textual comprehension, how can we develop processes of learning and teaching that can be capable of naturally originate this thinking ? Perhaps a possible answer can be found in the exercises with estereograms[1], I mean, structures of vision in depth from the 90's; perhaps not!... Another aspect born from this new diagram and of vital importance is to establish the collectivity as a tool to interpret new knowledge. The knowledge net, the collective intelligence, he interactivity, represent the arrival of cooperation as well as a way toward the inter-culture or at least, the perception of numerous other cultures, values and thoughts. (Barrueco, A. 1992-1993)

Through this point of view the nowadays teacher can not repeat the models of yesterday. (Peters, O.: 2001). If before the consequences of these acts caused this outdated knowledge to spread, nowadays it causes complete exclusion.

"It is obvious that one of the main intentions of Education is to prepare the individual to acquire the best possible conditions to his/her adult life. And this acquisition happens when this individual is capable of acting freely and with responsibility and when he/she has access to most of the goods and economical and cultural values (...)" (Barrueco,A 1992-1993, p.97)

Thinking and acting under the new paradigm of information/knowledge, is not only thinking about the development of the knowledge, but also about the development of the new Man that is coming. Those traces of a split Man, of disconnected devices, of reason and emotion as different departments of their context, will soon be over.

The human development needs to be seen as an original and inseparable group whose unit is made of contrasts and conflicts, subjected to innovations and expanding. (Wallon, 1979).

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[1] estereograms structures of vision in depth; three-dimensional vision developed in the 90's. (PINKER, S. 1999)

About the Human Cognition

The first aspect of the need of a thorough investigation about the influence of technology in our lives, mainly in the way we think, can be found in one of the Cognitive Science Definitions by Michel Imbert In Andler (1998; p55). This definition refers to the study of human intelligence from its formal and biological structure to its psychological, anthropological and linguistic expressions. And thus, it can only be understood taking into account an inter-relation between the sciences that study the brain such as, psychology, computer science, anthropology, linguistics and the philosophy among others. With this definition we are once more facing the problem of revealing how our cognitive functions (affect) and are affected by the new representation of information that technology offers. Even the place where the investigation is held does not belong to one or another area of knowledge, but it belongs to its connections, considering multiple dimensions as the time, history, culture, neural nets, psyche.

It will not be enough for the teachers to know about the cognitive functions development in the past, not even analyze them with the same tools, the same knowledge and hypothesis. The memory, the imagination, the logical thinking, the perception, the comprehension will have to be structured again so that they will be able to interpret and create the new phenomena of the knowledge. It is not a privilege of functionalists and dual philosophies or even of the neurology to know about the mind and the Human Brain. More than never we, teachers, should try to unravel the phenomena of this relationship as a matter of survival (social Darwinism), ours and of our students.

One of the questions I ask myself when I try to work with the cognitive functions of my students during a cybernetic path is: - Do you think that with the Web, the information and the accesses have an intention of self-conducting and with this, conduct their own cognitive functions? I do not believe in this hypotheses very much but this would mean abandon all our History and rely on the lack of knowledge/neutrality. This would re-affirm the social segregation already imposed by the several languages used in the internet. That is why there is an emergent necessity of getting to know our cognitive process better.

The perception is also an element affected by the technological process. The truth is not unique, it is of different kinds. The truth depends on how the person looks at anything. If the mind is the brain or mind is part of the brain.... the crucial point here is that, Putnam (1970) as well as Nagel (1995) (In: Teixeira, 2000) and Chalmers (1996) have as their aim to make the Man worry about getting to know himself to better know.

The Cyberspace take us towards pluralists perceptions of the representation of meanings. The representations allow the meaning, I mean, a perceived relationship network that give meaning to what is lived. The pluralism comes before the sense of the meanings, therefore the comprehension of the plural is not to look for the truth but try to promote the syntheses of the dialectic , the one that results from the theses and anti-theses in a chaos situation; philosophical chaos.

"The social world is every day formed and designed because of a system of meanings, and these meanings exist, once formed, represented by what we call effective imaginary (or the imaginary). (...) However, there is a previous thing in the man, something that is not there to represent another thing, something that is before "operative condition of all previous representations, but that already exists in the representative mode" (Castoriadis, 1982 p.177 and p.172)

If this plurality of meanings is established as the new communication process, once more, we, teachers, are called for this awakening. We have the role of expanding the human capabilities, so that the people can intervene in the formation of their own subjectivities and also being able to act with power. (Giroux and Simon; 1994). The inter-subjectivity and the group of inter-subjectivities will be necessary fundaments for the new knowledge relationships.(Berger & Luckmann, 1985). When we deny the studies of the mind, be it in the Neurology, in the Reductionism or in the Functionalism we are moving a cycle of rationalist blindness. We know the problem, we just do not want to deal with it. At the moment we get over the new destinies of the human congnition facing the new information technologies, we are denying our existence in this planet. If before Man was blind and even though survived, nowadays, at every minute, we are targets of the past, we are just memory of the future. We are excluded by the criation. It is a good idea to get to know our brain. It means to create a new identity, create new relationships, to get free from the positivist, rationalist and individualist traditions. It means to create, maybe, a new theory about the Mind in its several different social-educational contexts and therefore, the beginning of a new History.

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Revisiting Schools: A Curriculum Check-up

Madeline Justice
Department of Secondary & Higher Education
Texas A&M University-Commerce
United States
Madeline_Justice@tamu-commerce.edu

Sue Espinoza
Department of Secondary & Higher Education
Texas A&M University-Commerce
United States
Sue_Espinoza@tamu-commerce.edu

Abstract: The Clinton administration sought to assure that every public school would become connected to the Internet. (Oliva, 2001) This meant that curriculum in the schools would change all over the nation. Students would be able to surf the web, chatter with newfound friends around the world, play video games connected to class assignments and much more. Glenn (1999, p.16) reported that there were several essential aspects of technology that educators should consider incorporating in school, among them: up-to-date technology to build management systems that can track individual student progress, intelligently developed software to provide students with real-world experiences not possible in the traditional school, 21st century technology-based assessment tools, and telecommunication technology that provides access to multiple-tiered digital libraries. Glenn's report signified how important technology needs to be integrated into the public school curriculum. This paper is a pilot study of where some public schools stand in the scheme of technology integration into the curriculum.

Introduction

Olivia (2001 p. 318) said that schools have only scratched the surface of the computer-assisted instruction and the use of the Internet as an instructional tool. The U.S. Census Bureau reported that accessibility to computers in the schools increased between 1984 - 1985. The report showed 63.5 students per computer and between 1996-1997 reported 7.3 students per computer (Market Data Retrieval 1997, p. 171). Another report stated that the percentage of public schools with Internet access jumped from thirty-five percent in 1994 to seventy-eight percent in 1997 (National Center for Educational Statistics 1998, p.40). Does this mean that technology has been integrated into the curriculum?

This pilot study investigated how has technology has been integrated into the curriculum by answering the following questions:
What technology is available for use by students and teachers on the public school campus?
How do teachers perceive technology integration within their curriculum area?
Who is responsible for the technology effort in the school?
What kind of assistance has enabled teachers to meet society's technological need?
In addition to the answers to these questions, the researchers will make recommendations based on the results of the study. This paper gives insight into how this challenge is being met in accomplishing the nation's goal, "going beyond technology literacy".

The Study

The target population of this investigation was 49 graduate students who were teaching in the k-12 grades in the public school. They were enrolled in technology or curriculum courses at a regional university for the fall semester 2001. The data collection for this pilot study was done at the end of the semester. The procedure for collecting the data began with three instructors passing out a survey form for graduate students to fill in after they had completed technology or curriculum courses. The survey was divided into five sections. Some of the variables involved in the study were grade level, subject, and years taught in the public school; availability and use by teachers and assistance from the administration; and the connection between class and computer activities.

Findings

Section A contained demographics of the teachers, which include grade level taught, subject, years teaching and size of school district. The results showed that there were 16 elementary, 10 middle school, and 23 high school teachers. The subjects taught included the following: math, Spanish, Web Mastering, all subjects, science, English, technology, career and computer investigation, computer application, keyboarding, history, reading, business, writing, theater, physical education, biology, physics, journalism, industrial technology, sociology, debate, English as a Second Language and criminal justice. The average number of years taught was 7.57 years. In this number teacher's experience ranged from one to twenty-eight years, and worked in small to large school districts.

Section B focused on the availability of computers used by students. The survey sought answers to questions about the location of the computers, Internet connections and technology usage. The results showed that 43 of the students said that they had computers available to them in the classroom; 47 had availability in computer labs; and 42 had availability in the library. Forty-five had Internet connection in the classroom; 45 responded that they had connections in the computer lab; and 42 had connection in the library. The last question in this category asked how the technology was used. The chart shows how the computers were used.

Computer Usage

How used	Drill & Practice	Problem Solving	Simulation	Tutorial	Games	Assigned Lessons
Number of student surveys (49)	42	36	31	40	32	41

* Because students could mark more than one time in the different categories, the categories equal one hundred percent.

Table n: description

The chart shows that of the 49 teachers, 42 used the computers for drill and practice; and 41 responded that they used technology for specific assigned lessons. In all of the areas teachers are using the computers to help students practice, enhance their thinking skills or create assignments.

In Section C, the question of how is the use of technology integrated into the curriculum the following responses were recorded:

"In algebra, we use the classworks gold for extensions, drill and practice and remediation, and we also use algeblaster, and the Internet for projects. As a teacher I use the projector to present lessons. We also use the graphing calculator on a regular basis."

"I use different power point presentation with my Spanish lessons. I also send out lesson plans and activities via e-mail for the teachers."

"I use Internet lessons for each Science chapter. Usually these involve research, then tutorials and games are available for leftover time (or at home)"

" I use many math games sites to remediate low students. I use Internet sites to expand on the information in science, social studies… Occasional I use it for collaborative projects. I also use many Internet sites for lesson plans, activities, and teaching ideas."

"Students in my classroom practice phonics skills on the Buggles each week. They do very limited research because of the reading level. They check the weather daily for our math meeting. Sites are book marked that pertain to our topic, periodically; and we allow the students to explore that particular site, such as "The American Flag" and a "Betsy Ross" site. Students also use the computers for Accelerated Reader Tests and to practice their keyboard skills. I find it hard to integrate technology on the second grade level from the web."

To the second question in Section C, who is responsible for the technology being integrated into the curriculum, the following responses were listed: of the graduate students most felt that the teacher was responsible for designing lessons that integrated technology; implementation must be done by the teacher; modeling effective use of technology is and should be done by the teacher and technology coordinator; training, support and computer maintenance should come from the administration and it does.

Section D of the survey focused on assistance through Technology Application TEKS standards, district professional development activities, regional service center activities, online resources and other professional development activities. It was recorded that 38 of the respondents felt they received help from the Technology Application TEKS standards; 42 received help through the district; and 33 received help from regional service centers. Thirty-nine received online assistance, and 13 received helped from other sources.

Section E focused on the number of computers in the classroom and lab, how they are used, where students do their assignments (lab, classroom, library, or home), how often and how long. The final questions focused on the connection between classroom and lab activities, and campus and district administration contributions to technology integration. Respondents said that they had computers in the classroom. The average computers in the classroom was 6.98; and they did the following activities: projects supported by the internet, word processor, classworks gold, algeblaster, web information, interactive web sites, web creation, teacher administrative duties (grades, attendance, memos, announcements, email etc.), tutorial or drill practice skills, newspaper productions, power point presentations, art books, classroom instruction, content integration, lectures and notes for absent students, incomplete work in the lab, and as a reward for students. Of the 49 graduate students, 32 take them to a computer lab. The least amount of days students spent in the lab ranged from once a month to a daily occurrence. The amount of time they worked in the computer lab ranged from 30 to 90 minutes. Activities done in the lab were: accelerated reading test, state practice test, internet activities, accelerated math test, projects word processing, power point projects, research, webquest, quizzes, guided search activities, virtual field trips, math, keyboard drills, grammar tutorials, KidPix, dictionaries, informational CD Roms, power point presentations, class assignments, fitness spread sheets and interactive lessons. It appears that most students work on assignments in class or in the lab. Fewer numbers work on them in the library or at home. If they do not have access to the classroom or lab they probably completed assignments in the library or home. Then the connection between lab and class work is closely related. The lab supplements or extends, reinforces, or follows up on classroom activities. The administration's contribution to technology was to provide hardware and professional development, maintain equipment, reward incentives for participating in technology training, and continue to apply and receive grant money for laptops in an attempt to stay abreast.

Conclusions

The survey showed that technology was available to teachers in three different locations: classrooms, computer labs or libraries. More technology usage could come through more computers being placed in the classroom. A computer (laptop for each child) would greatly enhance instruction. Teachers do perceive that they are integrating more technology into their curriculum, and they feel that they are responsible for meeting state technology standards. Assistance to teachers comes from district and campus technology coordinators, administrators and regional service centers in the form of professional development.

The public school is trying to meet the challenge. Universities, businesses and communities need to provide support by partnering, and obtaining grants, so that more computers can be placed in the classroom for student usage. Public school district need to provide professional development activities on a continuous basis to make sure that teachers stay " up-to-date " with the world.

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Becoming Proficient in Using Technology in Teaching: Stages of Acquisition from Novice to Expert User

Colleen S. Kennedy
Department of Teaching & Learning
University of Utah
United States
kennedy@ed.utah.edu

Abstract: This presentation examines models that have been devised to explain how teachers acquire and become proficient in teaching with technology. One characteristic common to all models is that teachers progress in *stages* from novice to expert users. Hypothesizing the existence of stages predisposes one to: a) describe the characteristics of each stage, b) develop methods to accurately pinpoint one's stage of development, c) study progression from one stage to another, d) determine if progress may be accelerated through direct intervention and, e) apply the theory and research findings that result from one's hypothesis and investigations in designing effective learning experiences for beginning and experienced teachers. The validity and utility of stage theory models of technology acquisition and use are examined and implications for both research and practice are discussed.

Society places a premium on preparing a new generation of students who will "... become literate, self-directed learners, problem-solvers, and productive members of a technology-oriented society" (Utah State Office of Education, n.d., para 2). Teachers who can integrate technology into the teaching/learning process are viewed as being essential to achieve this goal. The general lack of technology expertise by teachers has been the subject of numerous national reports (Market Data Retrieval, 2000; National Center for Education Statistics (NCES), 2000) and repeated calls to strengthen the preparation of teachers in this area.

Indications are that computer use is increasing among American teachers. Between 1998 and 2000 the percentage of schools reporting that the majority of their teachers used computers for planning and/or instruction increased from 47% to 76%. Similarly, the percentage of schools reporting that the majority of their teachers used the Internet for instruction increased from 39% to 77% (unpublished Market Data Retrieval data as cited in Myers, 2001). While teachers' use of technology in schools is rising (Myers, 2001) and their skill levels are improving "...only 8% of public schools in 2000 report that the majority (50% or more) of their teachers have advanced technology expertise. This fact confirms that teachers need additional training to get their skills to a more acceptable level, especially in the area of technology integration into the curriculum" (Piazza, 2001, para 3). Teachers themselves recognize the need for more technology-related professional development. In a recent national study, 82% of teachers cited the lack of time allocated for training, practicing and planning as a major barrier to using technology in teaching (NCES, 2000). In our zeal to accelerate teachers' proficiency in using technology, renewed emphasis is being placed on studying the development of technology acquisition and use among teachers.

Several models have been devised to explain how teachers develop expertise in integrating technology into teaching (Hopper and Rieber 1995; Mandinach and Cline, 1992; Rieber and Welliver 1989; Rogers, 1999; and Sandhotz, Ringstaff and Dwyer, 1997). "Many of these were based on teacher concerns about innovations involving the use of computers in the classroom, often referred to as concerns-based models" (Newhouse, 2001). According to Byrom (1998), Everett Rogers' more general *Diffusion of Innovations* (1983) model may also help to explain the development of teacher expertise in using technology.

While the various models differ in some respects, one characteristic common to all is that teachers progress in *stages* from novice to expert users. The notion of stages is perhaps the most compelling feature of the models because merely positing their existence prompts one to ask a series of questions, including: What are the promises and pitfalls associated with proposing a continuum of stages from novice to expert user of technology? What teaching behaviors are thought to be indicative of each stage of development? Are valid and reliable assessment devices available to assess teachers' stages of development? What strategies have been employed to help teachers progress along the path from beginning to experienced users of technology? How successful have these efforts been? What are the implications, for both research and practice, in adopting the view that teachers progress in stages from novice to expert users of technology?

The presentation provides a framework for examining the development of teacher expertise in incorporating technology into teaching. The intent is to critically examine research in this area and stimulate discussion regarding the validity, utility, and practical implications of these models for future research and for developing effective pre-service and in-service experiences for teachers. An attempt is also made to relate research on the development and use of technology by teachers to the broader literature on the diffusion of innovations.

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Online Challenge: Teaching Teachers to Share the New Hi-Tech Wealth in the Classroom

Dr. Lesia Lennex, Associate Professor of Education, Leadership and Secondary Education, Morehead State University, Kentucky, USA, email: l.lennex@morehead-st.edu

Abstract:
The multimedia collaborative project with schools (MMP) was designed to increase teacher skills in K-12 education. The project goal was to provide Morehead State University teacher education candidates with more realistic field experience in using technology to enhance learning among K-12 students. Students visited assigned schools and the assigned teacher at least six times during the semester. During the six visits, they planned a unit plan with the assigned teacher and taught, or assisted in teaching, the unit plan and evaluated student learning from the unit plan. Teachers were assigned based on student certification area. Although a secondary education class, students may have been assigned to an elementary teacher if their certification included those grade levels. This paper reflects some requirements of students for the MMP and self-reported data on use of technology in the classroom.

Introduction to the MMP

The Multimedia Project is an active learning service project in the public schools. Pre-service teachers participate in three hours of observation, then twelve or more hours participation with a specified classroom teacher. The students and teachers in this study were chosen on a volunteer basis. Teachers in the public schools were not compensated beyond the usual "student observation rate." Students received no compensation, but they gained invaluable experience working with technology in the public schools. The following were requirements for each visit. This ensured successful planning, delivery, and evaluation of a unit plan.

First Visit: Observe the teacher and record the answers to the questions from syllabus under the "multimedia project" section.

Second Visit: Participate in teacher-directed activities this visit. Teacher-directed activities are those designed by the teacher with students following direction in some way. Work with students in a one-to-one situation so that you can get to know them better. Grade papers from assignments that the teacher has made! Begin discussion with the teacher about the lesson you all would like to teach with technology.

Each visit from this point forward requires an email to Dr. Lennex. You must include information from your teacher, such as comments, or suggestions, to demonstrate the collaborative nature of the project. You should write the information requested in Word and either attach it or copy and paste it to Dr. Lennex. I prefer copy and paste. Can't be too careful with viruses! ☺ In the subject line of the email, title this "Visit Two." If you are working with a partner from EDSE 312, please send only one email with your partner CC'd (copied). I expect you to take turns sending the emails.

In your email, due by the following Sunday, midnight, detail the following information: 1) behavior of the students in the classroom- note any having IEP's and what must be done for reasonable accommodation in using technology, 2) possible considerations for using technology in this classroom such as software that is approved or existence of technology that is used by students, 3) the topic for your collaborative unit plan that will be taught using technology in this classroom.

Visit Three: Review software in the classroom applicable for the unit being taught. You may need to check out the software or equipment and bring it into the classroom. Please make sure to test this in the classroom on each computer being used. Note any bugs or malfunctions with the technology.

In your email, titled "Visit Three," due by the following Sunday, midnight, detail the following information: 1) specific goals for your unit plan to be taught in this classroom, 2) specific objectives for your unit plan, 3) length of the unit plan in days, 4) Location of technology – software or hardware - to be used in the lessons.

Visit Four: Obtain from your teacher a scoring guide (or several if the differ among units) that could be used as a sample for your unit plan. Grade student open response papers along with your teacher or as directed from your teacher. Be sure to use a scoring guide! Compare your scores with the teacher based on their scoring guide standards. How did you differ? Think about "what would Piaget do?"

In your email, titled "Visit Four," due by the following Sunday, midnight, detail the following information: 1) Specific procedures for each day of the unit plan to be taught in the classroom, 2) a SIMPLE scoring guide that may be used to evaluate a student's learning with the technology used in the lesson, 3) evidence that you have reserved the technology to be used in the classroom and a back-up plan in case the technology should become unavailable or fail.

Visit Five: Test your teaching "withitness" by teaching a small lesson with students. This can be a group activity or a whole group lesson. It may designed by the teacher.
In your email, titled "Visit Five," due by the following Sunday, midnight, detail the following information: 1) complete unit plan outline with all components required for each day's lesson plan. This may be a draft version.

Visit Six: Finish teaching and evaluate the final lesson in your unit plan for the multimedia collaborative project.

Comments on the MMP

Commentary on the project was very positive from both teachers and MSU students. Students had been somewhat apprehensive in using expensive equipment with public school students. Several stated that they did not feel comfortable allowing young children to use videocameras or laptop computers. In most cases, once the teaching unit was settled upon, students were using computers and equipment in the classroom. One of the best examples of use of technology occurred in a 4th grade classroom, an art student, who professed technology insecurity, used a videocamera and iBook for editing of a student made movie. The student was very surprised that public school children were so careful of the equipment and that they had made such a fantastic product. The entire unit plan taught creation of drawings for cartoons using Microsoft Word. The 4th grade students then made a movie of themselves practicing for a play. They edited the video in order to see how movies capture still frames to produce motion, just like a cartoon! The MSU art student in her comments on the project was not only pleased with student learning but also very happy with the professionalism and trust given to her by MSU for using the equipment.

Prior to the project, MSU students were asked to respond to this question: I can appropriately use technology to enhance student learning in the classroom. They (N=35) reported as 4 novice, 24 apprentice, 4 proficient, and 2 distinguished. The post-survey (N=28) indicated 11 proficient and 16 distinguished. When asked in the pre-survey if they could use a Windows operating system, 13 reported as proficient; the post-survey showed 22 as proficient. Most interesting is the increase in students claiming knowledge of Macintosh operating systems. Eastern Kentucky is almost entirely a PC supported school area and the MSU campus relies nearly totally on PC's. The pre-survey indicated 5 novice, 16 apprentice, 8 proficient, and 4 distinguished. The post-survey reported 2 as novice, 8 apprentice, 10 proficient, and 6 distinguished. Yes, I am a Mac fan and require their use in my classes. It is safe to say that students displayed a gain in perceived proficiency with technology.

Using Technology to Improve Instructional Planning

Guan-Yu Lin, Feng-Kwei Wang
School of Information Science & Learning Technologies
University of Missouri – Columbia
gylqz6@missouri.edu, wangfeng@missouri.edu

Abstact. Lesson planning is considered a critical but complex task to attain effective instruction. The traditional paper-based approach was found to be cumbersome and consequently detrimental in the willingness and effectiveness of teachers' lesson planning. A Web-based lesson planning system combining instructional planning and calendaring functions to support Missouri's education reforms was in the process of development and testing. Early usability tests proved the system to be positive in helping Missouri teachers plan their instruction. Some design issues were identified.

Introduction

The success of Missouri's education reforms, to improve student performance as measured by the Missouri Assessment Program (MAP), will require new and different teaching and learning strategies that align curriculum and state standards using inquiry-based instructional strategies and infusing instructional technologies. Successful teaching and learning does not occur by chance. It relies on careful planning of instruction. Since lesson planning is considered to be critical to the success or failure of teaching and student learning, it is vital that teachers are competent in planning daily lessons that support Missouri's education reforms.

Lesson planning is an essential but complex task (Borko & Livingston, 1989; Doyle & Holm, 1998; Johnson, 2000; Ornstein, 1997). Various theoretical models were developed to help teachers plan lessons (Eisner, 1967; MacDonald, 1965; Tyler, 1950; Yinger, 1980). While numerous studies exist to discuss lesson planning and its effects, the research on the effect of technology-based lesson planning systems is conspicuously lacking.

The use of technology to support lesson planning is not new. Several systems such as Computer-Prompted Instructional Planning System and Lesson Plan Maker appeared shortly after personal computers gained acceptance in early 1980s. Several studies have showed the positive effect of using personal computers to support lesson planning. Today, the advancement and prevalence of technology in schools makes it a very viable option for teachers to utilize in planning, sharing, and communicating instructional information. In particular, the Web allows teachers to create and access instructional plans without time and space boundaries. However, a search revealed that a Web-based lesson planning system combining instructional planning and calendaring functions to support Missouri's education reforms does not exist.

Issues

While Missouri has undertaken a State initiative to support Missouri teachers as they integrate multimedia technology into inquiry-based, student-centered instructional practices (http://emints.more.net), most teachers are still using pencil and paper to do lesson planning. Major drawbacks of this paper-based lesson planning include:

- The process is very labor-intensive and cognitively arduous. The task becomes perfunctory to many teachers. They feel obligated to write out lesson plans only because it is required by the administration.
- There are no systematic prompts or built-in links to information that can guide the teachers' lesson planning to focus on Missouri's education reforms.
- Lesson plans are not accessible to colleagues or school administrators unless special requests are made. Consequently, sharing instructional information among teachers is difficult.
- Parents have no access to lesson plans and, as a result, must rely on other methods to know what their children are learning on a daily basis.
- It is difficult to modify the contents of lesson plans once they are written on paper.
- Paper is not very durable and thus, valuable instructional information can be easily damaged.

Implementation and Preliminary Results

To help resolve these issues in lesson planning, a Web-based lesson planning system is under development with "teacher friendly" tools. The objectives of the system are threefold. First, it streamlines the lesson planning process to align with curriculum and Missouri standards and provides guidance with checklist functions to help teachers focus on addressing Missouri's education reforms. Second, it preserves valuable lesson plans developed by teachers for dissemination and facilitates the sharing of lesson planning knowledge and skills among teachers. Third, it promotes better lesson planning results through sharing and collaboration and enhances communication between parents and schools, thus increasing parental involvement in their children's education.

This Web-based lesson planning system is a work in progress; consequently, only formative evaluation is available. To date, a preliminary working system developed in Lotus Domino has gone through several rounds of prototyping and usability testing to collect user feedback. Early indicators suggest the system will be particularly helpful in the areas of:

- searching and adapting existing lesson plans for other uses,
- communicating instructional plans with other teachers and students, and
- developing lesson plans to meet Missouri academic standards.
- User feedback also reveals several issues that need to be resolved before the objectives of the system can be fully realized. Among them, the following two are most critical:
- The system has to be flexible to accommodate different instructional needs and processes of schools and teachers.
- Other non-technical arrangements such as training and support have to be in place to motivate teachers to use the system and to share their instructional plans.

Conclusion and future research

Preparing teachers for technology integration in their instruction and enhancing teachers' instructional quality are two important endeavors to advance K-12 education reforms. This initial phase of this project is to develop, implement, and pilot test the lesson planning functions. Later phases will include additional functions to support communication with parents via the Web and to scale-up the lesson planning model for statewide access and use, and to disseminate to a national audience. From a research perspective, this project will lead to a better understanding of:

1. How teachers plan instruction using technology?
2. How teachers share instructional information through technology, how technology can assist with instructional planning?
3. How the Web can serve as a communication means between parents and schools?

The on-going process of building the lesson planning system and preserving instructional plans in a sharable library enables teachers to better plan their instruction and share their instructional materials. As the system matures and the content grows, it will have the potential of improving instructional planning process and products of Missouri teachers and thereby advancing the entire K-12 education enterprise at Missouri.

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Enthusing Teachers About Infusing Technology:
Increasing Teachers' Use of Technology in the Classroom

Annette B. Littrell

Tennessee Technological University

Abstract

For the past decade, our schools have rushed to put computers in the classroom, in preparation for the 21st Century. Millions have been spent as the ratio of students to computers decreased from 125:1 to less than 6:1 in the state of Tennessee alone (Education Week, 1999). Internet connections increased, as school after school gained access to the Information Superhighway. No one offered a dissenting opinion when broad educational statements were made about the new Information Age replacing the Industrial Age, or about the need for technology in the classroom. And now that those computers are in the classroom, how are they being used?

Those struggling the most with this new technology seem to be today's inservice teachers – all 2.8 million educators in kindergarten through 12th grade – who lack the skills, background, and opportunity to use technology as they should. A call was issued by the Office of Technology Assessment report (1995) for the technology training of teachers to become a national priority. For preservice teachers, technology training did become a priority of sorts: most all teacher education programs now require at least one course in technology in their degree program, some require two.

However, is it possible that only one or two 16-week undergraduate classes, primarily stressing computer competencies, are sufficient to ensure that once the students graduate from the university and find themselves in a classroom they will know how to integrate technology into the curriculum?

Of all the possible barriers to technology use, one that we certainly should address is the lack of adequate training to use technology effectively. Though most inservice teachers see the value of technology, and though most claim at least a novice-level of computer literacy, few are truly prepared to use technology resources in a classroom. Most of the instruction preservice teachers receive is *about* technology, rather than providing experiences in using and integrating technology into the curriculum. Therefore, when they transition from preservice to inservice teachers, in charge of their own classroom, they feel ill-prepared to make use of a technologically-enriched classroom.

Studies have shown that stand-alone technology courses, such as those taught in most teacher education programs, only develop basic computer literacy skills and do not prepare educators to use instructional technology in the classroom. A survey was completed by 168 teachers within a county school system to assess classroom uses of technology, dividing uses into classroom management (using such skills as taught in literacy courses) and instructional technology (infusion of the technology into the curriculum). Results supported the hypothesis, showing that most teachers were using classroom computers only for management tasks. Strategies for increasing the instructional use of computers in the classroom are discussed.

National SMETE Digital Library for Teachers: Process, Promise, Progress

Ellen S. Hoffman
College of Education
Eastern Michigan University
United States
ehoffman@online.emich.edu

Marcia A. Mardis
Center to Support Technology in Education
Merit Network, Inc.
United States
mmardis@merit.edu

Abstract: The emerging National Science Math Engineering and Technology (SMET) Education Digital Library, which is being constructed by a variety of educational institutions, is an "online network of learning environments and resources for SMET education at all levels" (NSF, 2000). It is envisioned as a premier portal to a rich array of current and future high-quality educational content and services, and a forum where resource users may become resource providers. Technical, social, and economic issues involved in developing the library are reviewed, with emphasis on implications for teacher education and instructional support.

Introduction

The National Science, Mathematics, Engineering, and Technology Education Digital Library (NSDL) is an educational vision and goal with initial funding from the National Science Foundation (NSF)—a vision that is different from any existing library today. Formal and informal partnerships and projects among universities, K-12 entities, professional associations, government agencies, non-profit organizations, and corporations are part of the Library's realization. When the NSDL opens its virtual doors in Fall 2002, it will be the culmination of over a decade of research and collaboration among librarians, technologists, and educators in the public and private sectors (Wattenberg, 1998).

The NSDL will serve not only as a "gateway to a rich array of current and future high-quality educational content and services," (NSF, 2000), but also it will encourage users to engage with and to create resources. Recommendations for a national digital library for science, mathematics, engineering, and technology education (SMETE) have focused on the need to define and interconnect user communities, establish subject-specific and interdisciplinary collections and services, and develop tools that focus on learning and teaching needs. This paper is a review of the vision, history, current progress on organization and technical infrastructure, and the potential for new avenues in teacher support and education.

The Internet Paradox: Is More Less?

With the rapid growth of the Internet, education has augmented access to information and resources and increased opportunities for collaboration and community building. Yet, these benefits have also proven to be problematic. The Internet can be a powerful resource to improve teaching and learning because of the wealth of freely available information resources and tools, but it too often overloads the user. The high-quality content educators seek can be difficult and time consuming to locate despite the increase in sites that attempt to provide searchable, usable materials for teachers and students. Further, challenges related to intellectual property have hindered creators from contributing quality materials and establishing economic models for the sustainability of content and services.

Clearly, current models for searching and archiving materials are inadequate to meet educator expectations and requirements. As a result, digital library development must go beyond simply producing another site with selected links on specific topics. Critical barriers for digital libraries today are as much human issues as technological ones. Even when good collections are developed, getting them known and used remains problematic in this age of Internet information overload (Zia, 2001). Further, when confronted by the overwhelming amount of content, learners may not have the experience or basic knowledge to evaluate and use the resources.

While the Internet contains an incredible diversity of resources, it also offers the potential to combine authoritative collection development with highly sophisticated tools that can enhance research efficiency and provide scaffolded support for learners. An interactive and personalized research environment can unleash the power of digital information and improve information analysis, synthesis, and application (Scribner, 2000). The NSDL has the potential to encourage and support inquiry-driven, collaborative learning while incorporating distributed architecture to provide stability, reliability, and smooth interoperability. At last, the NSDL has the possibility of allowing pre-service and in-service teachers to bring innovative tools and practices into their classroom in a supported and effective manner.

While concerns about organization, access, economics, and educational applications are well documented, the technological barriers to achieving a new Internet paradigm are less clear-cut. In the case of the emerging NSDL, questions have been raised about the extent to which existing protocols and applications could be recombined to achieve technical objectives and the identification of gaps that will require new development. To some degree, the Library's debut is premised on the concept that given the right funding and organizational structure, technical solutions are either in existence but not yet well placed for optimal use and interoperability or can be developed within known frameworks in a relatively short timeframe.

A Virtual Library Vision

While numerous projects have explored the digital library paradigm, no project has yet met the potential imagined for such an enterprise. A prime consideration in building digital libraries is meeting users' unique needs. Therefore, the NSDL will have to provide value-added services that enhance the user experience; users must have a compelling reason to visit the Library rather than to use public search engines.

A 1997 National Research Council digital libraries workshop (NRC, 1998) raised important issues for in-service and pre-service teachers: faculty want to change their methods of teaching but have no single point of contact to search for useful ideas and journals often do not discuss what techniques failed in the classroom. Reform efforts need an easily accessible and searchable source of programs and resources that have been used successfully and have been evaluated for effectiveness.

The Library will have many resources and services beyond traditional books and journals, including non-textual sources, lesson plans, curriculum guidelines, and tutorials. "Beyond providing traditional library functions such as the intelligent retrieval of relevant information, indexing and online annotation of resources, and archiving of materials, the digital library will also enable users to access virtual collaborative work areas, hands-on laboratory experiences, tools for analysis and visualization, remote instruments, large databases of real-time or archived data, simulated or virtual environments, and other new capabilities as they emerge" (NSF, 2000).

The NSDL intends to support pre-service and practicing teachers through its commitment to assuring resource quality, supporting contextual learning, fostering critical literacy skills, acknowledging access inequities, and advancing scientific understanding. The Library will not enforce clear bounds between users and contributors and will encourage active sharing and community building among participants. Educators will have the ability to access a broad range of learning objects and to utilize tools that allow those objects to be repurposed for classroom application. Of course, issues of sustainability and intellectual property will need to be addressed. As a result, all stakeholders are expected to be active participants in the Library's development and future success.

While NSDL's focus is on SMET education content, services, infrastructure, and community, the tools and techniques that are developed and tested in this program will apply to other virtual library development. The NSF effort is seen as a prototype that can lead to further deployment in fields such as medicine, humanities, and social sciences. In addition, NSF is developing international linkages that have the potential to create global resources for SMET education.

Progress and Achievements

The NSDL efforts began in 2000 with projects focused on development and deployment rather than basic research. Projects are grouped into four tracks: Core Integration, Collections, Services, and Targeted Research. Universities and professional societies lead most efforts with nascent private sector and publisher involvement. All projects represent more than one institution and many have K-12 linkages. Project abstracts and links to project sites can be found at http://www.nsdl.nsf.gov/.

Core Integration projects are designed to provide management and coordination, technical infrastructure, standards and requirements for participation, and outreach to providers and users. Collections projects are those which focus on content, generally within a specific discipline or coherent theme. These projects are also focused on content use issues like discovery and access modes, classification and cataloging, acquisitions, and referencing. Collections may include non-textual resources, such as data sets, analysis software, visualization tools, or reviewed commentary. Initial Service projects are focused areas that content providers will need to integrate their materials rather than direct user support or evaluation. Services include learning systems that tap digital content, metadata translation, quality and peer review, content identification systems, and mechanisms for categorizing and searching non-textual resources.

Key organizational concepts that guide NSDL progress are its distributed nature, the need for active governance that involves all stakeholders beyond grantees, a variable collections structure that includes those following prescribed requirements, harvested through targeted selection, and gathered with smart agents. The NSDL also prioritizes the development of a technical in frastructure that will support multiple portals for entry, and the use of multiple metadata standards to meet the diverse needs of the different disciplines and users.

Future Challenges and Considerations

How will the NSDL differentiate itself from other Internet services or resources? What participation incentives will be sufficient to bring all stakeholders to the table through grant programs? The NSDL will need to consider a distinctive program for intellectual property rights, support and training for users and contributors, a way for organizations to maintain individual identity while benefiting from collective branding, professional recognition for individual participation, and evolution of NSF programs and policies that will bring together this large community and rich potential.

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How to Successfully Implement Change — Build It and They Will Come

Donna Musser, University of Missouri-St. Louis, US
Cheryl Bielema, University of Missouri-St. Louis, US
Robert Keel, University of Missouri-St. Louis, US

Rogers (1995) and Light (1998) have described the diffusion of innovation according to series of transformational stages. After early adopters successfully integrate new technology in their teaching and research activities (largely on their own), the institution is often faced with pressure to bring the masses of faculty and staff to the innovative approaches adopted by the risk-takers. The diffusion of technology innovation at the University of Missouri-St. Louis (UMSL) has occurred in a textbook like fashion, with a few exceptions. These exceptions, successes, and proposed recommendations learned from this process will be discussed in this paper.

The University of Missouri-St. Louis is a typical urban campus serving more commuter than residential students, utilizing a high percentage of adjunct faculty, and a history of telecommunicating both programs and distinct courses to remote sites. Lessons learned from these experiences prepared campus technology administrators to identify potential barriers to moving courses online. Beginning in the mid 1990's campus innovators had integrated online content into their courses utilizing a variety of means to accomplish their goals. These innovators increasingly wanted to do more, and campus technology administrators were faced with providing more and more support to a myriad of hardware and software needs as resources and technology personnel were diminishing. Standardizing campus technology hardware and software was the first step, while identifying and adopting one Web Course Management System to be used campus-wide was the next. Change agents, in both the administration and faculty, recognized the need to identify potential sources of power (innovators and visionaries), and to use these relationships to move the campus forward. These change agents recognized that by sharing their visions, power, and influence the campus, and its students, would all benefit.

Cummins and Worley (2001) delineate the critical change stages as motivating change, creating a vision, developing political support, managing the transition and sustaining momentum. UMSL began motivating institutional change in the mid-1990's by instituting a plan to provide desktop systems for faculty and staff, and systematically replacing them every four years (replacement has since accelerated to every three years). Faculty and staff choose from one of the standard (PC or Mac) systems, with the option of the unit paying for additional features beyond the standard system. Two years later, Information Technology Services (ITS) identified standard platforms and software the campus would support. In 2000, one Web Course Management System was adopted campus-wide to further standardize the technology on campus. This enabled the campus to concentrate its resources and develop expertise in specific technologies, and this has led to further standardization of needs and support. These processes helped shape an institutional culture oriented towards change. Resistance was managed by providing faculty and staff with new hardware and resident software support specialists. By committing resources to the vision and putting structures in place to support the transition, this process additionally reflects Cummins and Worley's fourth stage, managing transition. Cummins and Worley's second stage, creating a vision, emerged as key innovators and stakeholders worked to communicate their ideas to the campus community. However, this vision was not adequately articulated campus-wide due to a lack of consistent and clearly defined technology terminology. These barriers in communication led to confusion as to where the campus was headed, and how proposed changes fit into the mission of a land-grant institution. As with any higher education institution, resistance is often articulated in comparing new practices to "traditional practices." Key innovators and stakeholders are now in the process of influencing other stakeholders on campus via a well-planned and orchestrated process of providing instruction, in-mass or on demand, and involving all who wish to participate in monthly "conversations" on how to utilize available technology to improve and/or enhance instruction and to further engage the student in learning.

What we did right was to first standardized hardware and software to maximize limited residential technology support. Second, we adopted one Web Course Management System and put faculty support services in place. Those support services have expanded as additional faculty and students adopted the change to web-assisted course development. Additional right moves include:

- Unilateral creation of all courses in the web course management system, and populating these courses with students and faculty;
- Ongoing orientation, problem solving and support for faculty;
- An organized effort aimed at providing new and adjunct faculty with access to online technology;
- Help documents and orientation for students (web-based and on site); and
- Focus on teaching implications and enhancements while integrating technology.

The University of Missouri-St. Louis has followed a classic change process, and is creating desired change by following the advice of those change agents and researchers who have successfully led change. The adoption of the online technology has been dramatic and beyond expectations. The experiences on this campus can be used to facilitate change and encourage innovation on other campuses.

Digital Reality or Digital Insanity? The Lived Experience of Teachers in a Digital School District

Christian Penny, Penn State University, US

Interest in educational reform has reached new heights in recent years. Grappling with the problem of achieving large-scale reform educational reform has become the new challenge. There are many new examples of initiatives and corresponding lessons of change to be mined (Fullan, 1991). But much of the research on educational reform has neglected the human side of change. Little research has been done into educational change from the perspective of teachers who are simultaneously the subjects and objects of change (Nolan & Meister, 2000; Fullan, 1991).

People react to new experiences by attaching their own construction of reality to them regardless of the meaning assigned to them. Thus, the implementation of educational changes is never fully envisioned until the people in the particular situations attempt spell them out in use (Fullan, 1991). The purpose of this research is to provide in-depth stories on the lived experiences of public-school teachers who are engaged in a school restructuring effort intended to transform Spring Cove School District into the Digital School District. This rural school district in central Pennsylvania was recently awarded $4 million from the state in an attempt to become an integrated district that combines the Internet with the best emerging educational technologies.

The research will be yearlong study during which the researcher will spend considerable amounts of time living with six teachers. The goal will be to capture and portray as vividly as possible the teachers' experiences during the restructuring implementation and their attempts to make sense of their experience. In doing so, the researcher hopes to flesh out and give life to many concepts that are used to analyze and explain school change. The researcher also intends to highlight the critical role teacher's play in the change process.

In response to calls for research that will enable educators to achieve a deeper understanding of the meaning of educational change for teachers (Nolan & Meister, 2000), this study will be designed to describe and interpret how public school teachers define and make meaning of becoming 'Digital'. By focusing on the questions, what did these teachers experience? And, how did these teachers understand these experiences? This study is rooted in phenomenological inquiry, a form of interpretive inquiry that focuses on human perceptions.

Research in the phenomenological mode attempts to understand the meaning of events and interactions of ordinary people in particular situations (Bogdin & Bilken 1992). An effective way to study program implementation and educational change is to get detailed, descriptive information about what is happening (Patton, 1990). Since educational change and program implementation is characterized by a process of adaptation to local conditions, needs, and interests, the methods used will be open ended, discovery orientated, and capable of describing development processes and program changes. As linked to Patton's beliefs, this qualitative research case study is designed to describe the meaning the teachers attached to the change process of becoming a Digital School District.

The researchers interests, values, and experience with the research problem are a source of motivation for the study. Supervising preservice teachers in the school district for over two years, the researcher has experienced the change personally and witnessed the ways in which it was affecting teachers. Thus, the researcher has a vested interest in the outcomes, not that a certain outcome is expected, but that the interest generated from the researchers personal experience will keep them focused on the details of the inquiry.

The best way for us to know what others are experiencing is to find methods of data collection that allow was to devise procedures and strategies to consider experiences from the participants perspectives. Therefore the researcher will utilize fieldwork as the primary research instrument. In-depth interviewing, participation, and observation in the setting, document review and field notes, which are the fundamental methods that qualitative researchers rely on for gathering information will be used in this study (Marshall and Rossman, 1995).

The data will be analyzed through a process of systematically searching and arranging interview transcripts, field notes, documents and other materials to increase one's understanding of those data and present the discoveries to others (Bogdan & Biklen, 1992). The researcher will use a modified version of Straus and Corbin's (1990) coding procedures.

Through the eyes and the experience of teachers, the researcher intends to create and recreate a picture of how teachers make sense of and understand Spring Cove's school restructuring efforts to become a Digital School District. The overarching goal is to open a window in the realities of this major educational reform at the classroom level.

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Cyber-cerebration: Edge Happenings at Western Illinois University

Susan C. Philhower, Special Education

Jennifer Allen, Law Enforcement

Sara Simonson, Curriculum and Instruction

Rodney Greer, Educational and Interdisciplinary Studies

Barry Witten, Curriculum and Instruction

Greg Montalvo, Educational and Interdisciplinary Studies

Western Illinois University
United States

Less than six months ago, 25 colleagues gathered for a celebration. We were recruited for the Innovators in Teaching and Learning cadre, lured by the dangle of a wireless laptop and the desire to become edge users of technology. Today we again celebrate the modest, but steady diffusion that our team members have made. We've come to think with you about the strengths of our cross-disciplinary team, the formation of a community of learners, and the application of our new skills in our teaching.

Technology has had an impact on our lesson content, the thinking processes we employ with our students, and the products our students produce. The diversity of the cadre was one of its strengths. There were experienced distance teachers, newbies and converts in the group. We were united around the Blackboard course that gave structure to our development plan. Participation in the course gave us much need support in the earliest stages of our endeavor. Relevant readings were the focus of our discussion and served to re-focus our commitment to the project. After a particularly globe trotting summer, we are back in harness digesting Kurzweil's book, The Age of the Spiritual Machine (Kurzweil 1999). The futuristic scenarios spun out by this author lend further motivation to our work together.

Panel members will briefly share their story. You'll hear about electronic portfolios and website development, concept mapping in teacher education, on-line teaching and learning, and integrating technology and content standards with student products that include hotlists, treasure hunts, webquests, and desktop publishing. We'll document our learning and challenge participants to join the fun as part of their professional development.

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The Use of Laptops within the Gulf and Islamic Culture

Bradley Saunders, Zayed University, AE
Emad Bataineh, Zayed University, A E

This paper describes the experiences of both students and faculty in a university for women in the Middle East which requires all students to purchase a laptop computer. It examines the benefits and drawbacks of laptop use within the Gulf and Islamic culture. The positive reaction of female students toward the use of laptops is compared with less successful uptake by female students in the West.

Consideration is given to how laptop use has impacted university planning. To what extent has the provision of laptops to students precluded other means of instruction? How can laptop use be regulated and standardized given the intrinsic freedom that laptops make possible? To what extent do societal pressures reduce the possibility for these young women to benefit from their laptops when away from the University Network and Intranet?

The impact of unexpected technical problems and the need for institutions to develop and implement integrated plans for change are discussed, as is the effect on faculty, who have to cope not only with a new workload created by the introduction of laptops but also with an unexpected new learning paradigm.

Communication in the Virtual Teaching and Learning Space

Antonio Simão Neto
Pontificia Universidade Catolica do Parana
Brazil
4simao@terra.com.br

Abstract
This research project addresses broadly the issue of whether the new media, being potentially interactive (and thus bridging teachers, students and other educational agents) may open new ways of teaching and learning, which are more adequate to contemporary life and the global society.

"Technology is the campfire around which nowadays we tell our stories."

Laurie Anderson, American artist and multimedia pioneer, chose the image of the campfire to drive our attention to the central role of technology in our society, shaping out collective views of the world and mediating human relations.

The university, as a social and cultural institution, could not be untouched by this phenomenon. In fact, there are many similarities between the mass media and the traditional teaching model. Both are marked by the separation between the main agents (producers/audience, teacher/student) of the communicative process.

New media, being potentially interactive, may help educators in their efforts to close the gap related above, creating new learning environments which are more “in sync” with post-modern society and culture.

More directly, it aims at identifying the degrees of teacher awareness and understanding of the communicative changes brought by the new interactive media such as the internet and its impact on the learning process as it happens at the Pontificia Universidade Catolica do Parana.

This project is part of the research being carried on by the research group Virtual Leaning Communities, itself part of the broader Theory and Practice of Higher Education project, linked to the Masters and Doctoral programmes at our institution.

Our university began to implement last year a new educational model, for all its 51 undergraduate majors, based upon “learning programs” developed jointly by teachers and students. This model leans heavily on problem-solving, investigative skills as well as on collaboration and tutoring.

Eureka is a collaborative learning environment, developed at our university, in cooperation with Siemens Corporation. As many other such environments, Eureka offers discussion forums, e-mail, chat room, scheduling, message board, repository, and other online and offline resources aimed at facilitating collaboration and learning. At the end of academic year 2000, there were more than 20.000 Eureka registered users, of a 26.000 (staff and students) academic population.

Eureka`s 850 virtual rooms are our research universe. They are the environment in which the central issue of the use of new technologies as support for educational changes can be addressed. We will follow the tutors from the moment they open their virtual rooms until the end of the academic year, looking into the ways they communicate with their students in this environment, the tools they use and how they use them, the ways the students react to stimuli and how they start and keep their own forms of collaboration and communicative exchange.

So far we have been able to identify a close resemblance between the way mass media mediates communication and the way traditional teaching happens.

We want now to find out whether new media can be associated with a new learning paradigm: a student-centered, problem-based, research-oriented, knowledge-building model, where collaboration and interaction are essential.

Mass-Media and Traditional Teaching Common Characteristics.

Centralized control: messages (content and form) are constructed by the few who control the medium
One-way communication: messages travel in one direction only, from those who control the medium to those who receive them
Prevalence of "cold" media prevail: as defined by MacLuhan, the more finished the message is, the less space the medium leaves to the spectator, the colder the medium
The spectator: from the Latin *expectare* (to be there, just watching); spectators/students are expected to sit quite and listen/watch, without interfering with the production of messages.
Linearity: messages built along a pre-defined, pre-built sequence, in a linear flow with its own temporality, independent from the spectator, who cannot alter this direction or speed, nor choose alternative ways.

New interactive media characteristics

Decentralization: one the main characteristics of the internet, the first big media without owners and central controllers, opened to all
Two-way communication: information flows in multiple directions, allowing new communicative exchanges
Interactivity: hot media prevails (if we take the potential for interaction in its fullest sense).
The "users": so new that there isn't a good word for it, these new spectators refuse to "just watch"; they want to participate, to interact, to wet their hands in the ocean of information, to manipulate messages and create new meanings
Multimedia: more than just a new audiovisual medium, multimedia is opening a universe of multiple stimuli
Non-linearity: the wide use of "water metaphors" (to navigate, to surf, to dive...) to describe user movements in the information "ocean" reveal the non-linear structure of the new media; one can move in the surface, or dive into depths never made possible by linear media

New media and contemporary education

As we develop and spread new tools around campus, new forms of communication between teachers and students can take place. New tools, however, are not enough to make a difference. It is the attitude of the learning agents that counts more.
If we want to depart from traditional, informative teaching, and move towards new directions for learning, we must try to establish new communication spaces and to develop new communication skills, alongside with the ones we are familiar with (at least as consumers of media products).
That is the challenge for nowadays educators. New forms of teaching and learning surely will employ new technologies and resources, more interactive and flexible. On the other hand, educators must change their views and attitudes accordingly. It is imperative that we find a common ground upon which true, rich communication exchanges with our students can occur.
Learning can and must be a joyful, stimulating activity.
The university (and the school as well), as a communicative space, must go beyond the model based on the mass media, reaching for the new digital, interactive communication - if education is to keep on being significative and important to students and to society.

Sustaining Technology Integration: Lessons Learned

Sean Smith, University of Kansas, US
Joseph O'Brien, University of Kansas, US
Steven Smith, University of Kansas, US

This presentation will focus on the of one School of Education's effort to sustain technology integration across the preK-12 classroom environment. Having successfully integrated technology across several teacher preparation programs, project emphasis has turned towards creating and sustaining technology rich environments for appropriate student teaching and internship placements. Current efforts will be shared and idea and suggestions will be discussed amongst participants.

Teacher education students are capable of serving as significant players in the effort to integrate instructional technology into programs. While the students though become more competent and frequent users of instructional technology, they encountered some of the implementation barriers identified by National Council for the Accreditation of Teacher Education (2000) and the Office of Technology Assessment (1995) as they move into classroom settings. One student, for example, ran afoul of the traditional classroom operation when he attempted to use instructional technology during his student teaching. This suggests that addressing one implementation barrier, teacher training, in isolation runs the risk of failure in the long run. More importantly, this does a disservice to the teacher education student. Marcinkiewicz (1996) reported that while student teachers possessed high expectations about the use of instructional technology in their future classroom, their first year of teaching dramatically lowered these expectations. The challenge facing us not only is how to better prepare our students to use the technology, but also how to work with K-12 educators on the implementation barriers unique to their setting.

This demonstration/poster seeks to identify the challenges faced in sustaining technology use across student internship as well as student teaching experiences. In cooperation with Professional Development Schools, this PT3 Project (Learning Generations) is currently developing ways to enhance preservice teacher education students use of technology during their critical teaching development experiences.

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Why should we motivate teachers to use instructional technology in their teaching process?

Panel discussion prepared by Dr Armand St-Pierre

Learners are moving from a traditional educational environment into an open learning society where they can learn anywhere anytime. They are brought up in a multimedia and technology environment where new media are available to promote learning outcomes. More learners are connected on a daily basis to the Internet and they have the opportunities to surf virtual libraries and electronic journals to enhance learning outcomes. The web offers a rich platform of educational contents. The use of information technology could help to support new ways of collaborative learning, electronic communication, and independent learning. Research shows that conservative institutions entering into an information and communication age still emphasize the university professor as the classic information-giver, while nowadays several research studies advocate a collaborative learning environment where the professor becomes a mentor to his/her students.

The author of this article believes that Web media and technology should be used simultaneously in the teaching and learning processes, i.e. there should be equilibrium between the left-hand side (teaching) and the right-hand side (learning) of the equation with respect to the uses of Web resources in the curriculum. If the professors were using Web media in the delivery of course contents, the students should be learning how to integrate these tools into their learning process and vice versa. The technological delivery platform for the curriculum is ineffective if the students are frequent users of Web resources and technology in their learning process; whereas, professors do not know how to integrate these media into their teaching process. Based on the author's experience in using technology in teaching for several years, the author firmly believes that Web media and technology had to be in equilibrium if the institution wants to effectively deliver the curriculum. In fact, empirical results of different surveys done by the author corroborate the theoretical justification for using Web resources and media in the teaching and learning processes.

The goal of this panel is to discuss the pros and cons why any school, college, and university should introduce in an efficient and effective ways instructional technology in their teaching process. Some of the issues to be discussed could be: what is the tradeoff between increase in student learning with traditional methods versus time invested in learning new technology— Is it worth the effort? Technology integration takes valuable time and effort .... Are we willing to do it?

Participants from the floor will have the opportunity to present their experiences with respect to this topic. A summary of key factors will be presented at the end of the panel discussion to help participants to introduce technological media in their educational environment.

BE THE TECHNOLOGY:
REDEFINING TECHNOLOGY INTEGRATION IN CLASSROOMS

Steven C. Mills, Ph.D.
Institute for Life Span Studies
University of Kansas
USA
stevem@ku.edu

Robert C. Tincher
Computer Studies
Independence (KS) Unified School District 446
USA
btincher@indyschools.com

Abstract: One way to better understand the difficult instructional issues associated with the integration of computer technology in classrooms is to analyze the teaching practices of teachers using technology in classrooms. We established a set of technology standards and educational best practices to describe how teachers use technology for teaching and learning in the classroom. We learned that technology integration is more than just using and operating computer hardware and software. By establishing technology standards and associating specific educational best practices to the standards, teachers were able to progress from using the technology to *being the technology*.

The goal of transforming teaching and learning by increasing access to and use of technology in schools and classrooms has been near the top of most educational reform agendas since the early 1980s (Cuban, 2001). We launched a technology professional development initiative in a school district with the hope of revolutionizing classroom teaching practices and preparing a new generation of learners for a 21st century workplace driven by the acquisition and manipulation of information. Our model was based on a set of technology standards and indicators that clearly described the educational best practices for teaching and learning with technology. For technology to transform teaching and learning in the classroom we knew it required more than teachers just using technology—we wanted teachers to *be the technology*!

The technology standards on which our technology professional development model was established were formulated by synthesizing national, state, and local technology standards and then identifying educational best practices that supported these standards within the local context. We discovered in our literature review that although many reasonable and appropriate technology standards for teachers exist, these standards were are often stated in abstract or general terms. Additionally, since there was a high degree of variability in educational beliefs, technological availability, and state and community expectations, technology integration should be locally defined, using available research models and national standards as a foundation (Pierson, 2001). To support and reinforce this *be the technology* professional development model, we devised a set of performance assessments whereby teachers could demonstrate various levels of proficiency in technology integration and receive financial incentives.

To appraise our accomplishments, we undertook a process to evaluate the technology integration practices of teachers before and during this initiative. Although several models or strategies have been employed by educational researchers and practitioners to provide a systematic approach for determining the quality of innovation implementation, the Concerns-Based Adoption Model (CBAM) (Hall, Wallace & Dossett, 1973) fit our evaluation requirements because it emphasized change as a developmental process experienced by individuals implementing innovations within an organizational context. Over time CBAM has evolved into a comprehensive systemic change model that allowed change investigators and facilitators to understand organizational change from the point of view of the persons affected by the change (Surry, 1997).

CBAM is based on the assumption that change is best understood when it is expressed in functional terms—what persons actually do who are involved in the change. Since change involves developmental growth, the focus of facilitation is with individuals, innovations, and the context (Hord & Huling-Austin, 1987). CBAM provides for the development of diagnostic tools based on the design of the innovation being evaluated and the operational patterns of those using the innovation. One of these tools is the Innovation Configuration Matrix or Map (ICM). The ICM delineates an innovation in the form of a two-dimensional matrix along a scale that renders closer approximations of conceptualized implementation or use along one dimension of the matrix and the various configuration components along the other dimension of the matrix. Rather than being a static measure, the ICM has a procedural definition that allows an innovation configuration to be designed relatively easily for a specific instructional innovation. Thus, we formulated an ICM based on the technology standards and indicators of our professional development model to evaluate the quality of technology integration among teachers in the school district.

METHODS

Instrumentation

An instrument for analysis of technology integration and implementation in classrooms was developed. This instrument, the *Technology Standards Integration Configuration Matrix* (*TSICM*) was based on a consensus-building process that followed a procedure developed by Heck, Steigelbauer, Hall, and Loucks. (1981) and used previously by the researcher (Mills & Ragan, 2000). Relevant national, state, and local technology standards were reviewed and evaluated by the researcher in conjunction with the district technology committee and technology coordinator. The committee agreed upon 18 technology integration standards that were appropriate for the school district. Technology integration standards were organized into three skill sets or phases: Using and Operating Technology in the Classroom (Standards 1-6), Facilitating and Managing Classroom Technology (Standards 7-12), and Technology Integration (Standards 13-18). Each successive phase was intended to identify a set of instructional strategies that exemplified a more appropriate application of technology or a higher quality of technology integration into classroom instruction and learning.

Each technology standard was established as a component of the *TSICM* and then variations for each component were identified. Variations for each component consisted of discrete categorizations of technology implementation for the corresponding component. Component variations were designed to represent educational best practices along a continuum from unacceptable use to ideal use. The component variations were refined by the technology committee to reflect the actual practices of teachers using computer technology in classrooms. The components and component variations were organized into matrix comprised of four variations for each of the 18 components with each successive variation indicating a level of use representing a closer approximation of ideal or appropriate educational use. The *TSICM* was deployed as a paper- and Web-based checklist.

Data Collection

The school district used in this study was located in a small town in a Midwestern state. The school district had a total enrollment of almost 2,200 students in grades K-12 with 147 certified teachers. Computer technology was used in all the schools in the district. All schools except the high school had computer labs and all teachers had classroom computers.

The school district had made a substantial investment in computer technology and was beginning a district-wide technology professional development initiative. To collect data regarding computer technology implementation occurring among teachers, all teachers at all grade levels were provided with a paper version of the *TSICM* checklist and the option to complete a Web-based version of the *TSICM* checklist on the school district Web site. The checklist was designed in a multiple-choice format in which respondents could select more than one response for each *TSICM* component.

Data collection occurred at both the start and end of a school year. A usable TSICM was completed by 70 teachers at the start of the school year and 84 teachers at the end of the school year. 57 teachers completed both the start and end of year administration of the *TSICM*.

Data Analysis

The rubric for rating teacher responses on the checklist was to rate to the highest level of use for each component on the checklist. The responses to the *TSICM* checklist were analyzed by cluster analysis to identify relatively homogenous groups of cases based on the *TSICM* components. Discriminant analysis (DA) was then used to assess the adequacy of the groupings from the cluster analysis by using the *TSICM* implementation components as predictor variables. A step-wise methodology was used to enter variables into the discriminant functions. One-way analysis of variance was used to determine if the component attributes of each group were statistically significant. Comparisons were made between the start and end of year data collections using a paired-samples *t*-test. Descriptive statistics for the data collections are provided in Table 1.

TECHNOLOGY STANDARD	Start of Year Administration (N=70)			End of Year Administration (N=84)		
	SUM	MEAN	STD. DEV.	SUM	MEAN	STD. DEV.
1. Operate common technology input devices.	217	3.10	.82	313	3.73	.73
2. Perform basic file management tasks.	206	2.94	1.11	316	3.76	.63
3. Apply trouble-shooting strategies and install software.	226	3.23	.87	318	3.79	.70
4. Use software productivity tools.	182	2.60	1.34	297	3.54	1.01
5. Use technology to communicate and collaborate.	228	3.26	.72	316	3.76	.59
6. Use technology to collect data and perform research.	188	2.69	1.10	286	3.40	.95
7. Model responsible use of technology.	174	2.49	1.42	274	3.26	1.13
8. Facilitate regular student use of computer technology.	208	2.97	1.45	257	3.06	1.43
9. Conduct learning activities using computer technology.	187	2.67	1.43	234	2.79	1.46
10. Select appropriate technology resources for classroom use.	83	1.19	1.33	194	2.31	1.69
11. Evaluate the validity of data collected using technology.	22	.31	.91	93	1.11	1.69
12. Use technology to present classroom instruction.	154	2.20	1.16	235	2.80	1.23
13. Integrate technology-based learning experiences into classroom instruction.	138	1.97	1.43	207	2.46	1.48
14. Use computer technology for problem-solving and critical thinking.	118	1.69	1.48	199	2.37	1.48
15. Use technology to facilitate individualized/cooperative learning experiences.	94	1.34	1.39	157	1.87	1.40
16. Assess student use of technology using multiple methods of evaluation.	66	.94	1.57	91	1.08	1.53
17. Develop and maintain electronic student portfolios.	23	.33	.88	48	.57	1.01
18. Use computer technology to maintain and analyze student performance.	136	1.94	1.23	224	2.67	1.08

Table 1. Descriptive Statistics for Start and End of Year Administration of TSICM.

RESULTS

Beginning of Year Data Collection

Since the initial cluster centers and the number of dominant patterns were unknown, cluster analysis was performed on the first administration of the *TSICM* using all 18 technology standards or components of the *TSICM* and incrementing the number of clusters until a reasonable model was obtained. The cluster analysis was run for 2, 3, 4, and 5 clusters before a reasonable model was selected. A reasonable model occurred with the number of clusters set at 3. When the number of clusters was set at 3, the number of cases in Group 1 was 21, Group 2 was 33, and Group 3 was 16. In order to make comparisons between the start and end of year data, this same grouping model (3 clusters/groups) was used for analysis of the end of year data collection.

In order to assess the adequacy of the classification of implementation pattern groups derived from the cluster analysis, a Discriminant Analysis (DA) was performed. The 18 *TSICM* components were used to separate the groups into the discriminant functions. As a result of this procedure 97% of the cases or 68 of 70 cases were correctly classified. The DA reclassified 1 case in Group 2 for Group 3 and 1 case in Group 3 for Group 2.

The *TSICM* components were entered into the DA using a stepwise model in order to discard variables that were weakly related to group distinctions. Based on the discriminant coefficients, Component 13—Integrate Technology-based Learning Experiences into Classroom Instruction made the most important contribution to Function 1 and Component 8—Facilitate Regular Student Use of Computer Technology made the most important contribution to Function 2. Teachers identified with Group 1 (Technology Operators) were characterized by low or inverse relationships to Functions 1 and 2, Group 2 (Technology Facilitators) by high Function 2, and Group 3 (Technology Integrators) by high Function 1.

End of Year Data Collection

A cluster analysis was performed on the end of year data collection with the number of clusters set at 3 to compare with the clusters from the first of year data collection. With the number of clusters set at 3, the number of cases in Group 1 was 35, Group 2 was 18, and Group 3 was 31. The DA was repeated for the end of year data collection of the *TSCIM* and as a result of this procedure 92% of the cases or 77 of 84 cases were correctly classified. The DA reclassified 1 case in Group 1 for Group 2 and 6 cases in Group 3 for Group 1. Based on the discriminant coefficients, Component 9—Conduct Learning Activities using Computer Technology made the most important contribution to Function 1 while Component 1—Operate Common Technology Input Devices made the most important contribution to Function 2. Teachers identified with Group 1 (Expert Technology Users/Operators) were characterized by high Function 2, Group 2 (Beginning Technology Users/Operators) by low or inverse relationships to Functions 1 and 2, and Group 3 (Technology Facilitators) by high Function 1.

Paired samples correlations for each of components of the *TSICM* (technology standards) were computed for matched cases on the start and end of year administrations of the *TSICM*. Almost all components of the *TSICM* indicated significant differences on the *t*-test ($p<.05$) between the start and end of year administrations. Additionally, paired samples correlations were computed when *TSICM* components were grouped by skill set or phase and significant differences on the *t*-test ($p<.05$) were indicated for all three phases.

CONCLUSIONS

When we examined only the start of year data collection for this population of teachers, we discovered that proficiency in the use and operations of computer technology (Phase 1 standards) was not necessarily a distinguishing attribute of high quality technology integration. In other words, there was pervasive use of computers by teachers in preparing for instruction, but limited use of computers by teachers for delivering instruction. This finding had relevance for the provision of future technology professional development activities. These results clearly demonstrated that technology training activities needed to focus more on instructional strategies and methods to integrate technology in the classroom than entirely on activities to increase skills in the operation of computer hardware and use of software applications.

By the end of the school year, the characteristics that delineated differences among the teachers in technology integration was more sharply defined by teachers who were beginning or expert operators of computer technology and those who were facilitators and managers of classroom technology. Thus, there was a clear progression among the teachers from technology operations to technology facilitation—from using the technology to *being the technology*.

While the technology professional development program at the school did not make technology integrators out of all participants, it clearly accommodated reasonable growth and advancement in the technology integration skills of the participants. When we considered only those teachers for whom we had both start and end of year data, a significant pattern of growth across technology standards and at all skill levels was indicated. This observation suggests that when educational best practices for teaching and learning with technology are clearly defined and established, the professional skills of teachers will begin to exemplify the stated expectations.

We have learned from this study that classroom technology integration was not so much about the quantity of teacher interactions with technology, but rather it was about the quality of teacher interactions with technology. When teacher interactions with technology were accompanied by expert teaching practices and related to curriculum objectives, the quality of technology integration was increased.

Over time we have refined our technology integration professional development model to include more powerful technology integration strategies in classrooms beyond that of computer technology use and operations. We have learned that through the establishment of a well-defined set of technology standards and corresponding best practice indicators, higher levels of technology integration in classrooms can be identified and achieved.

Consequently, the potential for improving and enhancing teaching and learning in the classroom is increased when teachers know how to use and then actually use all the tools at their disposal,

IMPORTANCE OF THE STUDY

Although many school districts have established benchmarks or standards for the integration of technology in classrooms, no model or methodology exists for substantiating technology standards with actual classroom practices. The *TSICM* represents a flexible and adaptable approach to the evaluation of technology integration in classrooms because the *TSICM* components reflect a set of widely-used standards that can be contextualized.

A methodology to provide comprehensive and continuous analysis of technology implementation is needed to sustain high levels of use and integration of computer technology in classrooms. This study demonstrated that the *TSICM* was an effective tool to determine technology integration in classrooms, to reveal the technology integration characteristics of teachers integrating technology in classrooms, and to distinguish appropriate technology training themes that focus on specific technology standards.

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Handhelds: Important Technology for Classrooms and Educators

Neal W. Topp
College of Education
University of Nebraska at Omaha
USA
ntopp@mail.unomaha.edu

Paul Clark
College of Education
University of Nebraska at Omaha
USA
pclark@mail.unomaha.edu

Abstract: Handheld computers, such as Palms and Visors, are quickly becoming a common tool in the business world and this innovation has much potential to be used in education. This paper will focus on the initial integration of handhelds in a college of education. Activities include the training of faculty, administration, and staff, integration into undergraduate and graduate courses, researching of elementary, middle school and high school students' use of the devices, and the development of applications to be used in teacher and student teacher observations. In addition, the paper will highlight reasons educators should be learning to use handhelds, why educators need to develop effective ways to use handhelds in their classrooms, and why these devices should be integrated into the teacher preparations curriculum. Also, important issues that need to be discussed when implementing this new innovation will be addressed.

Introduction

Handheld computers (Palms, Visors, PocketPCs, etc.) are just beginning to be used in classrooms around the country, paralleling the acceptance of these devices in the U.S. business world. The uses and applications are usually different; business people use the handheld as an organizer and personal data center, and educators use the technology for such applications as writing, visualizing, data collection, data manipulations, and simulations. These devices have much potential for helping students learn and produce.

The College of Education at the University of Nebraska at Omaha is focusing on effective uses of handhelds in the learning process and is designated as a Palm Research Hub. Several faculty members are actively developing curricular ideas and researching P12 applications of handhelds in Nebraska classrooms as well as developing curriculum activities for its own teacher education courses. This paper will outline the rationale for using handhelds in schools and document five projects in Omaha area schools.

Handheld Use in Schools: Why, When and How

Why Use Handhelds in Schools

Before using any tool or innovation in schools, educators need to identify reasons the new innovation should be used. There are several reasons that handheld computers are a logical choice for schools and classrooms.

1. Handhelds are becoming a widely used technology in the "real" world. More and more business people are finding these devices to be an integral part of their work world. Many companies have made the handheld a

tool used for scheduling, addresses, to-do lists, and document exchanges. It makes sense that if many adults are using handhelds, educators need to investigate whether these devices will help our students learn and produce.

2. Constant and consistent access to handhelds for students can have a positive effect on their learning. The impact of computers in schools has been disappointing to many. One of the reasons for this is the limited use by students. In a 2001 survey [http://www.snapshotsurvey.com] of Nebraska teachers, Topp, Soloway, and Norris found that 50% of the teacher-respondents have their students use computers for 15 minutes or less per week. If this is truly the case, no wonder there is disappointment in the impact of computers on student learning. But, the handheld computer may allow the student to have their "computer" with them at all times. The low cost of a handheld provides the opportunity for full time access for each student. And the small size of the handheld allows for easy portability. Students can pull their handheld out of their book bag or desk any time they need it.

3. The versatility of the handheld makes it an efficient learning tool. In addition to the date book, address book, etc. usually associated with handhelds, these devices are very versatile for creative teachers and students. Writing, creating animations, developing concept maps, drawing pictures, collecting data using probes, using spreadsheets, manipulating databases, reading documents, taking quizzes, and picture taking/editing, are all possible with most handhelds. In addition, much of the educational software is free to education.

4. The connectivity possibilities of the handhelds facilitates sharing and collaboration. Students can beam documents to each other, they can print their work, or they can sync their handheld to a computer. All three of these features provide the creative teacher with options that are important for a student-centered, active learning classroom.

How Can Handhelds be Used in Schools

As noted above, handhelds are versatile tools in schools. Many types of applications are now available, and many more are in the developmental process. The possible uses of handhelds are many. Some of the ways we have seen them used are: personal organization, writing, document reading, document sharing, simulations, data collection, visualizations, concept maps, database manipulation, spreadsheet tasks, calculating, assessing, and concept mapping. Also, teachers are using the handhelds for downloading documents from the web. With each visit to handheld-infused classrooms, we see more ways teachers are using these devices. It should be noted that the Center for Highly Interactive Computing in Education at the University of Michigan (http://www.handheld.hice-dev.org/) has developed several applications that are free to education. Many of the uses in the classrooms we are researching use these software applications.

When Should Handhelds be Used in Schools

The decision of when to use any innovation is very important for effective use and efficient learning. The guidelines for handhelds are similar to other learning tools. Handhelds should be used to help the student meet course objectives, whether it helps them learn faster, better, or transfer easier. Also these devices are effective in active learning situations, where students ask questions, gather information, analyze information, and share results. The tasks should be meaningful and connected to real world situations. And finally, the handhelds facilitate a collaborative learning environment. Students can share a document or parts of documents by beaming to each other, or they can upload or download documents to or from the web.

How are Handhelds being Used in Schools

Although the uses of handhelds are in an early stage in Omaha area schools, there are five teachers that are beginning to use handhelds with their students. Some have just begun the process and others are a few months into the project. Although it is too early to judge the impact of using handhelds, teachers are reporting successes with the devices. As the school year continues, we will be documenting the impact on the students, teachers, and schools.

Watershed Study

King Science Center is an Omaha Public School District 4-8 science magnet school located in urban Omaha. In 7th grade science class, the students are currently involved in a local, long-term water quality ecological research study called "Watershed." Students are taught ecological interrelationships between biotic organisms, pH, dissolved oxygen, sunlight levels, and temperature. Students are then transported to several area lakes and the Missouri River to collect water quality data several times throughout the school year, thus enabling them to observe how seasonal changes affect abiotic and biotic water quality factors. Currently, all data is collected with individual test kits. The data is recorded on paper worksheets and graphed after returning to school. In this Palm project, handhelds with expansion modules and probeware will replace disposable test kits. Data will be collected on handhelds and returned to school for centralized analysis and incorporation into a single database. The data will be transferred during a technology applications class, then manipulated and graphed in math class, and subsequently analyzed in science class. In addition to the scientific aspect, some students will be assigned to document the field experience through digital photo expansion modules and descriptive essays, creating an interdisciplinary approach to the Watershed field experience.

Marketing and eCommerce - A Real World Simulation

At Omaha North High School, the handhelds will be used as an integral part of the current eClassroom initiative ("paperless classroom" with a 1-to-1 student to computer ratio using email as the primary communication tool). The seven marketing classes are already being taught "paperless." The handhelds, coupled with IntelliSync and other software, will extend the classroom beyond the school to mirror a real-world business environment. The handheld will become the "textbook," using web-based sources of information downloaded via AvantGo, groupware functions provided by GroupWise (mail, calendar, scheduling etc.) and other applications, both purchased and developed for our use by the South High portion of the proposal. The eClassroom is already a model for classroom instruction; the introduction of Palms pushes its development to a higher level, opening new and exciting possibilities for students.

Academy of Information Technology

The intent of the use of handhelds at Omaha Public School's South High School is to determine if high school programming students in the Academy of Information Technology can do the following:

1. Learn and develop software programs for the Palm OS system using CodeWarrior for the Palm OS
2. Interact with middle school teachers and students at King Science Center on issues and challenges of integrating the Palm into the science curriculum.
3. Utilize the potential of handhelds to increase student skills in computer technology.
4. Interact with North High School marketing students to market the innovative use and development of applications and integration of the Palm technology into the Academy of Information Technology curriculum.

6th Grade Math

An elementary teacher at Carriage Hills Elementary in the Papillion LaVista School District is using a classroom set of handhelds for her math classes. At this point, only free software is being used in order to keep costs to a minimum. Her handheld-infused curriculum is aligned with the NCTM Standards, and includes web page viewing, drawing, simulations, writing, calculating and drill. The handhelds are used by four different sets of students each day and are not used outside of the classroom.

5th Grade Self-Contained

A handheld is provided for each student in one fifth grade section at Willowdale Elementary, Millard Public Schools. The students use "their" handheld all day and keep it with them each day. Also, a keyboard is provided for each student. The teacher uses the handhelds in all subject areas and has developed or revised many activities to include the handheld. This teacher makes extensive use of web page syncing and the students do some of the web page development of their own learning documents. An interesting aspect of this project is that two models of two different brands of handhelds are used and both Windows and Mac computers are used to sync the handhelds. We are beginning to learn advantages and disadvantages of each variable in this classroom.

Summary

Handhelds show much promise in helping students learn. As more and more teachers use handhelds in their classrooms, we will continue to add to our knowledge of the uses of these devices. Education colleges must keep informed and continue to learn about "best practices" in the use of these versatile tools. Also, education programs will need to infuse handhelds into their own curriculum so that they can model effective use of this new technology. By partnering with local schools, Colleges of Education have an opportunity to not only watch innovative teachers and practices, but also to contribute to the development of effective activities that will not only help teachers teach better, but more importantly, help learners learn better.

An Investigation of Traditional and Constructivist Models for Internet Training and Effects on Cognitive Gain

Dr. Chenfeng Zhang
Department of Education and Special Education
Mansfield University of Pennsylvania
czhang@mnsfld.edu

Abstract: There has been an emerging body of literature on computer training and its impact on the use of computers, including the use of the Internet. Research has shown the two models of training – the Traditional Model and the Constructivist Model – each has a positive impact on students' achievements. These studies deal with topics such as math, science and geography, but not computers and the Internet. The results of the studies on the two training models are confounding. This current study determined which Internet training model – the Traditional Model or the Constructivist Model – could produce greater cognitive gain for pre-service teachers, as well as which model could produce greater positive changes in attitudes toward the use of the Internet. A nonequivalent control group pretest-posttest quasi-experimental design was used in this study. The participants of the study were exposed to alternative teaching strategies – the Traditional Model and the Constructivist Model of Internet training. A pre-and-post Achievement Test was administered to each group to assess the changes in the extent of learning. A Pre-service Teachers' Attitude Survey was administered to assess their attitudes toward the use of the Internet. In the analysis of data, the analysis of covariance, a t-test, two sample dependent means, and a t-test, two sample independent means were used. Results showed the Constructivist Model of Internet training produced a greater cognitive gain. After experiencing the Constructivist Model of Internet training, the pre-service teachers developed a more positive attitude toward the use of the Internet than before the training. After experiencing the Traditional Model of Internet training, the change of the pre-service teachers' attitudes toward a more positive direction was not statistically significant, but there was a shift toward a more positive direction. The study also showed that there were no significant differences in attitudes toward the use of the Internet between the two groups of pre-service teachers after experiencing either model of Internet training.

Introduction

This study investigated the impact of two training models, the Traditional Model and the Constructivist Model, on pre-service teachers' achievements and attitudes toward the use of the Internet. There has been an emerging body of literature on computer training and its impact on the use of computers that includes the Internet. Research has shown the two models of training – the Traditional Model and the Constructivist Model – each has a positive impact on students' achievement. These studies deal with topics such as math, science, and geography, but not computers and the Internet. These studies on the impact of the two training models are confounding. Some research favors the Traditional Model and other research favors the Constructivist Model. It is not known, however, which training model produces greater cognitive gain or which model brings forth more positive attitude changes. This study was based on the following hypotheses: 1) Pre-service teachers experiencing the Constructivist Model of Internet training will experience greater cognitive gain than pre-service teachers experiencing the Traditional Model of Internet training; 2) Pre-service teachers will experience a more positive attitude toward the use of the Internet after experiencing the Traditional Model of Internet training; 3) Pre-service teachers will experience a more positive attitude toward the use of the Internet after experiencing the Constructivist Model of Internet training; and 4) There are no significant differences between the two groups of pre-service teachers in their attitudes toward the use of the Internet after experiencing either model of Internet training.

The Design

A nonequivalent, quasi-experimental, pre-and-post survey design was used to study the effect of the Traditional and Constructivist training models on pre-service teachers' achievements. Pre-service teachers taking part in this study were divided into two groups – a control group experiencing the Traditional Model of training and an experimental group experiencing the Constructivist Model of training. The two models of training were carefully designed by the researcher to reflect the characteristics of each model. Distinctive teaching methods for each model were used. The Internet training focused on the Internet search engines, search strategies and applications of using search strategies to solve daily problems. The contents for the two training models were the same, with differences in the methods of instruction. After experiencing the Internet training, students took a Student Perceived Classroom Learning Environment Scale survey. Another similar survey, the Observer Perceived Classroom Learning Environment Scale survey, was filled out by two observers whosat in both models of the training class sessions three times: once before the Internet session, once during the Internet session and once after the Internet session. The purpose of the two surveys was to validate the methods used in the Internet training intervention, i. e., it measured the methods used in the training to determine if they contained the characteristics of the Traditional Model or the Constructivist Model. When the mean score of the survey for a training model is over 84, the model is a Constructivist Model and when the mean score of the survey is under 84, the model is a Traditional Model. Students also took a two-section Achievement Test before and after they experienced either model of training. The first part of the test was written according to the first objective – pre-service teachers will be able to list and describe the differences between common search engines and meta-search engines and differences in search results when different search strategies are used with 100% accuracy. The second part of the test was on the second objective – pre-service teachers will be able to use basic search strategies to locate information to solve daily problems with 100% accuracy. The pretest score for the Achievement Test was used as the covariant for the analysis of covariance to determine if there was a gain in the posttest score for pre-service teachers in the two training models and which group had a higher cognitive gain. The Survey of Pre-service Teachers' Attitudes toward the Use of the Internet gathered data of pre-service teachers' attitudes toward the use of the Internet. A t-test, two sample dependent means was used to analyze the attitude change before and after the training in each of the two model groups. A t-test, two sample independent means was used to compare the after training attitudes between the two model groups.

The Findings

To test the hypothesis that pre-service teachers experiencing the Constructivist Model of Internet training will experience greater cognitive gain than pre-service teachers experiencing the Traditional Model of Internet training, ANCOVA was used. The result of the analysis indicated that there was a significant difference between the posttest scores of the Traditional Model and the Constructivist Model. The mean score for the Constructivist Model was significantly higher than that for the Traditional Model. Besides, both of the Perceived Classroom Learning Environment Scale surveys indicated that each model of training was carried out according to its own characteristics. Data indicated that pre-service teachers experiencing the Constructivist Model of training developed a more positive attitude toward the use of the Internet after the training than before the training. After experiencing the Traditional Model of Internet training, the change of the pre-service teachers' attitudes toward the Internet was not statistically significant, but it did change toward a more positive direction. To analyze data for the fourth hypothesis, a poled difference in posttest scores were measured by using a t-test, two sample case, independent means. The data indicated that there were no significant differences in pre-service teachers' attitudes after experiencing either model of the Internet training. Further study could be conducted. Researchers could study the effects of different training models on pre-service teachers' cognitive gain, for example, compare the Traditional Model with a "mixed" model where both traditional and constructivist methods are used. Researchers could also study the effects of the training models on pre-service teachers' attitudes when they had a low positive attitude toward a subject matter.

TELECOMMUNICATIONS: GRADUATE

SECTION EDITOR:
Sue Espinoza, Texas A&M University-Commerce

Telecommunications and education – the two are becoming increasingly intertwined in our classrooms and programs at all levels, especially in teacher education programs that are preparing educators to effectively use these technologies in their classrooms. The range of applicable technologies is growing as new ones are emerging and current ones are expanding. The number of schools with Internet-connected computers in libraries, labs, and classrooms continues to grow, providing potential opportunities for students and teachers to participate in global learning communities, and to both retrieve and produce educational resources. Teachers must learn to use and feel comfortable with these technologies, as tools to enhance teaching and learning. So where and how does this take place? The papers in this section demonstrate the wide range of approaches, for both preservice and inservice teachers, in university, field-based, and alternative programs, with delivery 'sites' being online (Internet), videoconferencing, university classrooms, or k-12 schools – either individually or in combination.

Both video-conferencing and online Internet-based courses are described, as are uses of these technologies as integral components of classroom-based courses and/or faculty development. Also discussed are general support and community resources that are not course-connected, and that speak to the concept of lifelong learning. Taken as a whole, these papers provide a snapshot of ways that telecommunications can be used to support and promote effective teaching and learning in today's educational settings. Accounts of both successes and lessons-learned, as well as discussion of methods of assessment of the use and/or effectiveness of various technologies provide guidance for current and future educators.

The Internet may be a veritable goldmine of resources, or it can be an endless maze through which educators wander in a fruitless quest for those resources. Growing numbers of portals and other methods of organizing Internet resources are appearing. Levin and Grotto introduce one such effort – discussing how resources are selected and evaluated for inclusion in a database, and how teachers can become a part of that process. In addition to finding resources, the Internet also provides a forum in which educators can share resources they have created, thus contributing to others in their profession. Repman, Carlson, and Downs describe and provide links to a number of web-based tools that they have found helpful for productivity and instruction. Gersh, also explores web-based tools, discussing those that facilitate "Internetized" lessons and internet-based projects. Specialized applications provide opportunities such as the use of remote scientific instrumentation technology in K-12 and teacher education classrooms, as described by Thakkar, et al. This use of Internet-based activities is basic to the world of telecommunications for classroom instruction, and opportunities to learn more are often available at universities and colleges, as well as at school districts.

E-mail has become almost as common, if not more so, than the postal service it sometimes seems, and is but one of the methods of communication enabled by telecommunications. Several papers explore the communication and community building aspect of the Internet and related tools. Thomeczek examined electronic communication in an undergraduate teacher education course, and compared an e-mail discussion list with a web-based discussion board. Collier and Yoder suggest techniques, based on existing literature, for conducting successful online discussions and collaboration. Tuzun and Yilmaz describe an online learning community of inservice and preservice teachers, communicating via ICQ Active List. Leh and Winograd present some moderating strategies for instructors who are managing online computer conferences. Online communication forums may promote life-long learning, as students continue with these communities after completing their university studies.

Communication is also enhanced by the use of telecommunications to link university classrooms with those in K-12, a practice that has provided unique opportunities for preservice teachers to observe and interact with schools at a distance. Adcock and Austin discuss their experiences with a preservice observation project that connected the university with public school classrooms via a two-way audio/video conferencing system. Lehman and Razzouk describe a method of observation/interaction using IP-based videoconferencing. Boccia, Fontaine, and Lucas describe a "two-way television teaching, debriefing, and general mentoring" program that led to the development of a CD to help better prepare preservice teachers for observations. Videoconferencing permits students to broaden their perspectives and experiences, as they 'visit' schools, often at a distance.

Online courses also provide experiences 'at a distance,' and studies relating to faculty and students are being conducted to help guide the development of successful educational experiences for all. McKenzie, Waugh, Bennett, and Mims report the findings from their study of what faculty should know about course preparation for online learning. Tucker and Blocher review characteristics of successful distance education students and then describe their study of students and online collaboration. Other papers describe online courses for high school students, and for faculty development.

Integration of technology is one of the 'buzz-words' of the day – teacher preparation programs debate whether to have a stand-alone computer course, or whether to integrate technology throughout the teacher preparation program. What is the best method of introducing preservice teachers to ways to integrate technology into their future classrooms? Redmond and Albion used a newsgroup and a guest 'expert' in communication with preservice teachers to explore that question, and they report the results and explain their choice of methodology. Koro_ec, Kumpulainen, and McManus have also addressed the integration issue – they describe a survey they developed to obtain information about technology integration from faculty and students, on an institution-wide basis.

The papers in this section demonstrate a wide range of uses for telecommunications throughout the educational arena. There are full courses offered via video-conferencing, while others are online over the Internet. There are classroom-based courses, with online or video components. The modes of communication vary, as do the uses to which this technology is put, and the authors provide a view into successful implementations, as well as a discussion of lessons learned and some suggestions for improvement. The body of literature is expanding, as are the technologies. These papers provide a snapshot of ways telecommunications technologies are being used in support of teaching and learning.

Behind the Scenes: The Process of Implementing a High School Web-Based Course

Merry Boggs, Department of Teacher Education,
Holly Patterson-McNeill, Department of Computing and Mathematical Sciences
Texas A&M University-Corpus Christi
Diehl Boggs, Flour Bluff Independent School District
merry.boggs@mail.tamucc.edu, hollyp@falcon.tamucc.edu, boggsd@hotmail.com

Abstract: This paper describes how a team of university faculty with knowledge of computer science content, web-based content, and curriculum development content worked together with a high school teacher to implement a high school web-based course.

Introduction

Byun, Hallett, and Essex (2000) found four guiding concepts for online course development. (1.) The instructor needs to have content organized while integrating technology, (2.) The instructor needs to establish procedures for frequent and clear communications, (3.) The instructor needs to collaborate with outside technology experts for support, and (4.) The instructor needs to enculturation him/herself to on-line/web-based instruction.

This paper describes how a team of university faculty with knowledge of computer science content, web-based content, and curriculum development content worked together with a high school teacher to implement a high school web-based course. Through this collaboration TAMUCC teacher educators and a high school teach to implement for an effective implementation of a web-based platform for a high school course. But everything that could possible go wrong did. This paper examines through the two-and a half-month period it took to get this single high school web-based course started.

Behind the Scenes

At the beginning of the summer, this collaborative team delegated responsibilities to prepare for the 2001/02 school year. Mr. Boggs, high school computer science teacher, prepared computer science content. He has previously taught this course, but he prepared by re-organizing materials as to re-format homework, daily work, test, and lesson presentation for web format. Additionally, Mr. Boggs spent June and July at work making sure his computer lab would be ready for students on the first day of school. Drs. Boggs and Patterson-McNeill took care of purchase orders and research preparation.

Simultaneously, we spent time taking WebCT's on-line training. During this time, TAMUCC sponsored WebCT training for faculty only. So, Dr. Boggs took this course while Mr. Boggs took on-line WebCT introduction class. During this time, we decided to purchase epack to use with the web-based course. We felt that this would help transition into a web-base format smoother.

Each of us gave precious summer hours in preparation for beginning our web-based course the first day of school. Little prepared us for the events of August through October. As Mr. Boggs walked into his class with, Visual C++ install on all computers, WebCT, and epack curriculum on-line waiting for him to point and click or at least we though we were prepared. We first realized that there was trouble when he found that the classroom's network infrastructure had been ripped out and taken to another campus. There was no Internet or network access in his classroom.

Challenges

Without the network infrastructure, the web-based component could not be implemented. Meanwhile, computer science classes started. Students were informed of the upcoming web-based component of the computer science course and what to expect. To prepare students for taking tests and reading their textbook online, students in the proposed web-based class used the library research classroom.

Problems implementing a web-based component at the high school occurred at several levels. Since university and high school budgets were involved, beginning and ending dates of these budgets did not coincide with the actual starting dates of students coming to school. Several weeks were spent trying to purchase epack textbook.

During the summer months, network and Internet capabilities were in place. However, infrastructure fell apart when LAN switches were taken from the high school to the junior high to support their new grading and attendance software. Thus, leaving the high school without needed network equipment to implement a web-based component in the computer science class. The switches were replaced in the last week of September, five and a half weeks after classes had begun.

Finally, Internet access was solved, but some of the computers still do not have printing capability. Then, the Nimda virus struck through the ISP located at the school district central office. We were shut us down for another week. Luckily, this extra week gave us time to finalize the purchase of the epack textbook. Once we were ready with textbooks and Internet access, students needed time to adjust to WebCT and epacks.

Conclusions and Implications

We found that the summer months are not enough for planning and implementing a web-based high school course. A year is needed to plan, organized, and purchase software and materials before beginning the actual course. Also, this year is needed for learning the course delivery system. Mr. Boggs spent hours every weekend in the fall semester trying to master the basic navigation procedures and tools of WebCT. Any teacher implementing this system needs this time to dedicate to conquering the new software. We were naive thinking we could spend only the summer months preparing for this endeavor.

Students were frustrated with the transition from starting the school year with traditional classroom instruction then having to move to the web-based format. Traditional instruction in the history of computing was used to ease the pain of learning logon procedures, accessing epacks, and communication procedures via WebCT. Then, programming instruction began once Mr. Boggs felt all students could use the basic materials. Epacks were great for getting the students started and freeing the teacher from entering all content in WebCT. Epack textbooks were still incomplete because limited examples and program samples are not included. We found that traditional lecture time is still needed to supplement web instruction. Students still need daily teacher help, talk, motivation, and encouragement.

As the first semester ends, teachers, students, and researchers are finally comfortable with the WebCT format. The second semester brings the hope of focusing on C++ programming and measuring student achievement.

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A STUDY OF TECHNOLOGY TEACHERS' ATTITUDE TOWARD VIDEOCONFERENCE APPLIED IN EDUCATION

Jong, Yi-Shian. National Kaohsiung Normal University Of Taiwan.
Department of Industrial Technology Education
tl115@nknucc.nknu.edu.tw

Yang, Hung-Jen. National Kaohsiung Normal University Of Taiwan.
Department of Industrial Technology Education
hjyang@nknucc.nknu.edu.tw

Yu, Jui-Chen. National Science & Technology Museum
Kaohsiung, Taiwan, R.O.C.

Chao, Shih-Van. National Kaohsiung Normal University Of Taiwan.
Department of Industrial Technology Education
jim@controller.nknu.edu.tw

Lo, Kao-Hau. National Kaohsiung Normal University Of Taiwan.
Department of Industrial Technology Education
fork@ms26.url.com.tw

Abstract: The purpose of this study was to identify technology teachers' attitude toward videoconference applied in education. Technology teachers are always playing the pioneer role to adopting new teaching technology into their professional works. Their attitude toward certain teaching technology would consider an indicator of implementing technology in education. Videoconferencing technology allows two or more people at different locations to communicate each other at the same time. In addition, it is often possible to share computer applications It is a rich communication technology which could offers new possibilities for schools, colleges, and libraries including formal instruction, connection with guest speakers and experts, multi-school project collaboration, professional activities. Based on literature review, an investigation tool was design for collecting data of technology teachers' attitude toward videoconference applied in education. There were three attitude categories in the questionnaire. Those categories were advantage of using videoconference, type of using videoconference, and effective using videoconference. According to the result of statistical analysis, the technology teachers' attitude toward videoconference applied in education was concluded and discussed.

Technology teachers' attitude toward videoconferencing was the major issue of this study. There were three dimensions of attitude toward videoconference. Those were advantage, usage type, and effective strategy focus. Effective use of videoconferencing technology for interactive learning requires practice and planning as well as attention to a few important instructional strategies.

Methodology

An investigation method was applied to this study. Based on literature review, research instrument was layout and designed. Questionnaires were delivered to random sampled technology teachers for collecting data. Technology teachers were asked to mark a Likert scale from "Strongly Disagree" to "Strong Agree". The population of this study was technology-practicing teacher in Taiwan. The total was around 300. The Random sample procedure was applied to distribute 45 , 15%, questionnaires . There were 37 returned. The research instrument divided into two parts, profile information, and 15 Likert-type questions focused in three dimensions. The Alpha reliability coefficient of this instrument was 0.82. The separate Alpha values of each dimension were 0.87, 0.70, and 0.79.

RESULTS & CONCLUSION

The profile information listed as follows:

1. Gender: male (89.2 %) ,female(10.8 %)
2. Age: 20-25 (89.2%) 26-30 (8.1%) 31-35 (2.7%)
3. Teacher/Administrator: Teacher (56.8) Administrator (43.2)

The results based on statistical test results were discussed as following lists.

- Based on the one-sample Test of each Likert-type question, it was concluded that technology teacher agree video-conference providing following advantages:
  1. Heightens Motivation
  2. Improves Communication, Presentation, and Reading Skills
  3. Increases Depth of Learning

  It was concluded that technology teacher agree video-conference could be arrange as following types:
  1. Courses, Lessons, and Tutoring
  2. Virtual Field Trips
  3. Multi-School Projects
  4. Professional Activities
  5. Community Events

  It was concluded that technology teacher agree effectiveness of video-conference based on as following factors:
  1. Focus on Learning
  2. Set Expectations
  3. Provide Supporting Materials
  4. Engage Students with Variety and Interaction
  5. Encourage Dialog
- There existed no attitude difference between gender.
- There existed no attitude difference among different age range.
- There existed no attitude difference between teachers and administrators.

Successful Online Discussion and Collaboration: Techniques for Facilitation

Catherine Collier
Warner Graduate School of Education
University of Rochester
United States
catherine.collier@rochester.edu

Maureen Brown Yoder
Technology in Education Program
Lesley University
United States
Myoder@lesley.edu

Abstract: As more and more instructors enter the world of online teaching and learning, a body of knowledge is emerging around the challenge of facilitating online interaction and fostering online collaboration. This paper draws from the literature on asynchronous learning and the authors' own experiences with online discussion and collaborative online projects. We identify a variety of techniques for focusing student dialogue, fostering an online learning community, and promoting successful collaboration. Instructors who are teaching wholly online courses or simply integrating online components into face-to-face classes will benefit from the observations and discussion.

Introduction

Instructors who teach online, whether a fully online class or one that incorporates online components, face the challenge of facilitating online interaction and fostering online collaboration. Drawing from the literature on asynchronous learning and the authors' experiences with online discussion and collaborative online projects, we can identify a variety of techniques for focusing the dialogue, fostering an online learning community, and promoting successful collaboration.

Face-to-face vs. Online Discussion

Face-to-face and online communication are noticeably different for the instructor and the student. Differences arise from the spoken word vs. the written word and asynchronous vs. synchronous communication. There are advantages to asynchronous interaction that instructors can use to their benefit in facilitating online discussion.

In a spoken discussion, the facilitator makes the effort to encourage participation across the class, to acknowledge all contributions without being judgmental, and to avoid having participants interrupt others. This can be done by calling on people whose hands are raised and encouraging non-contributors to participate.

No special skills are required to participate in spoken discussion. Some people participate in face-to-face discussions with confidence. They may be effective and productive but can sometimes be controlling or opinionated. Some people may be introverted or shy in a face-to-face setting and are reluctant to contribute to class discussion. Both problems may require intervention by the instructor to insure equitable, productive discussion.

Typically, verbal contributions are spur of the moment, spontaneous reactions. Tone of voice, accents, and body language help convey a message in face-to-face discussions. Unless someone is taking notes, there is no written record of what is said.

Written discussions differ in important ways. Both the participants and the facilitator have a written record of contributions throughout the discussion and as a reference following the discussion. Taking turns does not involve bidding for the instructor's attention; each student simply writes a contribution when ready. Online discussion contributions tend to be more thoughtful and deliberate. They are often well constructed, and attention is paid to spelling, grammar, and punctuation. Emotion is conveyed with words and sometimes emoticons. Capital letters and punctuation may be used for emphasis.

The facilitator can send private email to non-contributors and can carefully plan interventions. Some problems arise when participants are not coherent writers or become impatient when they have to plan and write their thoughts. On the other hand, introverted or shy people may shine when they can plan what they are going to say and carefully construct an online entry.

For written discussion to be productive and effective, participants must be comfortable with online conferencing and able to navigate within the discussion area. They may need guidelines on writing subject lines for their postings and knowing when to begin a new thread. As with spoken discussion, the instructor may need to intervene occasionally to correct a problem, emphasize a point, or refocus discussion.

Facilitating Effective Online Discussions

With asynchronous interaction in mind, how can the instructor facilitate online discussion? In a face-to-face classroom discussion, the instructor needs to carefully listen to what is being said. Online, the teacher must read the written contributions and decide how and when to intervene. The literature and our experience show that fewer, but carefully constructed, instructor interventions can be effective in promoting thoughtful and thought provoking contributions by students. Effective online facilitation begins with observation of the participants to see what guidance they need from the facilitator. Sometimes this is a private e-mail reminder to an individual student to use meaningful subject lines or to reveal emotion. Often the most help an instructor can provide to the discussion as a whole is to intervene very little, merely asking a probing question or sharing a relevant story that will help refocus the discussion or motivate the participants to think at a deeper level about the topic.

Markel (2001) writes that instructors must be responsive. Feedback has long been recognized as critical to the learning process, and timely feedback is potent. This is especially true in an online course. A student assignment, question, or bid for response can come directly to the instructor via email or as part of a discussion forum posting. Feedback needs to be personal, specific, and timely (within 24 hours). Online students report checking back to see if there is a response. If they are left dangling, they lose a feeling of connection. This is a negative loop that contributes to a lessening of participation in the discussions.

Sarah Haavind emphasizes the responsibilities of a facilitator to deepen the dialogue and focus the learning. Knowing how and when to intervene is critical. Using a variety of voices and tones, the facilitator acts as "guide on the side", develops a rationale for an intervention, and carefully crafts an intervention that targets an obvious tension, an unresolved issue, or a gap in the thinking of the group. (Collison, Elbaum, Haavind, & Tinker 2000)

The best facilitators are flexible, adaptive, proactive, responsive, and resilient. They take into consideration the participants and the interaction, and they adapt their techniques to fit the situation. Sometimes this means encouraging more cooperation and less competition; other times it means emphasizing process over results. The goal is to maintain a balance that will best serve the participants and help them reach their learning goals. (Thiagarajan 1999)

Fostering Online Community

Creating a safe and challenging online community includes requiring participation and monitoring the quantity, frequency, and content of student contributions. Strategies that promote effective discussion include motivating inquiry with thought provoking questions, intervening effectively in group discussions, and supporting individual students. It is important that the instructor *not* be the central focus of the discussion; nor should the instructor be an equal participant; yet the instructor's guidance is crucial. The following techniques place the instructor in a thoughtful, useful role as a facilitator.

1. *Incorporate community-building activities*. In order to develop a comfort level among students, an instructor should not launch a serious discussion without first allowing an online community to develop. Ice breaking activities can be used where there is no right or wrong answer, where humor is welcome, and personal and professional information is encouraged. An instructor can share his or her own background and outside interests as an example. Activities that encourage imagination and creative writing sometimes work well. Student introductions could remain available on a class Web page for the duration of the semester.

2. *Clarify class requirements*. Class requirements should be clear, including the expectations around contributions to discussions. Stating the number and frequency of discussion contributions is not enough. The type of contribution should be described. "I agree", "Me, too." and "No way!" are not sufficient or acceptable. Opinions should be accompanied by a rationale. Responses that answer other participant's questions should provide clear explanations and examples. Participants should be taught how to include illustrative examples in their online postings, including Web links for further reading, images for enhancing a thought, and colored and bold text for emphasis.

3. *Know when not to intervene*. Effective online facilitation begins with the reading of conference contributions to see what guidance students need from the facilitator. Often the most help an instructor can provide is to intervene very little, merely asking a probing question or sharing a relevant story that will help refocus the discussion or motivate the participants to think at a deeper level about the topic.

4. *Privately acknowledge high quality contributions*. Instructors should refrain from publicly praising an individual participant or using one posting as a good example. Instead, the instructor can privately acknowledge how the posting helped to move the dialog in a more thoughtful direction or how it prompted others to participate that had not previously contributed. Lee (1994) explains that students who receive feedback by email are "active producers of meaning," rather than passive recipients of data (p. 152). The feedback is evidence that the instructor has read the student's work and cares enough to provide a personalized critique. Positive feedback from the instructor reinforces a student's accomplishments and encourages further good work.

5. *Address unsatisfactory student involvement*. If a student is not participating, or is contributing in an inappropriate way, the instructor has a responsibility to communicate with them. This should be done privately through e-mail, though sometimes a phone call is necessary. Research has shown that negative comments can result in a more positive reaction when delivered by electronic mail, rather than delivered in person. (Fishman 1999) This may be because the student is less likely to take comments and criticism personally when they are delivered asynchronously without personal contact. (Olaniran, Savage, & Sorenson, 1996)

6. *Remain neutral in heated discussions and debates*. A good facilitator acknowledges the many perspectives that have been voiced, but does not take sides or voice a personal opinion on an issue. The facilitator who voices a personal opinion runs a risk: some students will attempt to please the instructor, possibly for a better grade, by agreeing with the instructor's opinion. In this case, a spirited debate with many viewpoints is curtailed. The instructor's role is to encourage thoughtful discussion, not enter into it as a participant.

7. *Acknowledge different viewpoints, without summarizing*. Many lists of conference guidelines encourage the facilitator to summarize the contributions in order to focus the dialogue. The danger, however, is that the facilitator infuses his or her slant on student opinions and imposes an interpretation of student contributions. Instead, the facilitator should acknowledge that there are a variety of views, citing some general ones, and encouraging further exploration of the issue. A good strategy is to state the importance of respecting other people's opinions and urge everyone to support their views with additional information. Sarah Haavind refers to this as setting a "landscape", rather than summarizing. (Collison et al. 2000)

8. *Encourage student feedback to other students*. Some instructors mandate peer interaction by requiring students to react to postings made by other students. The practice can reinforce the student's desire to participate and encourage thoughtful reflection. A student logging into an online forum may find that other students have commented positively on a posting, or that there are six new messages in a thread that the student initiated. This feedback is both affirming and motivating.

Collaborative Experiences

Collaborative online projects are another aspect of online learning that benefit from careful design, monitoring, and effective instructor intervention. The design of online activities should include attention to logistics (such as grouping students), checkpoints to insure quality and timeliness of student contributions, and options that allow for joint and individual products.

When a significant online assignment is done collaboratively, the stakes are high. Students are unlikely to succeed as collaborators until they have, as Wegerif puts it, crossed the threshold from outsider to insider. (Wegerif 1998) Students may be reluctant to engage in collaborative projects or papers for a variety of reasons. Some have doubts about their ability to contribute and are concerned about pulling down another student's grade. Conversely, they may feel superior to the class and not want their own grades pulled down. The instructor addresses these and similar concerns by encouraging students to know one another well and to value their contributions before having them engage in high-stakes collaborative activities. This process is facilitated by preceding a major collaborative assignment with several smaller collaborations. Each time students are required to work with different classmates and encouraged to think about their current partner(s) as possible collaborators for the major assignment. By the time the major assignment begins, students are well prepared to choose their own partners.

While these community building activities are underway, the instructor assesses individual students' strengths, weaknesses, styles, and skill levels. The instructor can determine which students need prodding to respond in a timely manner, which students need assistance with technical aspects of collaboration, and which students are reluctant to ask for help. In this way, the instructor and students are accustomed to timely, targeted interventions when the major collaborative assignment begins. Andriole (1997) uses the term "choreographing" to describe the careful design of pre-course, mid-course, and end-of-course activities that support successful collaboration. In particular, it is useful to step through the phases of the project, anticipating difficulties, and designing in contingencies to circumvent or respond to problems.

Experience at Lesley University has shown that online students in collaborative projects are likely to work independently and to skip any required exchanges unless these steps are clearly defined and graded. (Collier & Morse 1999) When students receive clear instruction on what material will change hands, and when they know they will be graded on the exchanges, they comply. Hiltz's research bears this out while emphasizing that students are motivated to work hard on assignments when they know other students are reading their work. (Hiltz 1997)

Recent experience at Lesley University suggests that instructors may want to examine the components of major assignments to identify those that need to be done collaboratively and those that could be done independently. In a collaborative writing assignment, for example, Lesley students were given the option to produce individual or joint papers, but they were required to give peer feedback to their partners at several checkpoints during the collaborative assignment. The combination of providing options while requiring and grading peer feedback resulted in higher quality papers and greater student satisfaction.

In summary, techniques that contribute to successful online collaborative projects are the following: through preliminary, small collaborative assignments, encourage students to know one another and value their contributions; establish a climate of intervention early in the course to deal with the problems that will arise during a major collaborative assignment; build in checkpoints and grade those collaborative activities that are essential to the assignment; provide options for individual vs. joint efforts for some components when this will not compromise the goals of the assignment.

More Organizational Techniques

Throughout an online or face-to-face class, there are different types of online discussion that can support course content, stimulate debate, and promote collaboration among students. The following four discussion forums can be incorporated into any course.

1. *Discussion of course content, readings, and debatable topics*. This forum is the most academically oriented of the four and the most closely tied to the course objectives. The discussion is instructor driven, but populated by students in the class. The instructor largely controls the topics and questions, but after the initial input, the instructor can retreat, letting students take the most active roles.

2. *Logistics of course, assignments, and group formation*. A separate discussion area should be available for students to ask questions and discuss the logistics of the class. The instructor may be asked to clarify an assignment, or a student may contribute or request a resource that is useful for completing a project. The formation of groups for collaborative projects could be accomplished in this area.

3. *Technical support*. Sometimes a technical problem poses a barrier for a student trying to complete an assignment. Often another student in the class has the resources and experience to solve the problem. Having problem-solving information available on a public forum can benefit other students who may need the information in the future.

4. *Social interactions.* In this area, opinions on current world events and stories of personal triumphs and tragedies can be shared, along with informal discussion on any topic of interest to the students. The instructor may have little or no involvement in this discussion and does not need to facilitate or monitor. Often instructors "lurk" in this area, reading but not commenting, to get a sense of the culture and community of the class.

In addition to serving specific purposes, each of the four provide valuable feedback for the instructor about students' understanding of the content and students' ability to articulate their thinking.

Conclusion

Online learning is a challenge for instructors. Facilitating online discussion requires monitoring of the quantity, frequency, and content of student contributions. The instructor motivates inquiry with thought provoking questions, timely interventions, and private support for individual students. Facilitating collaborative work requires the establishment of community, timely interventions, checkpoints and grades for required exchanges, and thoughtful options for joint vs. individual products. These techniques can be learned by any instructor to provide a valuable online learning experience.

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A STUDY OF HOW TECHNOLOGY TEACHER USING INTERNET SEARCHING ENGINE FOR LESSON PLANS

K.H. Lo & Hung-Jen Yang, & Rong-Jui Fong & S.F. Chaw & Yi-Shian Jong
Department of Industrial Technology Education, National Kaohsiung Normal University, Kaohsiung, Taiwan, R.O.C.
fork@ms26.url.com.tw & hjyang@nknucc.nknu.edu.tw

Jui-Chen Yu
National Science & Technology Museum, Kaohsiung, Taiwan, R.O.C.,

Abstract: The purpose of this study was to identify how technology teacher using Internet searching engine for initiating and updating their lesson plan. An investigation research method was applied for this study. There were two phases in this research. In the first phase, an on line recording system for browsing path, screen images and operating video was setup for technology teachers who were experienced searching engine users. By reviewing recorded data the goals, procedures and functions of using Internet searching engine for lesson plan were drawn. In the second phase, a investigating tool was design based on the result of the first phase. Questionnaires were delivered to random sampled technology teachers for collecting data. The statistical process was followed for analyzing collected data. Conclusion of research problem was drawn from the analysis result. Based on the result of data analysis of both phases, a portal type environment of technology teacher professional searching engine for lesson plans was discussed and suggested.

When a technology teacher edits a lesson plans, he/she often needs much information for his/her lesson plan. However, when he/she wants to search his information in demand on the WWW, he/she just can find information in the shortest time by searching engine besides finding information at known professional webs or relative webs. But each searching engine provides different searching functions and information range. For this reason, it is necessary to build a portal type environment of technology teachers professional searching engine for lesson plans. Before reaching this purpose, we must know how technology teachers using internet searching engine for lesson plans. Therefore, the purpose of this study was to identify how technology teachers using Internet searching engine for initiating and updating their lesson plans.

Methodology

There were two phases in this research. In the first phase ,an online recording system for browsing path ,screen images and operating video was setup for technology teachers who were experienced searching engine users. In the second phase, investigating tools was designed based on the result of the first phase. Questionnaires were delivered to random sampled technology teachers for collecting data. Technology teachers were asked to mark a Likert scale from"Strongly Disagree" to "Strong Agree". The population of this study was technology-practicing teacher in Taiwan. The total was around 300. The Random sample procedure was applied to distribute 45 , 15%, questionnaires. There were 39 returned. The research instrument divided into three parts, profile information, terminology explanations, and 36 Likert-type questions. The Alpha reliability coefficient of this instrument was 0.87.

RESULTS & CONCLUSION

The profile information listed as follows:

1. Gender: male (89.2 %) ,female(10.8 %) .
2. Using computer attitude: 88.9 % of them liked using computer , 11.1% of them were neutral.
3. Learning computer experience: 1~5 years (78.3 %), 6~10 years (19 %), above 15 years (2.7 %).
4. Using computer time a week 0~30 hours(62.2 %),31~60 hours(32.4 %), above 60 hours (5.4 %).
5. Contacting to Internet time : 1~5 years (86.5 %) , 6~10 years(10.5 %),and above 10 years(3 %).
6. Using Internet search-engine time: 1~5 years(94.6 %),6~10 years(5.4 %).
7. Internet instrument accessibility: 2.7 % were hard , 18.9 % were neutral ,40.5 % were easy, 37.8 % were very easy.
8. Self-estimating operating search-engine (scale degree from 1 to 10): scale 5(8.1%),scale 6(5.4%),scale 7(24.3%),scale 8(37.8%),scale 9(16.2%),scale 10(8.1%).

- Based on the one-sample Test of each Likert-type question, it was concluded how technology teacher using search-engine for their lesson plan. They used Internet search-engine in following ways:

  Synonym search; Key-word search; Semantic search; Subjects browsing; Initiating new lesson plan; Editing lesson plan; Contract filtering data; Verifying data; Parallel filtering data; Comparing data.

- There existed no difference between gender among different search-engine operations. The attitude toward computer would be a factor influencing using search-engine in verifying data manner.
- The person with higher level of positive attitude was with higher intention to verify data from search-engine.
- The instrument accessibility factor made no difference among types of search-engine usages.
- The ability of operating search-engine also made no difference among types of search-engine usages.

According to these findings, an environment of technology teacher professional search-engine for lesson plans could be designed to reduce technology teachers searching information time and frequency, help teachers selecting information, and editing lesson plans.

Using the Internet to Create Web-Based Activities

Sheila Offman Gersh, Ed.D.
City College of New York
sogcc@cunyvm.cuny.edu
http://www.schoollink.org/twin

The "Internet Style of Learning" has provided teachers and students with new ways to approach teaching and learning. Teachers can easily take one of their traditional lessons and turn it into an "Internetized" lesson using resources from the Internet or take a topic they want to teach and create a collaborative inquiry-based Internet project that can be shared with a class in another location, nationally or globally.

Stage One

By going to http://www.epals.com, teachers can search for educators around the globe and create an opportunity for sharing, collaborating, etc. There are so many ways that teachers around the globe are using the Internet to bring the world into the classroom. Examples of projects and collaborations can be found at sites under "projects" at the Web site http://www.schoollink.org/twin

Most traditional lesson plans can be enhanced by adding Internet activities. These activities include research exercises, communications with other students or experts, virtual field trips, publishing, collaboration, interactive activities, or Internet searches. It is always good to have students use the search engines that are designed for students (http://www.yahooligans.com or http://ww.ajkids.com -- Ask Jeeves for Kids). Teachers can learn a lot from each other when they join listservs. You can find out about listservs by going to http://www.liszt.com. Many teachers have already created lessons that include Internet components, so we should take the time to view such lessons.

Some teachers find it better to start with new lessons when they introduce Internet activities into their lessons. They use their traditional lessons as outlines for their new lessons. It can take a long time to create the new lessons. Time has to be spent searching for the right site for the lesson. Once the site has been chosen, the next procedure is to develop some meaningful activities for students to complete when they visit the site. If the students are going to communicate with other students/experts, make sure they understand time zones and realize that they won't get responses immediately. Once students are proficient in using the Internet, they can do scavenger hunts on the Internet to find information. Of course, it's a good idea to try out the lesson before teaching with the Internet. Be aware that there might be technology problems so always have a backup lesson. WebQuests are always a good way to get started with Internet lessons. Go to http://edweb.sdsu.edu/webquest/webquest.html. for great information about WebQuests. You should read "Some thoughts about Webquests" at http://edweb.sdsu.edu/courses/edtec596/about_webquests.html

Once Internetized lessons become the norm for teaching, Internet projects should be the next step. Such projects should include students collaborating with other classes to exchange data, share writing activities, and create discussions on topics of interest. In addition, mailing lists often post requests for participation in hundreds of Internet projects. There are many commercial project commercial projects available for those who prefer to "buy in" to a packages project.

Stage Two

What is a project? Projects are collaborative, interactive learning activities that allow students and teachers to interact to carry out a research activity that supports the existing curriculum in new and exciting ways. Students use the Internet's research, communications, and publishing tools to get involved in data exchanges, team writing projects, world explorations, and even global shopping. The classroom walls become invisible as students connect to global partners and experts via the Internet. Through such projects, students around the world work together, sharing the experiences, research, and learning resulting from their work.

Ideas for projects come from students and teachers, and projects vary as widely as the people participating in them. Some projects consist of writing assignments, which are then posted to conferences and eventually gathered into a publication. Others consist of art projects, in which students from different schools exchange works of art. Still others provide ways for students to get directly involved in helping to solve problems in other countries.

Projects are usually organized according to the age/grade levels of the participants and by curricular subject matter. Participation is open to either students of all ages, primary/elementary students, or intermediate/secondary students. Subject areas include environmental or natural sciences; social studies, politics, and economics; arts and literature; language-based; and other/interdisciplinary.

Projects have been classified in a variety of ways. I*Earn (http://www.iearn.org), The Global SchoolHouse (http://www.gsn.org), Judi Harris (http://www.esu3.k12.ne.us/institute/harris/Harris-Activity-Structures.html) and Bernie Dodge (http://edweb.sdsu.edu/webquest/webquest.html) have made outstanding contributions to the use of Internet projects. For example, I*EARN has categorized projects as structured, unstructured, and Learning Circles. Judi Harris has done extensive research in the area of Internet projects. As a result, she has classified projects into the following categories; Online Correspondence and Exchanges, Information Gathering, Problem Solving, and Competitions. On Thursday, October 25, 2001, President Bush highlighted the launch of the Friendship Through Education Consortium --is called Friendship Through, a resource network for schools wishing to interact with schools internationally. To learn more about the project or to get involved go to http://www.friendshipthrougheducation.org/.

Getting It Right

Suggested Design Criteria for Internet Projects

Internet project should:

- Focus on getting students to use their minds well; raise real questions and allow students to do authentic work rather than exercises from a workbook;
- Develop instruction around the questions, ideas, and concerns of students;
- Recognize and use learners' purposes for learning; view learning as meaning-making and constructive rather than passive reception and regurgitation of transmitted information;
- Develop active approaches to learning and encourage students to express their ideas and opinions;
- Give students ownership of their learning;
- View teachers and students as co-investigators-- both should seek knowledge and solutions to problems; foster collaborative/cooperative learning and devise activities that help build a sense of community;
- View students as producers of knowledge and publishers of their work
- Provide moments when everyone takes time to reflect on what they have learned;
- Contribute to the understanding of other cultures;
- Strengthen students' literacy and academic skills; and
- Provide ample opportunity to strengthen students' technology and Internet skills.

The Internet can make teaching and learning exciting while encouraging students to become lifelong learners, contributing members of society, and valuable members of the world of work. The research, communications, and publishing skills learned by students through Internet activities are essential for now and in the future. I have been using the Internet for 14 years. I often ask teachers who aren't using the Internet – How are you accessing information? How are you communicating? How are you teaching? Are you, also asking these questions?

The Concord eLearning Model for Online Courses

Sarah Haavind, Concord Consortium (sarah@concord.org)
Cynthia McIntyre, Concord Consortium (cynthia@concord.org)
Ray Rose, Concord Consortium (ray@concord.org)
Alese Smith, Concord Consortium (alese@concord.org)
Bob Tinker, Concord Consortium (bob@concord.org)

Abstract: The Concord Consortium has been designing and implementing netcourses since 1994. In our work wit h the Virtual High School (www.goVHS.org) and NSF-supported professional development project for mathematics and science teachers enhancing their inquiry pedagogy called INTEC (intec.concord.org), a model of collaborative, online learning emerged that now serves as a standard for effective netcourse design and facilitation. Concord staff have co-written two books on the topic, *Facilitating Online Learning: Effective Strategies for Moderators* (Atwood, 2000) *and Essential Elements: Prepare, Design and Teach Your Online Course* (Atwood, forthcoming). This paper describes the Concord eLearning Model.

Introduction

The netcourses developed and/or offered by The Concord Consortium (www.concord.org) are organized around online student collaboration as the core vehicle for learning. To this end, a *scheduled, asynchronous* format works best. It allows for the deepened focus, extended reflection time and flexibility of "anytime, anywhere" while at the same time fosters learning communities who move together through content and learning dialogues simultaneously on a weekly or bi-weekly schedule. But there is more that makes elearning quality learning. These additional facets are embodied in the following nine key characteristics:

Sound inquiry pedagogy. "The new and more powerful opportunity available to educators today is to use (internet) technologies to help individuals collaboratively construct networked learning communities that will accelerate and augment the community's learning, as well as each individual's learning" (Carroll, 2000). There are many specific design elements in the Concord eLearning Model that contribute to best practices for inquiry teaching including varied smaller group problem-solving activities, explicit objectives matched to qualitative assessments, rubrics for postings that ensure discussions provide embedded evidence of learning, and the effective use of graphics, simulations and visualizations that support exploration and sense-making activities for collaborating learners. Our extensive course standards (http://www.govhs.org/Pages/Main+Office-Course+Evaluations) that incorporate these design elements and sound pedagogical practices should be part of any effective course but are essential in this medium.

On-going Assessment. Continuous assessment is essential in online courses because one cannot be sure whether a high-stakes test would be closely monitored. Rather than taking advantage of quantitative testing options made easy by the electronic medium, our strategy allows the teacher to learn each student's voice and typical approaches to problem-solving thus avoiding the problem of secure monitoring. We find the learning is enriched by this alternative approach. Required discussion postings must contribute more than "I agree" or "I disagree". Additional credit is given for contributions that point others toward productive exploration, coin useful phrases or offer analogies that help others express their thinking and pursue new areas. A rigorous academic experience is ensured by augmenting the learning dialogue as a vehicle for evaluation with unique projects where content is explored in local settings or using additional Internet technologies (creating an original web page of resources for a specific audience, building an electronic portfolio of work, or posting original designs, new problems or findings, music, or other appropriate original work).

Aynchronous collaboration. The core learning strategy in our model uses asynchronous discussions and group problem solving collaborations between students in threaded discussion groups. Compared to synchronous technologies (chats, shared whiteboards, shared applications, audio conferencing, and video conferencing), these discussion groups are less expensive, more thoughtful, and far easier to schedule, particularly across time zones. A typical face-to-face sequence in a mathematics or science course includes a demonstration or modeling by the teacher, lab work or practice problems in class with a group and individualized homework for group review the following day. Online, the demonstration or modeling might be via an online, visual simulation activity (or offline experimentation with simple materials) that students can then explore or play around with to answer questions. The collaborative discussion would then revolve around gif images of interesting or surprising findings, unexpected outcomes or questions about aspects of the content to be learned. Students then help students with the instructor intervening only when others cannot assist. Research shows that this learning environment is inclusive and supportive of students with disabilities (Hsi & Hoadley, 1997).

Expert facilitation. Each course section must be led by a qualified person specifically trained in online facilitation. Leading an online discussion is a skill that must be developed; it is not sufficient to simply assign to online teaching to an excellent face-to-face teacher. Effective strategies in person have unintended effects online that halt rather than seed deepened dialogue (Haavind, 2000, Collison et al, 2000). In addition, many beginners make the mistake of putting themselves in the middle of the conversation by either asking all the questions or

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providing too many of the answers. Alternatively, many stay unintentionally in the way of learning by establishing private email with each member of the group. This quickly overwhelms the facilitator and interferes with student-to-student collaboration. A more effective facilitator moves out of the middle and has strategies for stimulating real student collaboration and guiding the conversation toward important content. The facilitator must monitor all discussions and respond within 24 hours if not sooner to technical or process questions. However, effective online community leaders can avoid interrupting participant collaboration and knowledge co-construction by only intervening to leverage content discussions toward deepened, clear focus on learning objectives (Collison et al, 2000).

Trust creation. Learning through collaboration requires participants to take intellectual risks. It is the responsibility of course designers and instructors to proactively foster a culture of community collaboration. This can happen only when participants are supportive, honest and encourage criticism and clear thinking. Leaving time to know one another is an essential first step in this process. Written expectations about good group processes is also helpful. The facilitator must establish and shape intellectual and emotional norms, model appropriate behavior, and steer harmful input toward higher, learning ground for all. Anonymous polls, role playing, introducing a partner to the group, and a cafe or student lounge thread where non-course topics are discussed, are all techniques we use to build and maintain strong, trusting groups.

Explicit Schedules. Online courses that rely on collaborative discussions must be tightly scheduled so that those participating share similar experiences and insights. We schedule a major topic for each week and usually schedule a set sequence of activity, discussion, and reflection within each week. For instance, if the content of a video is essential for a scheduled discussion, then the schedule must have all participants view the clip before beginning the discussion. While it is not important that all participants view the video simultaneously, it is best if each person views it within the days just prior to the beginning the discussion group. The assignment will then have each participant make an initial entry. Another assignment, within a few days will have participants make responses to comments already posted. The best schedule preserves the "anytime, anywhere" flexibility of online courses while also ensuring that all participants bring similar experience and currency to the discussion.

Limited enrollment. For meaningful online collaborations, the number of participants in an online discussion group needs to be limited. We find that 20-25 is the maximum number in one group for general discussions and that sub-groups with as few as two or three are needed for the intense collaboration required to produce something complex, like a cumulative project. However online discussions need a critical mass, so smaller is not better - and the minimum number of participants for effective online discussion is approximately 15. If the enrollment in a course is larger than 25, independent sections of approximately 20 are formed. When smaller working groups are needed for a specific task, the section is divided into public or private subgroups (depending on whether cross-pollination among groups has valued potential).

Excellent materials. Learning resources of many kinds are needed to provide the content and common experiences needed for effective discussions. To appeal to different styles of learning, we advocate using the widest feasible range of media and activities. We do not attempt to supply all material over the wire: books, media, kits, and labs might require supplies that are mailed or obtained locally. We encourage course authors to engage students in explorations, surveys, creative works, and self-reflection as appropriate. Multiple, short assignments in different styles and media are helpful in preserving course flexibility, reinforcing key concepts, and addressing different learning styles.

Purposeful virtual spaces. For most courses, several conversations are needed, each with different goal. At a minimum, four kinds of conversations are needed: An academic one about the content, and a technical one about the interface keep tech inquiries together and out of content threads. The facilitator only has to answer technical questions once, since others are encouraged to check the tech thread before asking the same question twice. Also needed is a social conversation thread for the group to meet and greet, de-brief and exchange resources or network. Finally, a weekly or bi-weekly "class meeting" thread is where participants can share with the facilitator and peers how it's going, what's working, what's being learned and appreciated about the course and what challenges participants confront as they move through the material. In many courses, multiple content threads, possibly time-limited, might also be needed. The conversations in these threads need to be set up in separate virtual spaces with clear learning goals and supporting rubrics for effective communication and growth (no "I agree/ I disagree"). The facilitator must nurture the appropriate use of each virtual space to keep dialogues clear and focused, and thus ensuring the content thread(s) are more fluid and rich.

These nine characteristics define the Concord eLearning Model, and position it as a major refinement of the more generally implemented scheduled asynchronous, instructor-led model for online instruction.

Collaborative Efforts through Tele-Mentoring to Increase Technology Effectiveness of Teacher Education

Seung H. Jin
Curriculum and Foundations
Cleveland State University, United States
seung.jin@csuohio.edu

Ernescia Torbert-Richardson
Curriculum and Foundations
Cleveland State University, United States
e.torbert-richardson@csuohio.edu

Abstract: The study examined the technology skills of the pre- and in-service teachers in the teacher education program. The two courses in the teacher education program established a cross discipline partnership creating a mentor/mentee relationship. The data was collected in quantitative and qualitative formats. The quantitative data was collected through technology surveys and online interaction. The qualitative data was gathered by classroom observations, mentoring technology activities, technology journals, electronic portfolios, instructors' notes, qualitative perspective discussions, and semi-structured interviews. This collaborative tele-mentoring activity offered students opportunities to expand use of e-mail in meaningful ways, to explore World Wide Web resources relevant to course topics, and to apply multimedia skills in the creation of electronic presentations and portfolios.

Over the past several decades educational professionals and practitioners on every level have struggled with the issues of how technology can be integrated into curriculums and increase students' technology skills in preparing for the future. Research reveals that core and specialized content professors in teacher education programs may be under-utilizing technology tools (Carlson and Gooden, 1999). According to them, modeling of technology by teacher educators was occurred only for word processing and most technology is underutilized. Therefore, pre-service teachers have little opportunity to see it modeled in their college classroom setting by their university professors. Moreover, Volk and Ming (1999) state the attitudes towards technology students receive is derived from prior experiences in formal education are important factors in their abilities to engage actively in any technological endeavors. Uses of technology in teacher education programs may motivate the pre- or in-service teachers to use it in their own instructional setting and maximize the quality of their research and presentations.

For innovative and motivational uses of technology into teacher education courses, three major goals were addressed in this present study. Those goals were: 1) to model the effective uses of technology for teaching and learning, 2) to develop the appropriate technology skills of the pre- and in-service teachers, and 3) to utilize technology tools to support their learning experiences. The study investigated the following research questions: 1) How does students' access of technology during the course differ in the experimental and control groups? 2) How does students' utilization of technology tools to conduct educational research and class assignments differ in the experimental and control groups? 3) How do the technology self-efficacy beliefs and attitude toward technology of students differ in the experimental and control groups? 4) How does students' expectancy of utilizing technology in future teaching differ in the experimental and control groups?

In the spring semester of academic year 2000, approximately 80 graduate students enrolled in the Child Development and Telecommunications in Education courses participated in this study. The two courses established a cross discipline partnership creating a mentor/mentee relationship. The participants in the Child Development course were divided into two groups which consisted of experimental and control sets. The instructor of the Child Development course encouraged students in experimental group to use technology for the research assignments as well as cooperative learning presentations. Also, the students were assigned to dialogue with mentors through a collaborative listserv maintained by the instructor of the Telecommunications in Education course. On-going support by the mentors was provided to the mentees for their educational research and learning practice utilizing technology tools. Participants in this collaborative mentoring activity were asked to write personal reflections related to integrating technology into their course work and personal use.

The data was collected in quantitative and qualitative formats. The quantitative data was collected through technology surveys and online interaction. The qualitative data was gathered by classroom observations, mentoring technology activities, technology journals, electronic portfolios, instructors' notes, qualitative perspective discussions, and semi-structured interviews. During the semester, the researchers collected three primary forms of data from the mentors in order to learn how mentors responded via listserv: each mentor's responses to his or her students, interviews midway and at the end of the study, and journals. All forms of data were a regular part of the Telecommunications in Education course. Additionally, the mentees in this study were requested to write a technology journal of integrating technology in their learning or teaching. There was a significant difference between two groups on e-mail access and interaction (Table 1). While the students in experimental group used technology as a research or collaborative tool for their learning, those in control group shown limited uses to ask questions or excuses to the instructor.

	Experimental (n=25)	Control (n=27)
e-mail access	100 % (25)	44% (12)
e-mail interaction	5.76 (144)	3.75 (45)
Contents analysis		
assignments	67% (96)	24% (11)
resources	6% (8)	2% (1)
group works	3% (4)	
problem report	9% (13)	2% (1)
questions	7% (10)	33% (15)
grade	1% (2)	4% (2)
absence/late	1% (2)	13% (6)
Personal notes	3% (4)	13% (6)
other sharing	3% (5)	7% (3)

Table 1. Analysis of e-mail interaction between two groups

This research study revealed progress made in the integration of technology in teacher education courses at this institution. This collaborative tele-mentoring activity offered students opportunities to expand use of e-mail in meaningful ways, to explore World Wide Web resources relevant to course topics, and to apply multimedia skills in the creation of electronic presentations and portfolios. The students in the experimental group expressed positive attitudes toward technology and competency for utilization of technology in classroom teaching. For example one student remarked:

> *When I began your class, I felt a little overwhelmed. I completed my undergraduate degree 10 years ago. I am glad you introduced me to technology. Whether I continue to further my education in education, I will need to be familiar with technology. So when my nephews need to work on the computer using the Internet, e-mail, Words, etc., I can assist them.*

As the result of this study, the participants in the Child Development course increased their proficiency level of technology, web-based research abilities, and analyzing online research materials. On the other hand, the participants in the Telecommunications in Education course linked their skills and knowledge to practical situation and had an opportunity to examine in detail the technology implementation process in the teacher education program.

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Survey on Use of ICT in University Teaching and Learning: Method and Content

Dean Korošec
Faculty of Electrical Engineering and Computer Science
University of Maribor, Slovenia
dean.korosec@uni-mb.si

Kari Kumpulainen, Thomas Fox McManus
Research Unit for Educational Technology, Faculty of Education
University of Oulu, Finland
kari@kumpulainen.net, thomas.mcmanus@oulu.fi

Abstract: As part of an on-going European project whose aim is to establish a Center for Distance Education Development, the University of Maribor developed a survey on use of information technology in teaching and learning at our University. In this paper we described the context and development of the questionnaires as well as the process of conducting the survey.

Our goals and purposes of collecting the data included: (a) evaluating the current nature of experiences related to ICT shared by members of staff and students of the University of Maribor, (b) assessing the needs of the University staff in implementing new media in their professional practices (such as developing teaching material in electronic form and establishing new forms of collaboration and dissemination within the University and beyond), (c) giving foundations for developing new skills of teaching and learning in the information society.

Introduction and background

In order to improve the quality of technology in teacher education it is first necessary that we determine the current state of technology integration within the institution. In our case we chose to examine the use of technology by our entire faculty as well as the student body rather than just looking at those in our teacher education programs. The idea was not to investigate on the technology (software and hardware) but to focus on applications, while also trying to assess some subjective impressions, opinions and prevailing factors influencing the openness and acceptance of ICT in university teaching and learning.

Two questionnaires - for teaching staff and students - have been carefully compiled by an international project group and presented to 600 members of staff and close to 16,000 regular and part time undergraduate students, both in paper and electronic form. To keep the effort requested from participants low, special care in preparation has been devoted to the number of questions, their structure and compact, yet clear, formulation.

The survey described was proposed as one of the final activities in the scope of the European Tempus DETECH project, whose goal was to establish and develop the Department for Technology Supported Distance Education within the Centre for Distance Education Development at the University of Maribor (CDED at UM). The Department should offer consulting and technological services in the area of open and distance learning for pedagogical staff of the faculties (9 of them and one University college compose UM).

Survey Overview

Main goals and purposes of collecting the data are listed in the Abstract and will not be repeated here.

Target group The survey has been performed both on teaching staff and students.
As *teaching staff* all employees of the University of Maribor, full and part time, who are taking part in the educational process are considered. This includes professors (full, associate and assistant), teaching assistants (with PhD, MSc or BSc) and technical staff (laboratory workers and demonstrators involved in some parts of the educational process and having some kind of responsibility regarding students). Their total number was 600.

With *students* all students, full and part time, with some experience in university education are described. Because the survey has been performed in the beginning of the school year students of the first year (freshmen) were not included in the survey, leaving us with 15.657 students.

Structure of the questionnaires Based on ideas of the team members, material from other surveys and a brainstorming session a large number of possible questions was accumulated first. These were then arranged into groups to build the basic structure of the questionnaire. Six main groups, listed in Table 1, were formed. A set of questions in each group was then carefully studied, discussed and refined. The main goal was to minimise the number of questions and to make them as simple, uniform and clear as possible while still retaining large amount of information in the possible answers.

Survey conduction Both paper and electronic form were used in order not to bias the results in favour of the population with better access to Internet. We delivered one copy of the paper form to each staff member through the administration of each faculty. Also each student received a paper form at the time of his/her inscription in the beginning of the school year. Reference to the electronic form was clearly indicated on all paper questionnaires so everyone was offered both options to participate; members of staff were additionally informed by two e-mail notifications. Of course, the approval from the University management had to be obtained prior distributing the questionnaires.

In the scope of the survey we announced a prize drawing to: (a) stimulate the response and (b) provide a means for participant identification, which should allow us to neglect possible multiple entries.

Collection of paper forms was again organised through the faculty administrations and student offices, although it was also possible to send the form directly to the Centre for Distance Education Development.

Questionnaires

Table 1: Overview of the staff questionnaire

Area	Question	Answers
Background data	Faculty, Academic position, Educational Role, Sex, Age	
General	Is a PC with an Internet connection available to you during the time you do your professional work?	Yes (Satisfied?) or No (Why?)
Tools and applications	Do you have experience in the following areas?	Nineteen areas, 1-4 scale
Basic skills	Are you satisfied with your skills in...	Three topics, 1-4 scale
	Compared to other staff members at my own faculty, I believe my ICT skills are...	1-4 scale
Teaching/communicating with computer	Do you (and how often): use e-mail, use newsgroups, use and create electronic presentations, publish Web material...	Seven topics, 1-4 scale
	Do you partly (or completely) deliver content for your students over Web?	Yes (How?) or No (Why?)
Preferred improvement style	In which way do you prefer to improve your knowledge and skills in ICT?	

Table 2: Areas and questions which are different in the questionnaire for students

Area	Question	Answers
Background data	Faculty, Degree, Regular/Part Time, Sex, Age	
General	For how many hrs/wk you use (a) computer, (b) Internet?	Private use / For studies
Learning/communicating with computer	Do you (and how often): use e-mail, use newsgroups, publish electronically, use educational software, learn from Web...	Nine topics, 1-4 scale

Conclusion

We believe that the described survey is a good proposal for investigating the overall climate regarding the computers and Internet as the educational media among all participants in the process of university education. We were searching for measurable proofs of a shift toward information society in an environment of a traditional University. We were also hoping to relate current and desired ICT skills to the overall openness and level of adaptability to new educational paradigms and/or technologies. Complete results, which will be ready soon, should also allow us to draw some comparisons between teachers and students.

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How Telecommunication Technologies and Moderating Strategies in Online Instruction May Benefit Teacher Education

Amy S.C. Leh
Instructional Technology
California State University, San Bernardino
aleh@csub.edu

David Winograd
Department of Information Communication and Technology
State University of New York, College at Potsdam
winogrdm@potsdam.edu

Abstract: The purpose of this presentation is to share how two educators use varied moderating strategies in managing online asynchronous computer conferences to facilitate learning of in-service and pre-service teachers. Although the strategies were used slightly differently, commonalities of experience were found dealing with issues of levels of participation, intervention, learner autonomy and the effect of learner-to-learner interaction. The advantages of using moderating strategies both for the teacher and the student are discussed.

Introduction

Online instruction is a current trend in higher education and is greatly influencing the practices of both institutions and educators. At present an increasing number of faculty members in teacher education are implementing telecommunication technologies such as listserv and asynchronous computer conferencing both in courses delivered at a distance and as enhancements to hybrid courses. Course management systems such as WebCT and BlackBoard are being used for instruction in the hopes that an online learning environment enhances learning. The purpose of this paper is to share how educators may use these varied telecommunication technologies and useful strategies to structure and moderate computer conferencing to reach this goal.

The authors are two university professors who use moderating strategies in their instruction both online, and as online enhancements to face-to-face courses in their instruction of pre-service and in-service teachers. One instructor taught online courses to in-service teachers who did not meet the instructor every week while the other instructor taught pre-service teachers in a classroom setting, using computer conferencing for issues of technology in education as enhancement to classroom discussion.

Subjects

During two semesters, instructor A studied a course that was an undergraduate requirement in the teacher education department of a small Northeastern College. The course dealt with the integration of technology into curriculum and was the only technology requirement in the teacher education program. The students were comprised of pre-service secondary Math, Spanish, History and English teachers. Student computer experience varied widely. Some had grown up with computers and had a great deal of experience in working with technology while others had minimal experience and only had vague ideas of the meaning of terms including: hardware, software and networking and telecommunication. Both semesters the class consisted of 20 students with a fairly even distribution of males and females.

Instructor B studied a graduate course in the Instructional Technology program of a teacher college in the Western United States. The course was offered at two campuses. The subjects were in-service teachers who were pursuing their Master's degree at the university. Since they had taken two technology courses for their teaching credentials and were working on their MA degree in Instructional Technology, their technology skills were relatively good. Many of them offered technology training to their colleagues at their schools, and some of them played technology leadership roles, such as being technology coordinators. The class consisted of approximately 20 students at the main campus and 10 students at another campus with a fairly even distribution of males and females.

Methodology and Structure

Instructor A

The course was divided into two groups of ten based on nothing more than their place on the class roster. Ten is a reasonable number since, if messaging is mandated, reading and responding to a large number of messages can become unwieldy while in much smaller groups the students may feel pressure to constantly perform and there might not be enough stimulus to maintain engaging discussions (Cifuentes, Murphy, Segur, & Kodali, 1997).

The entire class was instructed in how to moderate a computer conference through lecture and a non-theoretical written moderator training written by the instructor. The class was directed to subscribe to the 'Educause' listserv that deals with topics related to technology in education. This was done to expose the students to a diversity of issues and to offer a continuing stream of potential topics that could be used as source material. The BlackBoard course management system was used for asynchronous discussion. Within the two groups, one student per week was assigned to moderate a one-week conference. On Saturday two students, one per group, emailed the instructor a 'welcome message' including a topic, a number of propositions and a minimum of four open-ended questions. It was always important in a 'welcome message' to create a friendly and personal tone (Mason, 1991). The instructor would either make suggestions on improving it and having it resubmitted to him, or inform the student that the message was fine and should be posted to a special forum on BlackBoard by Sunday night. Hacker and Wignall (1997) found that in the participation in conferences lessened over time if students had little computer experience. Therefore everyone who was not a moderator for the week was required to post a minimum of three messages per week. The first must be a response to the 'welcome message' and must be posted by Tuesday night, the second should be a response to a non-moderator written message and should be posted by Thursday night. The third message, which would be posted by Sunday night, could be in response to anything previously posted. The moderator then wrote a summary, making liberal use of participant quotations, and posted it by Monday. It was suggested after the first semester that the moderator read the first and last message to the class since half the class was not party to the discussion and that was done during the second semester. Eastmond and Ziegahn (1995) proposed, along with mandating a certain number of messages per week, that there be standards established for the quality and relevance of the message. They suggested that participation accounted for 30% of the course grade agreeing with Cifuentes et al. (1997) who proposed that quality and quantity of messages should be able to raise or lower assessment by a full letter grade. In one semester online participation of Instructor A accounted for 30% of assessment, and the second semester an additional 10% was assessed for individual moderating.

The instructor made a choice not to participate in the conference. If the conference was going off-track or needed intervention, personal email was written to the moderator who was responsible for taking remedial action.

Instructor B

The course of Instructor B was a hybrid course in which the instructor met her students four times throughout the quarter—twice at the beginning, in the middle, and at the end. She valued active learning and meaningful learning (Grabe & Grabe, 2001; Brown, 1992; Knapp & Glenn, 1996; Means et al., 1993). Agreeing with Palloff and Pratt (1999), she designed her courses in a way that her students had to interact with other students to enhance learning. In a manner similar to Oliver (2000) and Santema and Genang (2000), she invited students to construct course materials together with her. All assignment submissions and discussions were conducted online via WebCT. She constructed a variety of forums (discussion boards) for students to communicate with each other and to share resources. Examples included forums for conducting discussions, making announcements, asking questions and receiving help concerning technical issues, submitting assignments, and providing feedback and critiques to their classmates.

During the first meeting, the entire class was instructed in what moderating was and in examples of moderating an online community. The students took turns to moderate their online community for a week, and chose the week when they would moderate. For the class with 20 students, they selected a partner who they would like to moderate with during the week. They needed to post discussion topics, host online discussions, answer questions posted by their classmates. They could also conduct any activities they created to enrich the online community, such as "happy hour" on Friday evening in chat rooms. The students were encouraged to explore new ways of moderating. It was understood that the instructor would not interrupt to answer questions unless it was necessary and that the moderators would receive credits based on how well they moderated the community. For example, if a question or a problem on a discussion board remained unanswered or not acted upon, the moderators of the week would be marked down. Moderators did not have to answer all questions or solve all problems but they needed to facilitate discussions about the issues within the community.

All students are required to participate in online communication by visiting the community on a daily basis and posting at least two messages with substance every week. Participating and moderating weighted 15% of the course grade.

Findings

Both instructors found that the level of discourse in the conference of all groups was quite high. Students who rarely speak up in class wrote eloquently and at length when engaging in online discussion. One student in the graduate course said, "I'm often quiet in class. I think I'm influenced by my family; I'm the youngest one in my family. However, I noticed that I was very eloquent online and felt very comfortable of expressing myself online."

It was virtually unanimous that students enjoyed the experience and would attempt to use it in future classes as long as the schools, in which they would work, had the required equipment. They also mentioned that they would recommend instructors who teach hybrid or online courses use moderating to enrich their online community.

Participation

Both instructors thought that the level of participation required was considered appropriate by a great majority of the students and that participation credits provided good incentive for students to engage in online communication. Nearly all students met the participation requirements and a good number of them posted many more messages than the minimum. Both instructors agreed that online participation was crucial for online community and recommended that participation credits be part of course grade.

Autonomy and Ownership

The majority of students felt a sense of ownership of their discussions both because they had control over how the discussion progressed and also because the instructors' decision not to participate. Instructors' involvement might have restrained discourse due to the intrusion of a figure of authority. Here are a few comments from the classes:

> I did enjoy moderating and controlling my discussion. I felt it allowed me to really think about each response…It was also interesting to see if I could spark some thought within the group, since that will be a main focus of being a teacher: "sparking thought."
>
> Having only students participate allowed the discussion to stay on a more familiar level with everyone. If teachers enter the discussion, it might be more advanced for some, and in return the students might be hesitant to ask certain questions, or they may be more self-conscious of what they say. I think that students learn very valuable information from discussion amongst each other.
>
> I've taken your online courses before and enjoyed this course much better because of the moderating. When I was the moderator, I tried to be creative and felt a sense of ownership. When I was a participant, I also observed how my classmates moderated and many of them had cool

> ideas. I learned a lot from them. I felt that the moderating allowed me to see personalities and creativity of my classmates.

Interaction and Cohesiveness

Most messages contained support for the current moderator and a great deal of positive reinforcement. Phrases like: "Interesting topic," "Keep up the great work," "Great Post!" "Good comments, You sum it up quite well" and "Keep up the good work" were to be found in just about every message. The amount of politeness, words of agreement and general good manners tended to increase participation and create an atmosphere of warmth and cordiality. Of the undergraduate course, group members reported that they felt closer to other members of their group than they did to the half of the class they did not engage in computer conferencing. Of the graduate course, the students also expressed that they knew their classmates in the hybrid course better than their classmates in a traditional class. A student said, "In a traditional course, I only got to know people who sat close to me. In our online [hybrid] course, I talked to everyone and got to know everyone although I might not recognize his/her face. I felt much closer to my classmates." Several students of the graduate course expressed their sadness during the end of the quarter. A student said, "I feel sad that the class is over now. I really enjoy our online communication and hope to continue."

Advantages of Using Moderating Strategies

The advantages for students of learning and practicing moderating strategies included a sense of ownership of the discussion and a sense of freedom to direct discussions into areas that they believe might not be allowed in a traditional course setting. In addition, they learned how to form a community that could contain many resources and reveal a way of learning. A student of the graduate course said,

> There were so many resources in our discussion forums. I downloaded the messages and can use them later. This seems to be an effective way of learning. See! I can't keep taking classes in the university, but I may keep learning by forming such a community. Actually this should be how we learn once we are in the field.

This practice in class management should prove valuable in their later careers.

For instructors a major benefit is that putting the onus of moderation to the students saves a considerable amount of time while instilling skills of critical thinking in students. Although it is true that all conferences must be attended to quite closely, not writing responses, outside of occasional email to provide direction, frees up time for other activities. In addition, putting the moderation to the students may stimulate students to conduct active and meaningful learning.

Conclusion

The two university professors used telecommunication technologies and moderating strategies in their online instructions. Although they used the strategies slightly differently, they found commonalities of experience dealing with issues of levels of participation, intervention, learner autonomy and the effect of learner-to-learner interaction. Both instructors thought that the moderating enhanced students' learning and benefited teacher education. They invite educators to use the technologies and strategies and to explore their potentials in education.

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Tasting Fine Wine Online for MERLOT:

Criteria for Evaluating Multimedia Educational Resources for Learning and Online Teaching

Barbara B. Levin
Department of Curriculum and Instruction
The University of North Carolina at Greensboro
United States
bblevin@uncg.edu

Karen Smith-Gratto
Department of Curriculum and Instruction
North Carolina A&T State University
United States
gratto@netmcr.com

Abstract: MERLOT (Multimedia Educational Resource for Learning and Online Teaching) is a database of high quality online resources that can be used to improve learning and teaching within higher education. The resources in MERLOT include (a) links to thousands of learning materials, (b) sample assignments that show how the materials could be used in the classroom, (c) evaluations of the learning materials by other individual users and panels of faculty, and (d) links to people with common interests in a discipline and in teaching and learning. This paper describes the peer review process used for materials submitted to the Teacher Education Discipline section of MERLOT at http://merlot.org and the process for becoming an external reviewer.

Introduction

Many teacher education faculty members are reluctant to develop web-based instructional materials for use in their classes. Others have difficulty finding quality resources to use in their online courses. To encourage the effort that is equired to develop these resources, MERLOT (Multimedia Educational Resources for Learning and Online Teaching) offers a peer review process that is comparable to the peer review process for journal articles. The purpose of MERLOT is to identify high-quality web-based materials that are appropriate for use in teacher education. While there are many databases for K-12 materials, MERLOT's Teacher Education discipline group at http://teachered.merlot.org focuses on sites that are used by other teacher educators and/or have been prepared by teacher educators.

MERLOT's Peer Review Process

Professionals within the field evaluate sites that have been submitted to MERLOT, a database of instructional materials available on the web for student learning and online teaching. The peer review process for evaluating teaching-learning materials follows the model of peer review of scholarship. Each review is conducted by a minimum of two reviewers and results are linked to information about online learning materials that are submitted to MERLOT at http://merlot.org. The review process is quite rigorous in order to provide the best information to potential users. Three major areas are evaluated: (1) Quality of

Content; (2) Potential Effectiveness as a Teaching-Learning Tool; and (3) Ease of Use. As a result of the peer review process, many institutions are now considering websites that have been evaluated by the MERLOT Peer Review Panels as comparable to peer reviewed journal articles.

Evaluation of these three areas (quality of content, potential effectiveness for teaching and learning, and ease of use) guides comprehensive assessment and peer review of the site. The review process yields high-quality peer reviews that support faculty members in validating the importance of online learning materials they develop for their students to use. For reviewers, engagement in the peer review process provides an excellent means of examining sites in their own instructional areas that they might use in their own classes. For all of us in teacher education, the review process provides a means of acknowledging and highlighting worthwhile sites. Finally, as the MERLOT database grows and more sites are reviewed, we will all be able to save time when looking for ways to incorporate web-based teaching and learning activities into our university classes.

Quality of Content

Reviewers with content expertise and experience with online teaching evaluate the quality of the content based on specific criteria. For example, the material must present correct concepts, models, and/or skills within the area of teacher education addressed. In addition, the concepts, models, and/or skills must be considered significant. This means that the content addresses core curriculum areas or areas identified as important by professional organizations. For example, if a site presents material about learning theories, we would expect to find up-to-date information about current theories of learning, such as constructivism. Additional areas examined in the area of quality of content include whether the material is considered difficult to learn and whether the material is essential for building more complex concepts, models, or skills.

Potential Effectiveness as a Teaching/Learning Tool

Another area that is evaluated is the potential effectiveness of the site as a teaching-learning tool. This simply means that the site is viewed through the lens of possibility. Can the reviewer envision how the site might be used for teacher education? This question is at the core of what occurs during this part of the review. Developers of online learning materials can aid this process when they include their learning objectives, characteristics of target learners, and how they use the materials. Reviewers also consider whether the site can be used to improve the teaching/learning experience. Another consideration is whether a site can be easily integrated into the teacher education curriculum. Several other areas that impact potential effectiveness of how the site can be used in the teaching/learning process are also considered and evaluated: potential for improving the teaching/learning process, ease of integration into a variety of courses and pedagogies, and potential for developing a variety of good learning assignments around the web-based learning material. Evaluation of this area is contingent on how authors and reviewers envision using the material under review. For example, "if this site is used with graduate students as an independent homework assignment for them to learn X, but for undergraduates if might be more appropriate to use this site during class with the goal of teaching X."

Ease of Use

Ease of use deals with accessibility for the teacher educator and by teacher education students as well. The user/site interface is of major concern here. The design of the site needs to be consistent and navigation through the site should not interfere with the learning process. Users should be able to travel through the software without getting lost or trapped. Appearance of the site is also important and requires consideration of font types (are they readable?) and background/foreground contrast, among other things Also considered is the balance between how difficult the site is to use compared to its instructional value. In other words, if the site requires that users spend time learning how to use it, then the learning experience must have high value relative to the time involved. For example, if a site is a simulation about classroom management, does the time needed or the difficulty of using the simulation negate the value of what students learn about classroom management? Other considerations include whether special plug-ins are needed to access the site and whether using the site requires a lot of documentation, technical support, and/or instruction for students to be successful.

Expanding the Peer Review Process

The Teacher Education Editorial Board for MERLOT want to make MERLOT's criteria for evaluation of online learning and teaching materials public to those who develop or contribute learning materials to the MERLOT database. We are also interested in expanding the pool of peer reviewers. Ultimately, we hope that peer review of online resources for teacher education will be a shared venture among those of us with interest and expertise in web-based learning and teaching.

In order to increase the number of online learning materials that are peer reviewed and to ensure adequate coverage of all the areas within the field of teacher education, members of the Editorial Review Board may invite an external reviewer to participate in the review process. External reviewers are qualified faculty from institutions of higher education who (a) are selected by the editorial board and approved by the Co-Editors, (b) come from any institution of higher education (they do not need to be MERLOT sponsors), and (c) will be partnered with and mentored by editorial board members for their first reviews. People interested in becoming an external reviewer can also apply by joining MERLOT and creating a MERLOT member profile, which contains a narrative summarizing their context expertise, teaching excellence, use of technology in teaching, and connections with professional organizations. Applicants should also designate the subject/discipline areas that they are qualified to review. An applicant should then email the Chief Co-Editor(s) about his/her interest in being an external reviewer. Contact information and more details about being an external reviewer can be found at http://taste.merlot.org/join/external.html.

Other Ways to Become a Part of the MERLOT Community

Other ways to contribute to the MERLOT community of teacher educators who use online learning materials include adding user comments and assignments. User comments are usually brief remarks that address the same criteria as more formal peer reviews: quality of content, potential effectiveness as a teaching-learning tool, and ease of use. User comments include both general remarks and technical remarks. Anyone who has used an item in the MERLOT database is invited to add a user comment. Authors and users of learning materials in MERLOT are also invited to submit details of assignments they have developed for particular courses or specific classes based on learning materials in the MERLOT database. Assignments include information about the course in which the site was used, the level of students in the course, relevant topics covered, student learning objectives, any needed pre-requisite skills, and details about the assignment including assessment procedures and time frame required. Assignments are very useful to members of the MERLOT community because they provide guidance about how others have used a particular site in the MERLOT database. Because MERLOT is a resource for all faculty (and their students) engaged in online teaching and learning, contributions in the form of new sites, user comments, assignments, and peer reviews are welcome. MERLOT is a *free* and *open* resource, which is made viable by the community of people who contribute to and use MERLOT to enhance online teaching and learning.

A STUDY OF HOW TECHNOLOGY TEACHER USING INTERNET SEARCHING ENGINE FOR LESSON PLANS

K.H. Lo & Hung-Jen Yang, & Rong-Jui Fong & S.F. Chaw & Yi -Shian Jong
Department of Industrial Technology Education, National Kaohsiung Normal University, Kaohsiung, Taiwan, R.O.C.
fork@ms26.url.com.tw & hjyang@nknucc.nknu.edu.tw

Jui-Chen Yu
National Science & Technology Museum, Kaohsiung, Taiwan, R.O.C.,

Abstract: The purpose of this study was to identify how technology teacher using Internet searching engine for initiating and updating their lesson plan. An investigation research method was applied for this study. There were two phases in this research. In the first phase, an on line recording system for browsing path, screen images and operating video was setup for technology teachers who were experienced searching engine users. By reviewing recorded data the goals, procedures and functions of using Internet searching engine for lesson plan were drawn. In the second phase, a investigating tool was design based on the result of the first phase. Questionnaires were delivered to random sampled technology teachers for collecting data. The statistical process was followed for analyzing collected data. Conclusion of research problem was drawn from the analysis result. Based on the result of data analysis of both phases, a portal type environment of technology teacher professional searching engine for lesson plans was discussed and suggested.

When a technology teacher edits a lesson plans, he/she often needs much information for his /her lesson plan. However, when he/she wants to search his information in demand on the WWW, he/she just can find information in the shortest time by searching engine besides finding information at known professional webs or relative webs. But each searching engine provides different searching functions and information range. For this reason, it is necessary to build a portal type environment of technology teachers professional searching engine for lesson plans. Before reaching this purpose, we must know how technology teachers using internet searching engine for lesson plans. Therefore, the purpose of this study was to identify how technology teachers using Internet searching engine for initiating and updating their lesson plans.

Methodology

There were two phases in this research. In the first phase ,an online recording system for browsing path ,screen images and operating video was setup for technology teachers who were experienced searching engine users. In the second phase, investigating tools was designed based on the result of the first phase. Questionnaires were delivered to random sampled technology teachers for collecting data. Technology teachers were asked to mark a Likert scale from"Strongly Disagree" to "Strong Agree". The population of this study was technology-practicing teacher in Taiwan. The total was around 300. The Random sample procedure was applied to distribute 45 , 15%, questionnaires. There were 39 returned. The research instrument divided into three parts, profile information, terminology explanations, and 36 Likert-type questions. The Alpha reliability coefficient of this instrument was 0.87.

RESULTS & CONCLUSION

The profile information listed as follows:

1. Gender: male (89.2 %) ,female(10.8 %) .
2. Using computer attitude: 88.9 % of them liked using computer , 11.1% of them were neutral.
3. Learning computer experience: 1~5 years (78.3 %), 6~10 years (19 %), above 15 years (2.7 %).
4. Using computer time a week 0~30 hours(62.2 %),31~60 hours(32.4 %), above 60 hours (5.4 %).
5. Contacting to Internet time : 1~5 years (86.5 %) , 6~10 years(10.5 %),and above 10 years(3 %).
6. Using Internet search-engine time: 1~5 years(94.6 %),6~10 years(5.4 %).
7. Internet instrument accessibility: 2.7 % were hard , 18.9 % were neutral ,40.5 % were easy, 37.8 % were very easy.
8. Self-estimating operating search-engine (scale degree from 1 to 10): scale 5(8.1%),scale 6(5.4%),scale 7(24.3%),scale 8(37.8%),scale 9(16.2%),scale 10(8.1%).

- Based on the one-sample Test of each Likert-type question, it was concluded how technology teacher using search-engine for their lesson plan. They used Internet search-engine in following ways:

  Synonym search; Key-word search; Semantic search; Subjects browsing; Initiating new lesson plan; Editing lesson plan; Contract filtering data; Verifying data; Parallel filtering data; Comparing data.

- There existed no difference between gender among different search-engine operations. The attitude toward computer would be a factor influencing using search-engine in verifying data manner.
- The person with higher level of positive attitude was with higher intention to verify data from search-engine.
- The instrument accessibility factor made no difference among types of search-engine usages.
- The ability of operating search-engine also made no difference among types of search-engine usages.

According to these findings, an environment of technology teacher professional search-engine for lesson plans could be designed to reduce technology teachers searching information time and frequency, help teachers selecting information, and editing lesson plans.

The Responsive M.Ed.: Using Technology to Reinvent the Master's Degree

Cheryl Mason Bolick, University of North Carolina at Chapel Hill, US

The M.Ed. for Experienced Teachers was specifically designed to meet the needs of experienced classroom teachers. This cohort-based degree program offers practicing teachers a unique opportunity to engage in action research throughout their academic experience that is directly related to their classroom teaching. It is our intent that teachers enrolled in the program will not only be able to immediately apply what they are learning in their graduate coursework into their classroom, but that the program will also help combat the growing attrition rate of our state's teachers.

To most effectively address the expressed needs of classroom teachers, alternative modes of instruction are used throughout the graduate program. Combining face-to-face instruction with Internet-based instruction allows practicing teachers to maximize their participating in the program. Teachers engage in intensive face-to-face instruction during the summer. Courses offered during the fall and spring semesters employ alternative delivery methods. That is, a percentage of the courses are delivered through web-based instruction, and a percentage is delivered through off-campus face-to-face instruction.

The goal underlying this effort is innovation rather than efficiency. "Technology's true potential is realized when it is employed in innovative ways which do not necessarily correspond to traditional classroom practices" (Pinheiro, 1998, p. 118). Distance education strategies are typically aimed at reaching as many students as possible to increase revenue (Garrison, 1993). The M.Ed. for Experienced Teachers, however, seeks to use distance learning strategies to maximize and enrich the students' academic experience and allow the teachers flexibility of pursuing a graduate degree while continuing to teach in the classroom. The potential of virtual communities for collaboration has been noted almost from the beginnings of the Internet. "The technology that makes virtual communities possible has the potential to bring enormous leverage .... But the technology will not in itself fulfill that potential; this latent technical power must be used intelligently and deliberately by an informed population" (Rheingold, 1993).

Teacher education programs have been mandated to prepare and support teachers who are well-versed in technology and able to collaborate within buildings and with other K-12 schools to share resources and strategies (Merryfield, 1999; NCATE, 1997; USDOE, 2001). Consequently an additional goal of this graduate program has been to model effective pedagogical strategies for teachers, who may then serve as change agents when they employ similar collaborative methodologies in K-12 schools.

Modeling collaborative education methods for K-12 teachers increases the likelihood that they will employ similar methods in their own classes. Recent data suggests that professionally engaged teachers differ significantly from classroom teachers who are isolated in their classrooms. (Riel & Becker, 2000). By using collaborative education tools, we are taking a step towards restructuring teacher education and preparing teachers to form "collaborative community activity" (Riel, 2000) of their own within and among classrooms, schools, and districts. Thus, our M.Ed. for Experienced Teachers' graduates are better prepared to act as change agents (Rogers, 1995).

This short paper will present initial data analysis from the first year of the program.

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Assessing Distributed Learning: Student Perceptions and Future Directions

Barbara K. McKenzie, Department of Media & Instructional Technology, State University of West Georgia, United States, bmckenzi@westga.edu

Elizabeth Bennett, Department of Media & Instructional Technology, State University of West Georgia, United States, ebennett@westga.edu

Nancy G. Mims, Department of Educational Leadership and Professional Studies, University of West Georgia, United States, nmims@westga.edu

Abstract:
This study assessed distance students' perceptions of distributed learning, the advantage and disadvantages; the impact it had on their learning. (and to plan future directions with web-based courses). Graduate students were surveyed fall 2000 through summer 2001 (N=242). Using UPSS, frequencies and percentages were calculated to determine the rank order findings for the advantages and disadvantages of web-based courses. Means were calculated for the Likert scale items, student attitudes toward web-based instruction. Chi-square tests were also run to determine if any relationships existed between selected student characteristics such as gender, technology background, degree program, and online experience and attitudes toward web-based courses. Major advantages of web-based courses included decreased travel requirements, ability to communicate electronically with the instructor and class, easy accessibility of course materials, and flexibility in completing the course. The greatest obstacles reported by students were the frustration that resulted when they were unable to get online and having technical equipment problems.

Introduction

Advances in distributed learning have provided students with a wide variety of teaching/learning alternatives that have expanded the educational process beyond the traditional classroom. In addition to the face-to-face mode of instruction students now receive instruction through teleconferencing, online and/or web-based instruction, e-learning, and other advancements currently taking place with telecommunications technologies. The advancements have been rapid and will continue to expand and impact our educational process (Hooper, 2001; Kearsley, 2000; Schreiber & Berge, 1998; Trent, 2001).

The effectiveness of distributed learning and students' receptivity to the new delivery modes must be more closely examined to ensure effective learning is in fact taking place and students do favorably receive the various types of distributed learning (Berge, 1998; Berge, 2001; McKenzie & Mims et.al, 2000; Palloff & Pratt (2001). To gain a more in-depth understanding of how distributed learning impacts students, a yearlong study was conducted at a medium university in the southeastern United States. The investigators' goals were to understand students' perceptions of the advantages and disadvantages of web-based instruction; the impact that web-based courses that on students and future directions for web-based courses.

The Study

In order to study student perceptions of web-based instruction, students enrolled in web-based courses in media and instructional technology, educational leadership, and curriculum and instruction between fall 2000 and summer 2001 were surveyed (N=262). All classes used on-line instruction and were delivered by experienced distance instructors. The vast majority of the courses used on-line instruction more than 50% of the time.

Using the research findings and a review of the literature, the survey was constructed. Closed and open-ended questions were used to generate the study's data on advantages and disadvantages of web-based courses, types of skills web-based instruction develops in its participants, to determine whether or not different learning styles are accommodated, and to evaluate changes that may be needed to enhance web-based courses. The study was pilot tested by eight members of the target popular and distance experts. Revisions were made before the final version of the survey was distributed.

Twelve instructors distributed the surveys to students near the end of the semester through electronic or paper survey. If a student had completed the survey previously they were instructed not to complete the survey again. Respondents were asked to reflect on their experiences in a web based on-line class and respond to the questionnaire honestly and return it to their instructor as soon as possible. They were informed the data would be kept confidential and used to make more informed decisions on the use of on-line instruction in the future. Most of the students agreed to participate in the study.

The returned surveys were entered into SPSS. Frequencies and percentages were calculated and rankings determined for each web-based course advantage and disadvantage. Means were calculated for the Likert scale items in part two of the survey. Chi-square analyses using gender, degree program, technology background, and prior experience in web-based courses as independent variables and identified advantages and disadvantages to web-based courses as dependent variables were also calculated.

Findings

A total of 262 students completed the survey. The gender demographic was 77% female, 23% male. A majority of the participants were enrolled in graduate degree programs: 68% were pursuing a Masters degree, 23% were working toward an Educational Specialist degree, and 7% were studying for a doctoral degree. One percent of the respondents were undergraduates, and the remaining 1% were not working toward a degree. Most of those replying were majoring in Media and Instructional Technology (44%) or Educational Leadership (28%). Other majors represented included Special Education (5%), Elementary and Early Childhood (4%), Middle Grades (3%), Counseling (3%), Physical Education (2%), Art Education (1%), and Business Education (1%). Other majors (9%) had less than 1% representation in each field of study.

Most students enrolled in the web-based courses were moderate to heavy users of technology. Twenty-seven percent indicated they used technology between 7-12 hours per week, 23% reported technology use of 13-18 hours per week, 21% utilized technology over 24 hours per week, 15% said their weekly use of technology averaged 19-24 hours, and only 14% used technology less than 6 hours per week. However, most students were relatively new to web-based instruction. The majority (61%) were taking their first or second web-based course when they responded to the study, although 24% were enrolled in their third or fourth course, 11% were in their fifth or sixth, and 4% had taken seven or more web-based courses. Most students (71%) reported that the current course they were enrolled in was 51-70% web-based, 24% of the respondents indicated that the web-based component of their course was 50% or less, and the remaining five percent of the students noted their course was 71-100% web-based.

Respondents were asked to identify which of a list of 11 attributes they perceived as advantages of web-based instruction. The majority of students (between 60 and 94%) categorized seven of the listed characteristics as advantages. A decreased travel requirement to campus was identified by more students (94%) as being an advantage of web-based education than any other attribute. Other attributes clearly identified as advantages of web-based classes included the ability to communicate electronically with the instructor (84%), easy access to course materials (82%), and flexibility in completing course assignments (81%). Some students indicated that timely feedback from the instructor on assignments (65%), the opportunity to enhance personal computing skills (64%), and the opportunity to use web resources (60%) were advantages of web-based courses. Fewer respondents indicated that ease of expression (45%), support of varied learning styles (41%), collaborative opportunities for students (38%) or teachers (38%), and opportunity to interact with a wide range of students (37%) were web-based course advantages. Table 1 lists the attributes that students responded to, and ranks them in order according to the percentage of respondents identifying them as web-based course advantages.

Rank	Perceived Advantage	%
1	Decreased travel requirements to campus for class	94%
2	Ability to communicate electronically with instructor and/or class	84%
3	Course materials can be readily accessed any time from any place	82%
4	Flexibility in completing the course and/or assignments	81%
5	Timely feedback from the instructor and/or students on assignments or projects	65%
6	Opportunity to enhance personal computing skills needed to take a web-based course	64%
7	Opportunity to take advantage of a variety of resources on the web	60%

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8	Some students express themselves more effectively through electronic communication	45%
9	A variety of students' learning styles are addressed	41%
10	More collaborative opportunities are available for student work	38%
10	More collaborative opportunities are available for instruction	38%
12	Opportunity to interact with wider range of students	37%

Table 1: Perceived advantages for web-based courses

Participants were also asked to identify web-based instruction disadvantages. Seven attributes were listed, but none were classified as a disadvantage by a majority of the respondents. Difficulty in securing online/computer access was identified as a disadvantage most frequently (49% of the respondents), followed by technical problems (42%) and students' inability to communicate effectively online (41%). Some noted that lack of student computer skills was a disadvantage (37%), as was lack of face-to-face interaction with teachers and classmates (36%). A few thought web-based courses did not address diverse learning styles (19%) and only 9% perceived lack of feedback to be a disadvantage. Table 2 lists the attributes that students responded to, and ranks them in order according to the percentage of respondents identifying them as web-based course disadvantages.

Rank	Perceived Disadvantage	%
1	Lack of access to computers or inability to get online	49%
2	Technical equipment problems	42%
3	Some students are unable to express themselves effectively online	41%
4	Lack of student computing skills	37%
5	Lack of face to face interaction with the instructor/class	36%
6	Many of the diverse learning styles of students are not addressed in a web-based course	19%
7	Lack of feedback from the instructor and/or classmates	9%

Table 2: Perceived disadvantages for web-based courses

Respondents were also asked whether they agreed or disagreed with a variety of statements regarding the value and future use of web-based courses. A seven-point Likert scale (1=Strongly Disagree and 7=Strongly Agree was used. Students strongly supported the expansion of web-based (u = 5.84) and the use of the World Wide Web (u = 5.55). They were also agreed that the course they were enrolled in had been enhanced through the use of web-based instruction (u = 5.49), and that participating in a web-based course had improved their general computing skills (u = 5.31) as well as their electronic communication and Internet skills (u = 5.29). Students were relatively neutral about team teaching in web-based courses (u = 4.40) and about the ability of web-based courses to address different learning styles. Table 3 identifies the Likert scale items, ranked according to positive mean response.

(Response Scale: 1=Strongly Disagree, 7 = Strongly Agree)	Mean	S. D.
Web-based instruction should be extended to other classes where feasible	5.84	1.60
The WWW should be utilized more in future web-based courses	5.55	1.55
Web-based instruction enhanced this class	5.49	1.67
My computing skills (word processing, preparing presentations) were enhanced as a result of taking this web-based course	5.31	1.83
My electronic (i.e., sending e-mail, attachments) and internet skills were enhanced as a result of taking this web-based course	5.29	1.80
More team teaching should take place in future web-based courses	4.68	1.69
The different learning styles of students are more effectively addressed in web-based courses	4.40	1.67

Table 3: Attitudes toward value and future of web-based courses

Chi-square analyses were performed to determine if any significant relationship existed between the demographic characteristics (gender, year of study, major field of study, amount of weekly technology use, prior experience with web-based courses, or percentage of current course that was web-based) and attitudes toward the value and future of web-based courses. For this analysis, Likert responses ranging from 1-3 were recoded to represent the disagree category, a response of 4 was recoded to represent the neutral category, and responses from 5-7 were recoded to represent the agree category. Only one significant relationship was found and that was the attitudes of men and women toward the efficacy of web-based courses in addressing different learning styles. The majority of women were neutral or disagreed that web-based courses were more effective in dealing with different learning styles, whereas the majority of men believed that web-based courses were more effective in addressing diverse learning styles. Table 4 summarizes these findings.

	Female	Male	Total
Disagree	47	17	64
Neutral	64	8	74
Agree	86	35	121
Total	197	60	257
$X^2=8.498$, df=2, $p=.014$			

Table 4: Gender differences in attitudes about web-based courses and learning styles

The results showed students perceived a variety of advantages to web-based courses, and few, if any, real disadvantages. Most students believed that the number of web-based courses should be increased, and that web-based courses improved their technology skills. The main concern identified by students was whether web-based instruction could address a variety of learning styles.

Conclusions and Recommendations

Based on this study, the researchers found that while most students were familiar with technology, web-based learning produced some anxieties. The ability to work from home, and having instructors and classmates virtually on a 24/7 basis appeared to be the biggest advantages for this instructional format. Instructors who are aware of the perceived personal contact and who enhanced courses with digital pictures and small group projects are perceived by students as more accessible. Recommendations for future studies include addressing student gender issues and learning styles and how instructors go about addressing these needs.

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Course Preparation for Online Learning: What Faculty Should Know

Barbara K. McKenzie, Dept. of Media & IT, State University of West Georgia, bmckenzi@westga.edu

Michael Waugh, Department of IT, Curriculum and Evaluation, University of Tennessee, waugh@tennessee.edu

Elizabeth Bennett, Dept. of Media & IT, State University of West Georgia, ebennett@westga.edu

Nancy G. Mims, Dept. of Educational Leadership, State University of West Georgia, nmims@westga.edu

Abstract:
The purpose of this study was to explore how instructors using distance education/on-line teaching and learning technologies (DE/OL) are using these technologies in their classes: their practices, problems, solutions, and any emergent patterns. Faculty were surveyed to determine what technologies they use and how they use them to support teaching and learning. Participants responded to questions dealing with a variety of issues such as incentives for teaching using DE/OL, time allocated to DE/OL teaching, preferred class size, formal training received, perceived return on investment. The survey data were content analyzed and entered into SPSS and analyzed.

Introduction

Telecommunications advancements in the past decade, the increasing importance of information technology in our lives, and the emphasis on lifelong learning today have been major factors encouraging faculty to change their traditional methods of teaching and jump into distributed learning to better meet the needs of distant learners (Berge, 2001; Kearsley, 2000). An increasing percentage of our students in higher education find themselves limited by time and/or distance constraints and need alternatives to traditional instruction to obtain professional development, certification and/or advanced degrees. Distributed education is one popular solution to this growing problem (Hooper, 2001; Phillips & Merisotis, 1999). Ely stated, "Community colleges and universities are offering more than 52,000 courses at a distance and many more are in the planning stages (2000, 26). Piccano reported, "The U.S. Department of Education indicates that in the two-year period between 1995-96 and 1997-98, the number of postsecondary institutions offering Web-based distance learning courses had tripled, far exceeding the growth of any other distance application (2001,164). Hooper (2001) concurred, "Online teaching has become an important element in the gathering momentum of the Knowledge Age" (35).

The effectiveness of distance courses is dependent on faculty members' ability to deliver their courses using this new format (Betts, 1998; Berge, 2001; Rockwell, S.K. & Schauer, et.al. 1999). Faculty must learn to adapt their traditional face-to-face classes and put it into an electronic format. Ko and Rossen stated, "Because teaching online is relatively new, many people don't know what it is, or how it's done, or even what some of the terms used to describe it mean. Others may have a notion of what's involved, but they don' t know how to get started, or they feel some trepidation about handling the issues they may encounter. Perhaps this is because the online environment is so different from anything most instructors have encountered before." (2001, 2). Hooper cited Calhoon stating, "educators are learning how to teach on the Internet as they go along and, predictably, there are risks, mistakes, and failures" (2001, 39). Courses taught through distance technologies have a number of significant differences from the traditional face-to-face classes. Faculty need to be aware of these differences and how to modify their courses, especially their teaching strategies, to be successful in this environment.

Distance learning is ever-changing and it requires faculty members to keep up with the latest developments in pedagogy as well as enhancing their skills. (McKenzie, B.K., Mims, N., et.al; Williams, 2000). Faculty teaching courses through distance education technologies are confronted with many decisions hat include the type(s) of distance technologies to utilize, the number of times students will meet in a face-to-face setting vs. through a technology-mediated "distance education" environment. Faculty are concerned about how much time to devote to interacting with students. Other questions to answer may include: Do faculty know just what to expect before jumping into teaching distance classes? What are the teaching practices of instructors who engage in distance education? How are instructors in higher education using distance education technologies? What problems are these instructors facing and how are they solving them? To answer some of these questions, a two-year study was undertaken by faculty at the State University of West Georgia.

The Study

In order to study how instructors are using distance technologies in their classes in the state, the researchers used two existing distance education listervs (one that linked users of WebCT around the state of Georgia and the other one that linked distance education instructors at Georgia College and State University) and a series of faculty contacts on many of the campuses in the Georgia university system. These sources were used to distribute the electronic address of a web server-based survey instrument that was used as the basis for collecting participant input. Although the respondents to this on-line survey were self-selected, they represent a sub-set of those higher education instructors in Georgia who are pioneering the use of distance education/on-line learning (DE/OL) technologies. Therefore, the opinions and perceptions of this sample should provide valuable information for administrators and others interested in DE/OL efforts about the issues and problems facing DE/OL instructors.

The survey instrument used for the present study was adapted from a previous survey administered in 2000 to UWG "distance education" instructors. Findings from the 2000 survey and a review of the literature were used to construct the survey instrument used in this study. Participants were asked to respond to open- and closed-ended questions.

The instrument revisions from the first year study included the following: (1) the instrument was put into an electronic format; (2) respondents were asked additional demographic questions (i.e., where do you teach, academic department, gender, number of courses presently teaching using some form of distance technology, and percent of course that uses distance technologies) and (3) respondents were asked additional questions specifically related to distance education/ on-line learning (i.e. what is distance education/ on-line learning? Does your technology-mediated course involve any face-to-face meetings?). For these open-ended questions boxes were provided for text entry. For closed-ended questions participants were required to select choices from a list of alternatives or to check all responses from a list that applied to their situation. The survey was pilot tested by a three distance education experts in the state and revisions were made before the instrument was used to collect the data in this report.

To examine how faculty are using DE/OL technologies for instructional purposes, the types of problems that are occurring and possible solutions that might be offered, DE/OL technology-using faculty from the State University of West Georgia and other higher education institutions in the state of Georgia who belong to one or two listservs were surveyed (their involvement was directly solicited, i.e., they were asked to complete the survey. However, we also asked them to forward the e-mail to any others whom they knew who were also using distance education and would have experience to share). All participants had taught at least one distance class during the year and voluntarily agreed to participate in the study.

After a series of discussions with distance experts in Georgia about the survey and its revisions, and another review of the literature, the research team designed an electronic survey to assess DE/OL instructor's practices, problems, and solutions to problems. The first part of the revised survey asked participants for demographic data (i.e., where they taught, academic department, rank, gender, and prior teaching experience. The participants were also asked to define in their own words "distance education/on-line teaching." The remainder of the survey utilized both open and closed-ended question to query participants about the: technologies they use for distance teaching, training they received, experience teaching courses in face-to-face and distance format, teaching format they prefer, optimal class size, importance of face-to-face meetings, and the assistance they need to be more effective in teaching.

E-mail messages sent to UWG faculty requesting their participation in the study were sent the end of April 2001. Two weeks later, reminder e-mail was sent. The first week in May, two distance education listservs were used to contact other DE/OL instructors in higher education in Georgia and solicit their participation in the study. Listserv members received a message explaining the nature of the study, the types of participants requested, and where to go to complete the online survey. Two weeks later, a reminder e-mail message was also sent to the members of these two listservs. A total of sixty-six participants completed the survey.

All of the participants responded by completing an on-line survey that submitted their responses to a web server/Filemaker database. The quantitative data from the survey were analyzed using the Statistical Package for the Social Sciences (SPSS v10). The qualitative data were analyzed by examining the content of the responses and grouping the responses into categories. These categories were summarized by reporting their frequency of occurrence or by reporting selected, representative comments.

Findings

Sixty-six faculty members from 19 different higher education institutions in Georgia responded to the survey. There were an equal number of male and female respondents (n=32). Two respondents did not report their gender. Assistant professors had the highest participation (34.8%) followed by Professors (25.7%) and Associate Professors (25.7%). Most of the participants came from the Health, Nursing and Medical fields (29%), Social Science and Humanities (23%), and Education (18%). Respondents reported having from 1 to 15 years of teaching experience. The majority of the faculty who responded to the survey reported teaching six years or longer.

The participants reported receiving between zero and 20+ hours of training with DE/OL technologies prior to teaching their first DE/OL class. Most of the participants (29%) reported receiving between 1 and 5 hours of training related to DE/OL technologies prior to teaching their first DE/OL course. Twenty-three percent of the respondents reported that they had received no training before teaching their first distance education class. Twenty percent of the participants reported receiving 20 or more hours of training prior to teaching their first DE/OL course.

In order to ensure that the participants held similar views regarding the meaning of DE/OL, they were asked to offer a brief definition of the expression. Most respondents offered similar definitions for the expression, although they were worded in various ways. The major concepts associated with DE/OL as reported by the survey respondents were the following: 1) use of electronic media (video conferencing, Internet and others), 2) teachers and learners are separated by time and/or space, and 3) interactions may be synchronous and/or asynchronous.

The survey respondents reported using a variety of electronic communication tools as part of their DE/OL environments. The survey offered a list of twelve items from which participants were asked to choose all that might apply. They also were asked to elaborate on any "other" tools they used.

The following is the list of twelve electronic communications tools included in the survey: 1) WebCT (adopted by the University of Georgia system as the recommended software for use in the creation of on-line courses), 2) GSAMS (Georgia Statewide Academic and Medical System, a proprietary videoconferencing system adopted and supported by the University System of Georgia), 3) web-based course materials, 4) Internet e-mail, 5) private e-mail system, 6) bulletin boards, 7) Internet newsgroups, 8) private conferencing software, 9) Listservs, 10) web-based course calendar, 11) chat rooms, 12) other.

Respondents were asked to indicate which communications tools they used during their first DE/OL course, and to indicate which tools they used during their most recent course. Forty-one unique combinations of communications tools were reportedly used during the respondents' first DE/OL course. Thirty-six unique combinations of communications tools were reportedly used during the respondents' most recent DE/OL course. Although many of these combinations of tools were reported by a single respondent, a clearer picture is possible by examining those combinations that were reported by more than a single participant. Figure 1 summarizes these data.

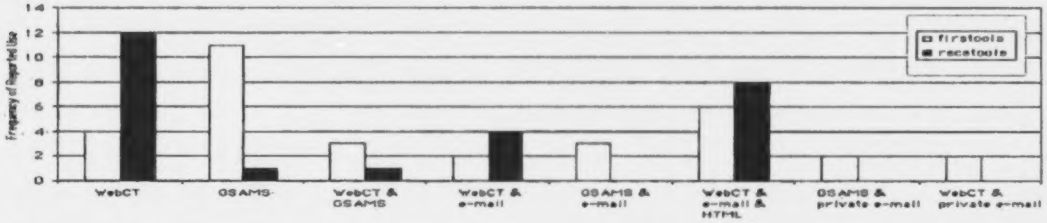

Figure 1. Change in Reported Electronic Tools Usage from first course taught to most recent course taught

Eighty-six percent of the survey respondents reported having taught the same course in both face-to-face and DE/OL formats. Of these, 22% reported preferring the face-to-face format, while only 10% reported preferring the DE/OL format. However, more than half, 53%, reported preferring to teach their courses using a mixture of both formats. Fifteen percent reported having no preference for one format or the other.

When asked which medium of instruction required the most time involvement, 89% of the respondents reported that DE/OL requires the most time involvement. Two percent of the respondents reported face-to-face instruction as requiring the most time involvement and 9% felt that the two media were equally time consuming.
The respondents were asked to estimate in two ways the additional amount of time they spent preparing for a DE/OL course. In terms of *additional time per week*, respondents reported spending approximately 5-10 hours per week

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longer preparing for a DE/OL course. In terms of *additional time per course*, respondents reported spending approximately 60 hours more teaching/conducting the DE/OL course. However, the variation in the responses was extreme, and very nearly as large as the average itself. The calculated average was 59.5 hours and the standard deviation was 56.5 hours. The range of responses was from 2 to over 300 hours of additional time spent per course.

Many respondents indicated that the amount of time required depended strongly on whether or not this was the first time the course was taught or whether it had been developed previously and merely re-taught. The typical response indicated that the DE/OL course did not require as much time to teach subsequently as it did the first time it was developed and taught, however no estimate of this time differential was possible from the data provided. These two estimates of the additional time required to teach using DE/OL technologies are somewhat inconsistent, but they provide a clear indication that it takes a significant amount of additional time to design and provide instructional experiences through DE/OL media.

Having worked with DE/OL instruction for many years, this research team has witnessed and experienced the value associated with combining traditional face-to-face instruction with DE/OL. As a result of our experiences, a question was included on the survey to probe the respondents regarding their perceptions of the value of face-to-face interactions as a component of courses that utilize DE/OL technologies. Eighty-one percent of the respondents indicated that they felt that their courses benefited by incorporating a face-to-face component. Nineteen percent of the respondents reported that face-to-face interactions were not seen as a valuable aspect of their DE/OL courses.

Respondents were asked which format, DE/OL or face-to-face, produced the better return (in terms of student learning or their perceptions of the quality of the instructional experience) for their efforts in planning and teaching their courses. The results are somewhat surprising but also reveal the complexity of this issue. Slightly over one-third of the group (38%) felt that a face-to-face format produces the "most bang for the buck". What is surprising about this is that these are the "pioneers" in using an electronic format for instructional delivery. One might imagine that they would be "ardent" supporters of these new technologies and would tend to see these new media as perhaps even more effective than can be demonstrated by hard data. However, such was not the case.

The next strongest view is held by those in support of DE/OL formats. Twenty-five percent of the group felt that DE/OL formats produce the greatest return on instructor investment. Fifteen percent felt that it depends upon the students. Eight percent felt that a mix of both face-to-face and DE/OL would produce the greatest return (recall that 53% *prefer* a course being taught as a combination of these two media). Seven percent felt that it depends upon the course. Five percent felt that both are equal in terms of return on the instructor investment. Three percent felt that it depends on both the course and the students. If we combine those subgroups that list students, course and course *and* students as conditionals, we see that 25% of the respondents feel that the relationship between the instructional format and the results that can be expected by that format depend upon the students involved and the nature of the course itself. One interpretation of these data is simply that these instructors recognize that a relationship exists between the student characteristics, the nature of the content to be learned in the course and the optimal instructional strategy(-ies) as manifest in the nature of the instructional experience that is attainable through particular media.

When faculty were asked why they were motivated to begin teaching through distance technologies a number of factors emerged. The most frequently mentioned was distance education provided students with more hands-on technology training opportunities (n=39). Other factors identified were distance technologies enhanced the quality of their courses (i.e., more up-to-date information) (n=36), the educational needs of students at a distance were provided (n=35), students' requests for distance classes were answered (n=32), more flexible working conditions (i.e., teaching from anyplace anywhere, electronic office hours) (n=27), more opportunities to interact with students (n=20), and some faculty were required to teach through distance technologies (n=17).

When asked to respond to the optimal DE/OL class size fifty-three respondents responded to the question. Responses varied with some indicating that it depended on the nature of the medium used (GSAMS vs. WebCT). Others indicated that it depended on the nature of the course and the students and the degree of interaction that is felt to be essential between the students and the instructor. The mean of the respondents' estimates was approximately 20 (19.8) students. The range was 43 and the standard deviation in the responses was approximately 8 (7.7). Based on these data, the optimal class size for a typical DE/OL course would be approximately 12-28 students. Given the respondents' considerable experience with DE/OL instruction (collectively, the respondents had taught nearly 300 courses in a DE/OL format) and the considerable variation in their responses, this figure would seem to represent a rather robust estimate that acknowledges the multiple extenuating considerations that attend the teaching of such courses.

Faculty identified a number of concerns they had with distance programs. The most frequently reported were providing release time to faculty who teach through distance technologies and offering more faculty support for classes (i.e., instructional design support, more training opportunities). Other problems that surfaced were administrators not being aware of the time faculty spend planning and teaching through distance technologies, the need to improve the student orientation program for distance learners, providing more support for distance instructors such as graduate students and/or instructional designers, limiting the enrollment in distance classes, provide student access to computers for distance classes, the need for more planning before the delivery of distance courses, and improving the distance equipment for faculty and students.

Conclusions and Recommendations

Distributed Learning and On-Line instruction can provide a richer instructional experience, however, there are costs associated with this gain. If these media are used to provide more interaction with students, this requires more time on the part of the instructor. Therefore, the data from this study suggest reducing class size in these courses to enable students to have greater interaction with the instructor, factoring increased instructor effort into workload and personnel policies, and increasing support for faculty engaged in this effort. If support is lacking, then organizations can expect distributed learning efforts to be less interactive and potentially less successful. Face-to-face interactions with students are highly valued. When possible, instructors should use mixed instructional models. At this time, research on the necessity of face-to-face is unclear but its value may far outweigh its inconvenience or expense. It is suggested that instructors understand this need and provide appropriate media for appropriate aspects of the instruction. Arranging for physical meetings may be awkward when students reside a considerable distance from the instructor but such meetings may be critical to the success of the instruction.

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Faculty Development through Online Courses: Results from an Evaluation of the PT3 Netseminars

Babette Moeller, EDC/Center for Children and Technology, Bmoeller@edc.org
Sarah Haavind, Concord Consortium, Shaavind@concord.org
Louisa Anderson, EDC/Center for Children and Technology Landerson@edc.org
Patrick Carrigg, EDC/Center for Children and Technology, Pcarrigg@edc.org

Abstract: In the Spring of 2001, the Concord Consortium developed and conducted10 Netseminars that were offered to members of the PT3 community. The Netseminars were 6 week, scheduled asynchronous courses that were offered on Blackboard 5 courseware over the web. They covered a variety of topics, including online teaching and learning, supporting inquiry-based learning, using simulations, technology tools for assessment, and using technology to support spatial visualization. This paper summarizes the results from an online survey of Netseminars participants that was conducted by EDC's Center for Children and Technology. The survey yielded information about the demographic background of Netseminar participants, teacher educators' motivation for participating in an online course, as well as perceived effects on knowledge and skill with technology and teaching practice. Results are discussed in terms of their implications for the design and use of online courses for faculty development.

Introduction

Integrating technology into pre-service teacher education programs often requires intensive professional development for faculty, since many teacher educators have not had the opportunity to use technology in their own teaching. In providing professional development, technology itself plays an important role--both as a means to model exemplary use, and as tool to deliver instruction. Professional development that is delivered online through the Internet offers the unique advantage to be accessible across distances and independent of the time constraints of face to face meetings. Recognizing the potential of online learning for providing continued professional development to teacher educators, the Concord Consortium has begun to offer a variety of online courses, or "Netseminars" to the teacher education community. This effort has been supported, in part, by the Preparing Tomorrow's Teachers to Teach with Technology (PT3) Program (through a subcontract with the University of Virginia in Charlottesville) and the National Science Foundation (through the Center for Innovative Learning Technologies (CILT) Consortium).

Netseminar Overview

During the spring and early summer of 2001, the Concord Consortium was able to offer a total of 10 different Netseminars to the PT3 community. The Netseminar covered a variety of topics, including online teaching and learning, supporting inquiry-based learning, using simulations, using technology tools for assessment, and using technology to support spatial visualization. They were moderated by staff from the Concord Consortium and post-doctoral fellows based at several different CILT research centers across the U.S. With one exception, the Netseminars were designed as 6 week, scheduled asynchronous online courses (one Netseminar was conducted over a 12 week period). They were offered on Blackboard 5 courseware over the web, and followed a common format. Learning was organized around a variety of assignments (e.g., readings, evaluating resources, design of curriculum activities) and discussions among participants around those assignments. Participation was free of charge. A total of 106 PT3 grantees enrolled in the online courses.

Methods

The purpose of the evaluation was to collect information that would help to inform the refinement of the NetSeminars as well as to document their impact on teacher educators.

The Center for Children and Technology, in collaboration with the Concord Consortium decided to conduct an online exit survey to address the following for major questions:

- Who are the participants in the Netseminars? What is their demographic background? What experience do they have with technology?
- What motivates teacher educators to participate in a Netseminar, and how well do the Netseminars meet participants' expectations?
- How do participants evaluate different components of the Netseminar and their online learning experience?
- What are the perceived effects of participation in a Netseminar on teacher educators' knowledge about and skill with technology? What are the anticipated effects on their teaching practice?

The survey was made available through the world wide web. Netseminar participants were contacted upon completion of the online course and invited to participate the online survey. A total of 35 participants completed the survey, representing 33% of the teacher educators who originally enrolled in the Netseminars.

Results

1. Netseminar participants were relatively homogenous in terms of their demographic background and technology experience. Seventy-four percent of the respondents were female and 88% were white. Seventy-eight percent of the respondents were 41 years or older. All respondents (100%) indicated that they had used computer-based or other electronic technology in their teaching. More than half (57%) of the respondents reported that they had taken an online course before, and nearly half (49%) had taught an online course themselves.

2. We found that a variety of different factors played a role in teacher educators' decision to enroll in a Netseminar. Key considerations were the ability to gain access to professional development that is otherwise not available and to learn about new ideas in their content areas. Other significant factors were the opportunity to interact with and share with faculty from other colleges and universities, to learn from leaders in the field, to learn about technology, and being able to learn at their own time and pace as well as to learn more about the process of online teaching and learning.

3. Overall, participants' reactions to the Netseminars were very positive. Ninety-five percent of the respondents indicated that they would take another Netseminar. The Netseminar components that respondents found particularly useful include readings, interactions with the seminar leaders, review of technology resources, private feedback from the facilitator, and guest visitors. The components that the respondents found less useful were interactions with other participants, working in small or large groups, and getting feedback from other participants.

4. Participants indicated that they acquired a variety of technology-related knowledge and skills through the Netseminars. Three-quarters or more of the respondents reported that they learned strategies for online teaching, and developed an understanding of what it is like to learn online. Half or more of the respondents noted that their Netseminar helped them learn how to integrate technology into their teacher education courses, including teaching strategies, technology skills, what technology tools are available, and how to design technology-enhanced learning experiences. Respondents anticipated that what they learned will influence their professional practice in a number of different ways including: the design of their online courses and the use of online teaching strategies; the use of specific technology tools in teacher education and K-12 settings; the use of strategies for technology integration at their local teacher education program; the use of contacts with professionals in the field at other organizations to expand teaching and learning activities; and the articulation of professional development goals in relation to technology and the pursuit of further professional development opportunities.

Discussion

Online courses like the Netseminars can play an important role for faculty development, connecting teacher educators to professional development opportunities and resources that otherwise are not available at their organizations. Teacher educators have found them particularly valuable for preparing them for the design and facilitation of online courses as well as the integration of technology into their face-to-face courses.

The results of this survey suggest a number of ways in which the Netseminars could be refined to serve the needs of teacher educators even better. First, several of the participants noted that the workload was difficult for them to manage especially during a very busy time of the academic year (end of the semester and graduation). Offering the seminars over a longer period of time with a reduced number of hours of work required per week could help to make the learning experience more manageable for them. Offering the Netseminars during semester breaks or early during an academic semester when teacher educators have more time available may be helpful as well. Second, participants indicated that they would like to have more interactions with the other participants in their courses. A revised weekly schedule allowing more time for discussion and additional online activities that support interaction could help to facilitate more exchanges among participants. Third, only a small number of participants reported that they learned about technology use and integration in K-12 settings. Yet, learning about technology integration in teacher education can be enhanced if connections to the use of technology in K-12 education are made. Involving K-12 teachers alongside teacher educators in the Netseminars could facilitate valuable interactions along these lines. Finally, to reach the broadest number of teacher educators with the Netseminars, the diversity among participants needs to be increased. Recruitment efforts should be broad and reach out to teacher educators from traditionally underrepresented groups and those who have little or no prior experience with technology. To insure the retention of teacher educators who are hesitant to enroll in an online course, ongoing support may be necessary. One strategy could involve having small groups of teacher educators from the same program enroll together in a Netseminar to help to establish local support.

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The Preparation of Alternative Licensure Teachers: Bringing Technology into the Classroom through Distance Education

John C. Park, North Carolina State University, US
April Cleveland, North Carolina State University, US
Lynnae Flynn, North Carolina State University, US
Brenda Wojnowski, North Carolina State Univerity, The Science House, US
David Haase, North Carolina State Univerity, The Science House, US

As K-12 schools continue to add initial technology purchases and upgrades to their yearly budgets, the need for professional development for teachers increases as well. With a diverse and often distant population, web-based technology courses speak to the needs of these learners. By providing web-based instruction, participants are able to log on and interact with the course material at a time that is convenient to their individual schedules.

This study looks at the use of the web as a way to provide technology instruction to alternative licensure middle and high school teachers. The course, Technology Tools for Science Teachers, offered as a graduate level course at North Carolina State University, provides web instruction in a number of technology-related areas.

The Learning to Use Technology web site was constructed during the summer and fall of 2000 with the topics for the site taken from suggestions made by the Cumberland County, North Carolina science teachers. The web pages that made up the instructional modules were structured based on research that focused on web-based instruction. Thibodeau (1997) suggested that the content of a web site should be broken down into smaller units of instruction and the screen design should be simple and uncluttered. In addition, Thibodeau contends that web-based instruction can "teach content at least as effectively as traditional instruction" and reduces a number of negative aspects associated with continued learning and the updating of teaching skills.

In the spring of 2001, the web site was the foundation for a North Carolina State 3 credit distance-learning course entitled, Technology Tools for Science Teachers. This course was structured primarily for the Cumberland County teachers, but was also open to lateral entry teachers who were working towards their teacher certification. An online syllabus was developed which contained links to all the instructional modules, which were broken down into weekly instructional units. Each unit of web-based instruction spanned a week to two-week period.

The teachers were asked to provide a computer with Internet access and demonstrate proficiency in the prerequisites that were presented to the teachers before the start of the course. These prerequisites included the ability to navigate the web, access to e-mail and the ability to send and receive e-mail messages. In addition, the instructor stressed the importance of scheduling the time necessary to devote to learning the course materials and completing the assignments.

With the exception of the four face-to-face meetings, the course was web-based in nature. A course of this type addresses both the time and place constraints that often hinder teachers' continued professional progress (Huntley & Mather, 1999). An additional advantage to web based courses is the reinforcement of technology skills that are necessary in today's society (Chute, Thompson, & Hancock, 1999).

In addition to the online instruction, the teachers were provided with a technology kit that included all the necessary software and hardware to complete the assignments associated with the course. The kits contained a digital still camera, a LabPro and Calculator-Based Laboratories interface, probes and sensors which were compatible with the LabPro and Calculator-Based Laboratories, and software which included

Dreamweaver 4, Adobe Photoshop LE, and much more. Vernier Software and Technology provided the LabPro and Calculator-Based Laboratories interfaces, probes, and sensors for 16 of the technology kits.

Besides allowing the teachers to complete the assignments, the technology kits gave the teachers hands-on experience with technology tools they could use with their students during the duration of the course. Teachers were also provided with a stipend, which covered the cost of the course, but were not notified of this until the course was in its final week. This reduced the possibility that teachers would sign up for the course because of the stipend involved which would give us a more representative set of teachers who may reflect the characteristics of future participants.

Assessment

The evaluation process transverses several phases:

- Pre-Survey-self report measure on their technological expertise.
- Meyers-Briggs Type Indicator (MBTI)
- Pretest and Post-Test for each instructional unit.
- Simmons Emotional Intelligence Survey
- Post-Survey- self report measure on their technological expertise.
- Web Portfolio of their accomplishments during the semester.

The pretest was used to determine previous knowledge as it related to each unit of instruction. WebAssign was used for the pretest administration as well as for several of the assignments and post-test administration. WebAssign is a web-based program that collects, grades, and provides feedback as a means for instructors to evaluate their students' progress. WebAssign can be set to provide student feedback in varying degrees. For this course, WebAssign was configured to provide only a grade to the student after the pretest was administered to the students.

A post-test was administered after each unit of instruction was completed to determine the level of knowledge acquisition from the start of each unit until it was completed. Feedback on the post-test was more elaborate in nature in comparison to the pretest and included a key as well as the student responses. This enabled the students to compare their responses to the correct responses for each question.

Also included as an evaluative tool were two to three assignments for each instructional unit. The completed assignments were delivered to the instructor in different formats that included e-mail file attachment, uploading a file to the listserv, using WebAssign, and uploading web pages to web space with the URL provided to the instructor via e-mail. The majority of the assignments and projects built on the previous assignments and culminated in a web portfolio that incorporated the majority of the skills developed during the duration of the course.

Results

Each student reported a gain in technological expertise from the administration of the pre-survey to the administration of the post-survey, a fourteen-week period. A gain was also noted in the content knowledge pre and post-test, which were developed for each instructional unit with the exception of one area in which they were already well versed. In addition, the overall student impression of the course was quite favorable. The comments focused on the ability to work at one's own pace and not spend time and money to commute to campus to participate in the course. The following are just a few of the positive statements made by the teachers in a final evaluation:

- I enjoyed the flexibility of the course.
- The course was very adaptable to my busy schedule.
- The web page resources were very helpful and informative.

The entrance survey also contained several open-ended questions, which asked the students about expectations for the course and whether they had participated in a distance-learning course previously. Out of 11 students, only four had previously participated in a distance learning type course, but they all had similar expectations. They wanted to become proficient in the use of technology so they could share this expertise with their students.

The exit survey also contained several open-ended questions. The first asked if the teachers would take another distance learning course. The second questioned whether their expectations for this course had been met. Ten of the 11 students responded that they would take another distance learning course and that their expectations for the course had been met or exceeded.

Personality variables were also measured with the use of the Myers -Briggs Type Indicator (MBTI) and the Simmons Emotional Intelligence Survey to indicate student success in the course. There were high correlations between personality characteristics and predictors of the success in the course. In addition, the degree of direction or self-motivation correlated highly with the level of benefit a student derived from the course. Lastly, a strong negative correlation was observed between self-esteem and the timely submission of assignments.

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A “distance scholarship” model for teaching and learning about technology supported assessments

Jason Ravitz
Buck Institute for Education

Abstract

The results of an innovative Netcourse are presented that sought to provide teacher educators with access to leading research-based and technology-supported tools for assessment. The course was delivered via the Web and Blackboard and featured a different assessment tool each week that teacher educators were allowed to try. The Netcourse seeks to address the preparedness of teachers to adopt assessments of complex learning using technology. With the wide variety of technology innovation taking place in schools, assessment remains one of the outstanding challenges that teachers and researchers face. At the same time, providing better and more timely feedback to teachers and learners and creating better technology-supported assessments is very effective a way to improve learning.

Overview

The work presented here was developed as part of the author's postdoctoral research with the Center for Innovative Learning Technologies (CILT). CILT is a distributed center involving SRI International, University of California, Berkeley, Vanderbilt University, and the Concord Consortium. The center serves as a national resource for stimulating research on innovative, technology-enabled solutions to critical problems in K-14 learning The center is designed to leverage contributions from the country's top experts, regardless of institutional affiliation.

The Netcourse presented here leveraged expertise on the design and delivery of online courses (Concord Consortium) at the same time it provided access to leading research-based tools for assessment. Examples of technology-supported assessments that have been available for distant learners via the Internet include IMMEX (Underdahl, Palacio-Cayetano, & Stevens, 2001), Intelligent Essay Assessor (Foltz, Laham, & Landauer, 1999), Knowledge Mapper (Baker, 1998), and the Analysis Toolkit for Knowledge Forum (Lamon, Reeve, & Scardamalia, 2001). In each case, there is evidence that assessment-related information can be provided to teachers and\ learners in a way that supports understanding of learning outcomes.

The paper will provide pointers and a summary of each of these and how they were used in the Netcourse. In addition, numerous technologies are available that, perhaps subject to debate, are not directly based on teaching and learningresearch but that can still be used to support assessment (e.g, Inspiration for concept mapping, Profiler for tracking human resources, curriculum and standards mapping software, rubic-generating software, databases of reusable objects, and others).

By providing the opportunity to try various tools “safely” within a distance learning setting it was hoped that the teacher educators would then be able to re-use all or part of what they learned. This means they might re-use materials from the online course while teaching others about the tools (say in a university-wide training session) or they might try a version of the tools themselves with learners in their own courses, including in face-to-face sessions.

The Netcourse, hosted in Blackboard™ by the Concord Consortium, was entitled PT341[1]: Technology Supported Assessments (TSA). It was developed as part of a Preparing Tomorrow's Teachers with Technology (PT3) “catalyst” grant and utilized principles of online facilitation developed by (Collison, et al, 2000) and as taught in the course Moving out of the Middle. For TSA, the goal of moving out of the middle was accomplished by highlighting external resources and expertise, as well as participants' own analyses and use of these resources. The weekly “routine” was for each learner to first read about the research base for use of the particular assessment tool being studied. Then they would try it out and discuss the results. Sometimes they would be asked to discuss both prior to and after using the tool This Reading, Activity, Discussion (RAD) format was intended to efficiently help learners identify their requirements and possible tools of interest. The discussion was shaped to help extract pragmatic lessons from each weekly assignment, and to begin to develop a broad and sharable (through conversation) understanding of available technologies for assessment.

Research Questions

While the course was not structured as a research project per se, the experience allows us to address a number of important research questions, such as those highlighted by Haertel & Means (2000). The problems facing educational researchers are often overwhelming (not allowing “clean” studies such as those done in other fields) and a key stumbling block is the perception, shared by teachers and others, that standardized and multiple choice tests more often than not do not meet the objectives of instruction (Ravitz, Becker & Wong, 2000). The rationale for the Netcourse is that it would accomplish two objectives: 1) developing the capacity for delivery of technology supported assessments, and 2) creating an audience of informed users in the educational community. Some key questions that are being addressed include the following:

1 **What kinds of technology-supported assessments are available via the web and where are they found?**

2 **What pedagogical framework supports teaching and learning about web-based tools in a Netcourse?**

3. **To what extent is the Netcourse viable as a vehicle for dissemination of technology supported assessments more broadly?**

4. **To what extent can user-centered Netcourses provide viable pilot test sites for the R&D community, while supporting the needs of the individual learners involved?**

5. **What kind of partnerships are envisioned between content experts, instructors, designers, and providers of Netcourses? What about between course developers and other users?**

6. **What web-accessible tools are ideal for side-by-side comparison of assessment techniques, e.g., examples that can be used in a classroom such as constrained vs. open-ended concept mapping techniques.**

Why Assessment?

Assessment is an important aspect of any educational innovation or reform. Often when another complex innovation is introduced assessment is used to help guide the teaching and learning process, shaping student self-monitoring and opportunities for learning. In fact, providing formative feedback to the learner may alone have a greater impact on learning outcomes than any other aspect of instruction. "Strengthening the practice(s) of formative assessment produce significant and often substantial learning gains . . . effect sizes are larger than most of those found for educational interventions" (Black & Wiliam, 1998, pp. 140-141). Formative assessment, where feedback is given to learners in time to make a difference, can help learning for all students. Black and Wiliam write that such assessments can help low performers most, while still benefiting all students: "Improved formative assessment helps low achievers more than other students . . . while raising achievement overall" (p. 141). There may also be a "pedagogical divide" so that teachers of high achieving students are more likely to offer opportunities for innovative technology assessments, while prescriptions for routine assessments are offered to those who are less able to pursue innovative pedagogical uses of technology. The Netcourse seeks to address the preparedness of teachers to adopt assessments of complex learning using technology.

Why technology?

As Internet connectivity becomes more and more ubiquitous in schools, teams of researchers and educators have been developing ways to use technology to help create improved systems for learning and assessment. This includes new activity structures and new social structures that will make instructional tasks more meaningful and learning deeper. The challenge for schools of education is to effectively model these types of uses of technologies in their own courses.

Technology can be an extremely effective tool for giving feedback during the learning process to learners and their teachers. The ability of technology to rapidly provide feedback to learners is one of its most salient features for education. Consider how quickly young people learn complex video games by being bombarded with constant feedback on their performance that proves to also be highly motivational. Examples from the educational research community include simulations, dynamic modeling tools, teachable agents, and other tools that give students and teachers tools they can use as feedback on their thinking. Some allow students to view consequences of their actions on the screen in near real-time and then provide tools for students to modify their thinking and test the results again. The assessments that are provided are valued over traditional "right vs. wrong" judgments because they facilitate analysis of student reasoning processes.

What is Distance Scholarship?

Learning is generally viewed as a process of individual enlightenment and insight. As a result, our traditional models of teaching do not help students share these insights in a meaningful way with others, i.e., in a way that would generate real value from their hard-won knowledge. Instead, we typically teach and test in order to demonstrate individual competencies, focusing on internal processes within the learner, in isolation from others. Alternatively, we do our own personal learning and then have no mechanism for sharing. At an organizational level, this means that once a problem is solved, its solution is invisible for all others.

The goal of distance scholarship is to encourage distant learners to try out ideas that seem relevant to them and to report the results back for use by others. Given the capabilities of the Internet to foster communication and to provide structures for sharing and collaboratively developing knowledge, it is simply not acceptable to continue focusing our efforts on producing individual knowledge and competencies with no apparent relationship to a broader community of investigators, be they teachers, learners or researchers. If there is frustration with the lack cumulative progress in educational research, the solution is not in the publication of better research reports and evaluations, but it lies in changing the very structure of projects to support the dissemination of new ideas within and across them. The Netcourse provides a vehicle for identifying, delivering, and spreading key ideas and tools across communities of educators, really in an unprecedented way. The proposed model of learning places ideas into a public arena, subjecting them to critical evaluation and peer-review, and seeks to put them into a form that can be used or built upon by others. This Netcourse demonstrates how emerging technologies can play a key role in this process.

The focus is on finding exemplary tools that open up new avenues for teachers and finding a way for sharing this information with teacher educators. What makes this approach called "distance scholarship" is that as a result people are trying ideas in different settings and sharing the results in a way that is useful to others. This contrasted to a more atomistic view of distance learning that does not privilege use of solutions found by others.The Netcourse provides a vehicle for social filtering (Wiley, et al, 2001) of assessments and other learning objects, but including this as the pedagogical focus of the Netcourse is an innovation, and one that builds on prior instructional use of web-based evaluation tools (Ravitz, 1995; 1997). The unique course structure also allowed experts and technical support personnel from the research centers to be notified when opportunities for intervention presented themselves.

Web-Based Tools For Teachers
SITE 2002 Short Paper Proposal

Judi Repman
Randy Carlson
Beth Downs
LTHD, Box 8131
College of Education
Georgia Southern University
Statesboro, GA 30460-8131

In addition to being a rich information resource, the web provides access to many time saving tools for teachers. As faculty members, we've found these tools useful for our own personal productivity and instruction. This short paper session will provide an overview of some of the most useful tools in the following categories:

Bookmark utilities. Bookmark utilities make it possible to access bookmarks or favorites from any computer connected to the internet. They also make it possible to easily rename, annotate and organize bookmarks. An example in this area is Backflip (http://www.backflip.com).

Rubric generators. As K-12 education and higher education move toward outcomes and performance based assessment, different assessment models need to be developed. Rubrics have become one of the most popular methods of assessment. Several sites on the web provide downloadable rubric templates (http://landmark-project.com/classweb/tools/rubric_builder.php3, http://www.ncsu.edu/midlink/ho.html), while tools such as Rubistar (http://rubistar.4teachers.org/) allow users to generate rubrics online.

Test generators. Online puzzle makers have been available on the web for several years and they are popular with teachers. Web sites such as Quia (http://www.quia.com/) allow users to produce tests, activities and web pages online.

Survey generators. Surveys are a popular data collection tool with many opportunities for use in a K-12 environment. Zoomerang (http://zoomerang.com/) allows users to create and collect data using a simple, free online survey process. Profiler (http://profiler.hprtec.org/) is an online collaboration tool specifically designed to help individuals within a school assess technology skills.

Weblogs. Weblogs (http://www.weblogs.com/about) are can be used to promote current awareness of any subject. Serious Instructional Technology (http://instructionaltechnology.editthispage.com/) is an example of a weblog in the field of instructional technology.

Example of resources in each category will be briefly demonstrated and discussed in terms of their application to teacher education and teacher education faculty personal productivity. A complete webliography of all sites presented will be provided.

The WebQuest as an Instructional Strategy

Maurice Rhynard, Lone Oak ISD, US

The 21st Century is an age of Edutainment where students want to be entertained when obtaining knowledge. The more involved a student is in the teaching/learning process, the more knowledge he/she will obtain. Brain research, media, video games, technology and interactive computer programs provide information about how students are motivated to learn. The Dale Cone shows that the least effective way to learn is the lecture. According to Edgar Dale direct, purposeful experiences promote greater knowledge. The days of lecturing, taking notes, and rote assignment are over. New instructional methods that have emerged during the past few years include cooperative group work, hands-on activities, use of manipulatives, building/ making models, videos, interactive computer software, and Internet research. These all have their place in the age of Edutainment.

The WEBQUEST is a new method of instruction that has emerged from Internet research. The blanket "just go look on the Internet" method of instruction has several weaknesses. Students who merely surf the Internet end up "chasing rabbits". The student gets so much information that he/she loses sight of the research objective. Information given is so broad that students have trouble sifting through it to decide what is useful. Determining whether the Internet source contains true or reliable information is another problem. Students tend to believe that everything on the Internet is true. Also, students have limited time in the computer lab and may not have access to technology in the home to continue this research. Another weakness is accessing appropriate sites. Although schools have filters, students can still contact some inappropriate sites.

A WebQuest is a guided research activity that addresses the weaknesses of using the Internet for research. WebQuests are constructed as inquiry-oriented activities that encourage higher-order thinking skills. Other traditional research sources can be used in conjunction with the Internet. A WebQuest activity is considered an inquiry lesson by which students obtain knowledge through investigating facts as directed by the instructor. Advantages of using a WebQuest include: 1) students are directed to web sites whose primary focus is information to be used in the WebQuest, 2) the objective of the research is in constant view, 3) the amount of information is limited, 4) information is true/ reliable, and 5) a student may stop and start at will and always locate the information sites. The WebQuest "fits" into the Edutainment Age that is motivating to students. WebQuests can be on any subject/topic.

The objective of the WebQuest is the end product as determined by the instructor. An instructor can motivate student work by directing the inquiry, i.e. setting up a mystery scenario interests the students to discover answers. Using a journalistic approach, students assume the roles of investigator, reporter, editor, etc. The instructor uses a grading rubric to ascertain specific objectives have been met as students progress through the tasks.

This Tutorial Session will define a good WebQuest, show examples of WebQuest, and demonstrate how a simple WebQuest is designed. Examples from different disciplines will be shown to demonstrate the usefulness of a WebQuest in the classroom.

Facilitating Teacher Collaboration in On-line Environments

Bronwyn Stuckey
Faculty of Education
University of Wollongong, Australia
bronwyn_stuckey@uow.edu.au

John Hedberg
Faculty of Education
University of Wollongong, Australia
john_hedberg@uow.edu.au

Lori Lockyer
Faculty of Education
University of Wollongong, Australia
lori_lockyer@uow.edu.au

Abstract:
The research study set out to ask what part can be played by well-researched and designed on-line activities in shaping the future of, and meeting the needs of, teacher professional development. Over time the community of practice (Lave & Wenger 1991) emerged as a complex yet attractive solution and the focus of the research clarified to mapping the development and efficacy of a web-mediated community of practice in advancing implementation of an innovation. This research explores how a Web-based network can become a community and in what ways this community can support the professional needs of its individual members? The StageStruck On-line Community http://www.stagestruck.uow.edu.au is the focus of this study and its development raises a roster of important issues as the theory of communities of practice is applied to a specific case of on-line teacher professional development.

Defining the community

The StageStruck On-line Community is the result of an action research program in which in-service teachers are being offered professional development towards implementation of an innovation. The research examines the classroom practices of teachers of the performing arts and their adoption of a CD-ROM based knowledge construction tool (Hedberg, 1997) *StageStruck* developed by the partnership of the University of Wollongong's *emLab* and Australia's National Institute for the Dramatic Arts *(NIDA)*. This paper is a bounded history of the research project to date. The full background to the selection of on-line community for delivery of professional development in this study is detailed in Stuckey & Hedberg (2000), Stuckey et al (2001a). Suffice it to say that through the study of the literature and available cases, the community of practice (Lave & Wenger, 1991) emerged as a nexus between best practice in professional development, innovation and pedagogical use of on-line technologies. What is unclear is whether community is really required in all of the situations that we see it applied. Would another form of connectedness better serve teacher needs, the specific context, the developer return on investment and the time available to all?

It also remains to be seen whether a 'true' community can be established for distributed classroom teachers through a wholly web-based structure. The concept of community, while widely viewed as very marketable, is falsely portrayed by the owners of many on-line architectures. The cautionary tale about community is perhaps best articulated by Grossman & Wineburg (2000, p.6) when they offer a warning about the confusion created by a proliferation of different uses of the word 'community'. *This confusion is most pronounced in the ubiquitous "virtual community", where, by paying a fee or typing a password, anyone who visits a web site automatically becomes a "member" of a community.*

It has become clear that not all groups meeting on-line are communities and that the term 'virtual community' is a misnomer. True communities are much more than just Web sites, communication tools or gatherings of people. Communities require member participation and contribution, ownership, quality support and facilitation, shared direction, goals and projects (Wellman & Gulia, 1997; Palloff & Pratt, 1999; Kim, 2000). They are an investment in time and nurturing. That old adage of 'if you build it they will come' certainly does not apply to community, for it is the members who create the community not the web site developers. Stuckey et al (2002) identify and propose distinctions between current Internet-based architectures that are self-declared as communities and explore the ways these architectures serve teacher education. It is known that connecting teachers is key to successful knowledge and change management. *Educators are "islands of excellence" with no ferry service to connect them to each other or to groups of their peers.* (Reilly 1999 pp.60) Reilly's statement describes the problem that exists for in-service educators, where in reality, they find themselves operating in isolation once the door to the classroom closes. That 'ferry' Reilly speaks of might variously be put into service for widely distributed individuals through on-line technologies. Whether the ferry service in this case it is the simple network or a richly interpersonal community environment is what remains to be seen.

Developing the community

At present stage of development they represent a potential community. Andrews (2001 pp.1) describes these potential groups. *Demographic groups normally do not constitute communities. However, they have the potential for becoming on-line communities when individuals share common interests, needs and goals, have a desire to communicate with a peer group, and can easily find each other to establish relationships.* The StageStruck On-line Community is taking the demographic group of K-12 teachers of the performing and creative arts and linking them together firstly through an on-line network then through to an opportunity to build community with active facilitation and support.

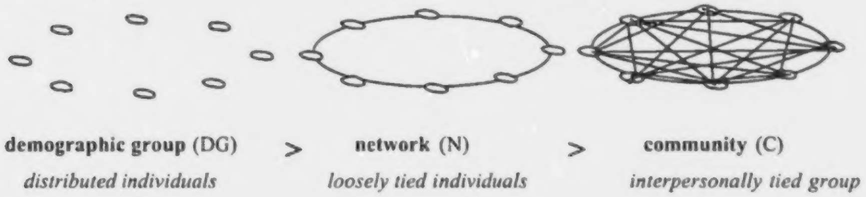
demographic group (DG)
>
network (N)
>
community (C)
distributed individuals
loosely tied individuals
interpersonally tied group

Diagram 1: The forming of lines of communication between individuals in on-line environments

The group being formed at the centre of this research did not exist before people were drawn to become members on-line. They are each member of other communities and may have ties through these to some members but no one community already exists to ties all the teacher groups (primary, secondary, drama, dance, design, creative arts, English) together. They do constitute a demographic group with the potential to become a community if ties can be effectively established.

It has taken two years in planning and web design and development and promotion to get to what Wenger (1998) describes as the second phase of community development; Coalescing. The plan for community development and the period of research is shown in Table 1. The focus of 2000 was the research, literature review and study of cases of on-line professional development and the design of the web site in response to teacher needs and concerns. During this year contacts were made and groups identified that might be integral to design of and dissemination about the community site. Finding out just who is in this demographic group has proven to be an ongoing task. In 2001 the development of the architecture became the focus. Time was spent in promoting the site and reaching out to teacher groups to elicit membership and teacher concerns about focus innovation CD-ROM technology. Establishing a critical mass of members for the network and connecting those people through the web site has taken much longer than was anticipated in this phase. In 2002 members will see the main activity, communication, collaboration and facilitation targeted specifically toward community building.

Table 1 maps the research program and the community development against the Wenger Community of Practice (CoP) stages of development. Wenger describes the typical evolution of community and the facilitator activities that promote community development at each of the stages.

	FOCUS	TASK			CoP STAGE
2000 (DG)	**Research**	Analyse	• Needs • Access		
		Design	• On-line environment • Interactions		
2001 (N)	**Infrastructure**	Establish	• Network • Members • Concerns		1st stage *Potential*
2002+ (C)	**Community Building**	Build	• Interest & value • Sociability & trust • Relationships & identity	• Interaction • Collaboration • Joint artifacts	2nd stage *Coalescing*
2003		Evaluate	• Concerns • Levels of use • Roles	• Interaction • Collaboration • Artifacts	3rd stage *Maturing*

Table 1: The development timeline for StageStruck Professional Development Community

The site remained largely as it was for the first six to eight months of 2001. While registrations had grown steadily involvement had not. It has taken a very personal face-to-face and one-to-one approach to elicit the initial teacher contributions. Teachers registered on the site were each approached by email to ask their experience level with StageStruck and their interest in being a contributor. Teachers described themselves as *newbie*, *experimenter* or *expert* in using StageStruck. No-one identified him/herself as an expert so the experimenters became the targeted participants for this stage. The *experimenters* were encouraged to explore ideas for contribution to the site. Email communication, neither broadcast nor personal, was working as the way to communicate and encourage these members. So meetings and phone calls were scheduled where time and geography allowed. It was decided to tap into some of the existing communities that teachers belong to and to attend functions and workshops at these to promote involvement on the Web site. The need for this type of active leadership or facilitation was noted in the early work of Hiltz & Turoff (1981). The requirement for personal communication from the coordinator is also borne out by the research findings of Cothrel & Williams (1999 p.23) when they studied 15 different on-line communities. They state as part of their findings that; *Often community managers would place phone calls to the individuals who they wished to participate in the community. One organization created a "social weaver" role, responsible for initiating a small number of members into the group.* Such roles are key to bringing (and keeping) people on-line. This personal approach and face-to-face activity seems even more critical when the community has no existing ties or relationships to rely on, as is the case here.

Most recently activities and events have been structured to focus teacher attention individually on each of the parts of the site and how these might be used. A team of 'experimenters' has been formed to develop an Innovation Configuration Map (Heck et al 1981) for StageStruck, working wholly on-line. This innovation configuration map will describe what classroom practice using StageStruck looks like as teachers move towards implementation. The kernel for the map was created through focus group meetings with the original designers and developers of StageStruck and now the map moves into the hands of the *experts* and *experimenters* for fleshing out and a classroom reality check. It is planned for this collaborative writing activity to begin in February of 2002 and for a draft map to be in place in March for teacher self assessment and professional development planning. The development of this map will be an iterative process throughout the year. The final map will be employed as an evaluation tool in the research project to gauge and describe teacher use of StageStruck.

What lessons have been learnt to date?

A raft of questions has arisen from the research and infrastructure stages of the StageStruck On-line Community to date. These questions can best be summarized under three major issues: *Access*, *Readiness* and *Culture*.

Access

Issues surround access to hardware within the school and at home, to the speed of the connectivity (school and or home) and the time avaiable for personal professional development.

A recent Australian survey of teachers and the Internet (Schoolsnet, 2000) suggests that the most likely point of school access to the Internet is still the school library rather than classrooms. Administration areas and staffrooms were found to be the next likely points of access. While this lack of access is changing rapidly in Australia, as networking within schools becomes a priority, it does show that we have still not reached a point where teachers have reliable personal access to the Internet. Indeed teachers in this particular demographic are some of the least likely to have ready access to technology.

Is school technology adequate to support teacher involvement in on-line activities? Surveys suggest that in Australia 61% of teachers have Internet access in their homes. It is yet to be established definitively whether teachers are more likely to access professional development from school or home, but early evidence from the StageStruck site logins suggests that most access to the Internet outside school hours. In 2002 this study will report on how access to technology affects patterns of involvement and contribution and whether school and/or home technology can adequately support teacher involvement. Teachers in the community will be surveyed and individual access to technology mapped against community involvement. The issue of how much individual contact is required to maintain involvement will also be monitored. Technical and time management guidelines are being developed January 2002 to assist teachers to effectively and efficiently communicate on-line.

Readiness

Teacher readiness issues surround community as an untraditional and less formal professional development structure. Unfamiliarity coupled with the newness of on-line learning itself and teacher preparedness, or lack there of, for open communication, sharing and collaboration will all be factors in teacher readiness for participation in an on-line community of practice.

In 1998 the New South Wales Department of School Education offered an on-line course in information skills. When advertised across the state the response from teachers wanting to be involved was overwhelming. Completion rates in the first cohorts were heartening and the feedback from participants was very positive. However this was a predetermined formal on-line training event held over five weeks. How prepared and motivated are teachers for less formal and more self-directed and multi-directional on-line involvement?

It is the impact each of these readiness issues, and more probably the combination of them, that stands to confound the outcome of this research. It is planned to include questions related to past experience and motivation in the mid-year and final semistructured interviews to determine how level and type of previous on-line experience relates to member contribution and learning. There is some clear anecdotal evidence from experience in previous on-line projects that, upon completion of student projects and after some reflection, teachers find project activity to have been very effective informal personal professional development. Teachers report on the skills and confidence they themselves have developed through supporting the student involvement and being able to learn along with their students. In February 2002 structured projects are being offered for students to engage in. It is envisaged that these projects will motivate further involvement from the teachers and draw them to other teacher-specific areas of the site.

Culture

Cultural issues of the teaching profession surround a depressed professional status; a need for incentives, recognition and accreditation for self initiated professional development and the teacher conception of the Internet as a consumer technology.

The Schoolsnet survey suggests that teacher at-school use of the Internet is largely for research (86%) and email (73%). At home use is primarily email, Web and research. Teachers perceive the Internet as a consumer and sometimes publishing technology. Teaching and professional development programs have largely supported this perception through a continual focus on resource retrieval. Teachers need to be supported to overcome a resistance to new ways of using the Internet and commit to communicating, collaborating and contributing in order for on-line community to even have a chance of delivering effective professional development. Focus group discussions with teachers have indicated that they are concerned about recognition and accreditation for time spent in activities on-line. In early 2002 it is intended that the StageStruck site will offer certificates for hours of on-line activity, whether seeking or answering, linking or mentoring, joining discussion or leading activity. To this end we are currently investigating precedents for equating on-line time and contributions with hours of professional development. As part of this investigation insights are been sought from similar face-to-face teacher professional associations and groups to see what parallels can be drawn between their development and the planned growth of this community.

As of December 2001 the StageStruck Online Community hosts a network that had not yet developed the hallmarks of community (Stuckey et al, 2001b). Facilitator/researcher focus for 2002 is on the member uptake of opportunities to contribute and the adoption of roles and development of strong ties, which will allow it to be labeled a community. It remains to be seen whether it will show signs of developing into a true community or whether while operating as a network it might still ably meet teacher professional development needs.

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"Teaching Online Changed My Teaching and My Life": Reflections Among Teacher Education Faculty

Roy Tamashiro, Ed.D.
Professor of Education
Webster University
470 East Lockwood Ave.
St. Louis, MO 63119—3194
Phone: (314) 968-7098
FAX: (314) 968-7118
Email: tamashiro@webster.edu

Abstract:

Institutions like Webster University (St. Louis, MO) are increasing the number of 100% online (Internet-based) courses and programs in teacher education. How does online teaching affect instructors' view of themselves, their teaching, their students, and the learning environment? This paper summarizes the individual emotional and cognitive changes that instructors reported after receiving training for teaching online and developing and teaching at least one 100% online course. Common themes include: improved understanding of course content and design; raised expectations for student autonomy and quality of student work, and increased professionalism and formality. Changes in instructors' views carried over to the on-campus classes. The implications for program development, faculty development, and the possible development of new norms and sub-cultures are examined.

Paper Summary

Introduction

Like many teacher education institutions, the School of Education at Webster University (St. Louis, MO) has been increasing the number of 100% online (Internet-based) courses and programs. Currently (Spring 2002 Semester), the School of Education offers 20 online courses, and two Master of Arts in Teaching (MAT) degree majors that may be completed entirely online. Faculty who teach online courses receive training to work with the online teaching tools, and they develop or redesign their courses for online delivery. Do instructors' experiences in preparing and teaching online courses change their views of themselves, of their teaching, of their students, or of the learning environment? This paper reviews the individual emotional and cognitive changes that instructors reported after receiving training for teaching online and developing and teaching five 100% online courses in the last three years.

Procedures

As part of the evaluation of new online initiatives, the School of Education's online instructors who received training for online teaching and who had developed and taught at least one 100% online course were invited address the following questions on a written questionnaire:

1. Has the online teaching experience changed or influenced your teaching? If so, How?
2. Has the online teaching experience changed how you relate to others, including students, other faculty, family, friends? If so, How?
3. Has the online teaching experience changed your thinking or your perception of reality? If so, How?

The responses as well as oral elaborations were discussed at department and School-wide faculty meetings.

Results and Discussion

Among the 23 instructors who met the qualifications, 16 instructors (7 full-time, 9 adjunct) completed the questionnaire. Preliminary results include the following:

- All instructors report a notable change in their teaching. (Question 1) Examples of types of changes described are: "I learned how to teach online;" "After teaching online, I had to reorganize my face-to-face courses too." "I learned a new way of thinking about course design and instruction." "I found teaching online to be so much more focused and effective—I might want to do all of my teaching online."

- Four instructors reported that the online teaching experience changed how they related to others. (Question 2). The other 12 instructors reported no change in their relationships. Changes described include: "I feel like I have a window into the students' mind;" "I learned that there are some students whose personalities or learning styles are not suited for online courses. There are also some instructors who should not use this media." "Because I get much deeper level discussions online, I think I now expect a higher standard of my students in both online and on-campus classes."

- Two instructors reported that the online teaching experience changed their view of reality. (Question 3) The other 14 instructors did not comment on this. One instructor elaborated on how online courses places students and instructors alike in a new social and academic environment and culture. The norms and expectations for what occurs in an online course are defined anew when compared to the norms of a campus course. The other instructor described how online teaching was part of a "transformation of academia" in which technology mediates and permeates all activities in higher education, from keeping appointments on PDAs and conducting advising by email, to teaching and conducting research entirely online.

Learning to teach online, in particular 100% online courses, involved more than adding to one's repertoire of teaching techniques. For all instructors, it was a significant professional development experience that expanded their understanding of curriculum design, and instructional principles. Every instructor devoted many more hours per week preparing and implementing the online course compared to the preparation and delivery of other new campus-based courses. The extensive preparation time was generally viewed as negative, but counterbalanced by the professional growth and gratification from valuable learning. Instructors described applicability of their new learning to curricular or instructional designs of the their campus courses.

The second and third questions aimed to elicit more personal reflections. The responses to these items may have been limited because personal information is still considered taboo for open discussion. Most instructors did not attribute profound personal change resulting from the online teaching experience. The impact of the online teaching experience upon oneself may be subtle and difficulty to observe. Or, one may resist acknowledging a personal transformation in an academic community that would probably eschew such a reaction as less than rational.

The wide range of responses combined with the already divided views among the faculty about the desirability of online courses and programs, may be reinforcing the divide in the School community between faculty who teach online courses and those who do not. If the interpersonal relationship changes that faculty reported were to extend into the School community, we may expect emerging norms such as increased personal autonomy and responsibility, more formal relationships, and lowered tolerance for unfocused expression. It is possible that these and other norms that emerge among the online faculty and students will begin to define a distinct sub-culture or counter-culture within the School of Education.

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Collaborative Learning and the Online Learner: Do Those Who Choose Online Delivery Want Collaborative Learning?

Gary R. Tucker, PhD
Northern Arizona University
Flagstaff, AZ – Gary.Tucker@nau.edu

Michael Blocher, PhD
Northern Arizona University
Flagstaff, AZ – Michael.Blocher@nau.edu

Abstract: When the courses were designed for the online Masters Degree in Educational Technology at Northern Arizona University, they were designed with various approaches that require collaboration among the students. This approach in online course design was based on research in designing effective online learning environments and on constructivist learning philosophies of the faculty. This need for collaboration that seems to be so vital for online environments and the general inclusion of this technique in the courses for this degree brings up two very key question: Do online learners have certain profiles that would make collaborative learning a less desirable technique for them? Are we forcing them into an instructional technique that they find exceptional difficult and undesirable? This paper reports on a initial research project that begins to shed light on these two questions.

Introduction

In the Spring of 1999, The Center for Excellence in Education at Northern Arizona University (NAU) began an online Masters Degree in Educational Technology (M.Ed. in Ed. Tech.). In designing the courses for this online degree, the faculty, with knowledge of the need for collaborative learning in online environments, designed the courses with various approaches that require collaboration among the students. This need for collaboration that seems to be so vital for online environments and the general inclusion of this technique in the courses for this degree brings up a very key question: Do online learners have certain profiles that would make collaborative learning a less desirable technique for them? Due to our limited knowledge of the dynamics of this instructional technique are we placing the students into an environment that is too difficult and problematic for them to be successful?

The California Distance Learning Project (1997) reviews some of the research on successful students in distance education programs and suggests that students who are attracted to this form of education share certain characteristics. They

- Are voluntarily seeking further education
- Are motivated, have higher expectations, and are more self-disciplined
- Tend to be older than the average student
- Tend to possess a more serious attitude toward their courses.

Pratt (1996) research indicted that an introverted person would probably become more successful online, given the absence of social pressures that exist in face-to-face situations. Conversely, extroverted people may have more difficulty establishing their presence in an online environment, something that is easier for them to do face-to-face (Pratt, 1996). Palloff and Pratt (1999) state that online learning can provide an educational experience that helps motivate students who appear to be unmotivated because they are quieter than their peers and less likely to enter into a classroom discussion.

Although these data provide baseline information on the type of students that are attracted to online learning environments, the authors of this study and faculty in the M.Ed. in Ed. Tech believe that greater information is needed to understand the learning preferences and characteristics of engaged students. For example, what are these students *motivated* by, what are their *higher expectations*, and how do they use or manage their *self-discipline*?

New Student Perceptions Of The Online Learning Environment

Students entering the Online M.Ed. in Educational Technology at NAU submit a battery of self-report instruments to help the faculty better understand their perceptions and expectations for learning in this new environment. One such instrument is the Motivated Strategics Learning Questionnaire (MSLQ: Pintrich, Smith, Garcia, & McKeachie, 1991). The MSLQ is a self-report instrument where learners rate their motivation and cognitive and metacognitive strategy use for a specific course. This instrument was administered to students enrolling in the M.Ed. in Ed. Tech. degree program to gain insights into students' feelings about motivation and strategies for that specific course. The MSLQ has fifteen different scales that can be administered individually or together with modular design to fit the needs of the researcher. Analysis by the author of the MSLQ scales reported only moderate correlation with participants' final grade. However, the Cronbach's alphas or p-values ranging from .52 to 93 suggesting that they have reasonable between factor validity.

To gain a better understanding of students' expectations regarding peer collaboration as they entered the program, individual items from two scales where analyzed, **peer collaboration** and **help seeking** – as it relates to peer collaboration. The results in Table 1 provide some interesting findings. For example, students reported below the median of 4 in the 7-point likert scale that they would try to work on their own – even if having trouble. However, when seeking help the means seem to indicate that if they did seek help, it would probably be first from the instructor and then individual peers. When examining student means concerning peer collaboration the means for all three items where noticeably lower than the help seeking means. This would give some indication that students, even though they would seek help if needed, may be less apt to engage in peer collaboration upon entering the online degree program.

Items	Mean	SD
Help Seeking I ask the instructor to clarify concepts I don't understand well.	6.200	1.103
Help Seeking I try to identify students in a class whom I can ask for help if necessary.	5.613	1.610
Help Seeking When I can't understand the material in a course I ask another student in this class for help.	5.507	1.446
Peer Collaboration I try to work with other students from a class to complete the course assignments.	4.811	1.685
Peer Collaboration When studying for a course, I often try to explain the materials to an online classmate or friend.	4.707	1.944
Peer Collaboration When studying for a course, I often try to set aside time to discuss course material with a group of students from the class.	4.547	1.596
Help Seeking Even if I have trouble learning the material in a class, I try to do the work on my own without help from anyone. *(Reversed Item 7 = Not At All True of Me; 1 = Very True of Me)*	3.740	1.633
N=75 1 = Not At All True of Me; 7 = Very True of Me		

Table 1: Mean and Standard Deviation for specific items of the MSLQ survey.

Rationale For Building Collaborative Learning Activities

Nipper (1989), a relatively early writer in the area of computer mediated distance learning discussed the need to create a sense of "synchronous presence" and reduce the social distance between all participants. Nipper notes that the need for social connection is a goal that almost supersedes the content-oriented goals for the course. Nipper suggests that it is important to somehow create the sense that a group is working together in real time. Many online instructors, seeking to create this sense of "working together in real time," have incorporated active learning techniques such as working collaboratively (Myers and Jones, 1993). Palloff & Pratt (1999) go as far to state that the ability to collaborate and create knowledge and meaning communally is clear indicator that a virtual learning community has successfully coalesced.

> In the online classroom, it is the relationship and interactions among people through which knowledge is primarily generated. (Palloff & Pratt, 1999). P15

This research combined with the fact that modern learning theories indicate that there is a very important social aspect involved in one's learning process gives a profound foundation for building collaborative learning activities in online environments.

> ... ideas can be collaboratively developed as the course progresses, creating the socially constructed meaning that is the hallmark of constructivist classroom in which an active learning process is taking place. This ability to collaborate and create knowledge and meaning communally is clear indicator that a virtual learning community has successfully coalesced. (Palloff & Pratt, 1999). P 32
>
> Lev Vygotsky "believed that it is our need to interact and communicate in the sociocultural context that makes human cognitive development intellectual" He also believed that "all higher mental functions" develop from social interactions (Kafai & Resnick, p. 178).

Even though the social distance of the online environment calls for some type of community building and our knowledge of modern learning theories show the need for social interaction there seems to be an indication that learners themselves are entering online learning environments with reservations about collaborative learning. In addition, educational practitioners may not have a very good understanding of the dynamics of collaborative learning (Burton, Brna, & Treasure-Jones, 1997). This could result in creating problematic situations when collaborative learning activities are included in online learning environments.

Purpose of Paper

This brings us back to the original questions that this effort is attempting to shed light on: (1) Do online learners have certain profiles that would make collaborative learning a less desirable technique for them, and (2) due to our limited knowledge of the dynamics of this instructional technique are we placing the students into an environment that is too difficult and problematic for them to be successful?

As mentioned earlier, the MSLQ provides some insight as to how students feel upon enter the program regarding peer collaboration. However, it cannot provide information on students' perceptions of specific courses where they are required to interact with peers and engage in collaborative learning activities.

This paper reports on an ongoing study that surveys students who have completed a particular course in the M.Ed. in Ed. Tech. that has a heavy emphasis on collaborative learning. The study inquires about students' perceptions concerning the required collaborative learning activities. Specially, they were asked to report on their likes, difficulties, successes, and perception of their learning as it compared to other online courses.

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The collaborative learning or cooperative learning activities of the course that the survey queried focused on working together to come to a shared understanding or view. The students were assigned different roles of involvement and the roles rotated so that each member experienced all roles. The collaborative groups were designed so that in order for the students to come to this shared understanding or view required them to engage with one another using asynchronous communication systems such as, e-mail, bulletin boards, as well as synchronous chats.

Results

Questions	N	Min.	Max.	Mean	Std. Deviation
Please rank your learning experience in 567 as it compared to other online	22	1.00	5.00	3.5909	1.14056

courses that you've taken.					
Felt Successful with the Online Collaborative Learning Activities	22	1.00	5.00	2.8636	1.16682
Please rank how well you liked the collaborative learning activities in 567.	22	1.00	5.00	3.4545	1.01076
Do you think the collaborative learning activities should remain a part of 567? One = Definitely Removed. Two = Kept, but reduced significantly in number. Three = Kept with major modifications. Four = Kept with minor modifications. Five = Definitely kept intact.	22	2.00	5.00	3.3182	1.21052
If you were designing an online learning environment, would you choose to use collaborative learning activities in your design?	21	1.00	5.00	3.3333	1.15470

Table 2: Means and Standard Deviations for specific items of the Collaborative Learning Survey for ETC 567

The Student Perceived Difficulties of Online Collaborative Learning Activities

When asked to respond to the difficulties they experienced in the collaborative learning activities, the difficulty most often mentioned centered around the complexity of coordinating a synchronous time when they all could meet in the chat – especially when many were located in different time zones.

> Coordination and time are the most difficult aspects --also people who don't or can't open their email everyday--or several times a day. During the summer last year I was in a group that had people in every time zone. I was in Michigan and twice I joined a chat at 1 AM my time because 10 PM Arizona time was the only time everyone else could get together. I understand that real life is like this, but it is a pain nonetheless.

Even though students reported that they were successful in dealing with peer group dynamics, they also reported that it created difficulties.

> People that did not do their part. Difficulty in coordinating times to get together, people not showing up. Group work is great, but online has the same drawbacks as in person.

> I have a hard time with the collaborative activities. First, two of my group members didn't show up to any scheduled chats at all. Another team member and myself had to complete the assignment tasks for all four people. We were eventually put in another group. The whole thing takes a lot of time and effort. I am in different time zones than everyone else and it is difficult to schedule chat times.

Successes of the Online Collaborative Learning Activities

As Table 2 indicates, the students who responded to this survey reported a mean of 2.864 (just below the median), which would indicate that they did not feel extremely successful nor exceptionally unsuccessful in their collaborative learning experiences in this course. However, when asked to describe the successes they experienced in the collaborative learning activities 76% responded with specific examples. When their comments were examined one area of success they experienced seemed to center around mastering the technical issues, such as chat. For example this student mentioned a success in dealing with her frustrations with technical issues: "I learned to deal with my frustrations better, and I got more proficient at email and chatting!" Another mentioned, "The successes I experienced were directly related to the technology and the team work with my colleagues. Negotiating the web, learning how to chat, and understanding the processes involved in the discussion performance were valuable."

Another area where the students mentioned a feeling of success, dealt with overcoming some of the problems of group dynamics. They mentioned such issues as learning how to share with unseen and unknown individuals, leaning how to manage people, overcoming the issues of coordination of schedules and developing leadership skills. For example this student describes it best:

> Managing people by long-distance and responding to the needs of a group when you don't know the group are challenging to say the least. The first time I had to do this, the whole group crashed and burned... In subsequent classes I and everyone else felt the responsibility stronger and

performed better. I think this is an important part of the learning process and I am sure that the future for professionals in all areas will call for more work like this–long-distance group participation. So, although I hated it, I am glad I had to do it and I don't think you should drop it.

Conclusions

Data from the MSLQ suggests that students entering the M.Ed. may only slightly employ peer collaboration as part of their learning strategies. Although they reported several difficulties that hampered their collaborations, not all were related specifically to online or technology mediated collaborations. Indeed, some reported difficulties are inherent to any kind of collaborative learning activities – regardless of delivery method. Interestingly, they reported that they didn't feel successful in the online collaborative learning activities, but 76% identified and reported specific successes that they experienced. While many expressed difficulty with the group dynamic complexities and even their dislike for the collaborative learning activities, they also reported they were glad they did it and that it shouldn't be removed from the class design. Perhaps the most interesting finding is that they reported that they learned more than other online courses that they had taken.

To answer the questions; Do online learners have certain profiles that would make collaborative learning a less desirable technique for them? It would appear that students enrolled in our M.Ed. Ed. Tech. Degree program might come to online courses expecting to interact more with the faculty than with their peers. This may indicate that their expectations are built upon a more "correspondence model" of distance learning. However, the degree program is built upon a more constructivist, learner-centered model where peer collaboration is a central component. This certainly can create some misconception of expectations but it appears that over the span of the course, students became aware of the importance of peer collaboration. This brings up the second question; Due to our limited knowledge of the dynamics of this instructional technique are we placing the students into an environment that is too difficult and problematic for them to be successful? Although students reported specific difficulties, some in the area of the technology and some in the area of the group dynamics, they also reported how they overcame them. Certainly this information can be used to help us become more mindful of our students' needs as we design our online courses. Indeed, more inquiry may be helpful in determining how they would modify the collaborative activities. But most importantly, their reports tell us that they came to learn and be successful in spite of the difficulties and felt the collaborations should not be removed.

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Bringing Inservice and Preservice Teachers Together In an Online Learning Community

Hakan Tuzun
Instructional Systems Technology Department
Indiana University
United States
htuzun@indiana.edu

Ozgul Yilmaz
Science Education Department
Indiana University
United States
oyilmaz@indiana.edu

Abstract: One of the implications of the information age is the massive information load. To keep up with the skills and knowledge of the information age, teachers can support each other and learn collaboratively in an online learning community. In this paper, we introduce such a community in which every teacher can learn from other teachers. We introduce the ICQ active list, the Internet tool we used for creating the online learning community.

Introduction

Teachers of the information age are required to have more diverse skills and knowledge. Besides, these skills and knowledge are increasing day by day. Layman & Varian (2000) estimated that roughly 250 megabytes of unique information is produced in the world per year for every person. Teachers might be supported with various resources, services, tools, and specialized staff to close the gap in their skills and knowledge. However, a lot of inservice and preservice teachers lack this support on a timely and consistent basis. In order to address these needs, teachers can collaborate in an online learning community.

An Online Learning Community (OLC) is a community in which all of the members share control and everybody learns (Wilson & Ryder, 1996). The characteristics of the OLC are distributed control, commitment to the generation and sharing of new knowledge, flexible learning activities, autonomous community membership, and high levels of collaboration. Wilson & Ryder (1996) presented three scenarios in which learning communities could be formed. One of these scenarios used Internet discussion groups to form an OLC.

Many other Internet tools can be utilized to form an OLC. Examples are a web site, e-mail, e-mail list, threaded discussion group, chat, instant messaging, audio conferencing, and video conferencing (Harrison, 1997; Madjidi et. al., 1999; Pattison, 1999). Harrison (1997) found the problems with tools that support OLCs as finding appropriate software for members, access control to keep outsiders from disrupting communication, training members in the use of various software packages, and cost of acquisition of appropriate tools. This paper describes ICQ Active List (ICQ AL), an Internet tool which can support an OLC for inservice and preservice teachers while eliminating almost all of the problems mentioned above.

ICQ and ICQ Active List

New forms of Web tools are becoming available everyday. ICQ (I Seek You) is one of them, which is an integrated set of Internet tools. Although it first came out as an instant messaging tool with limited capabilities, users of ICQ can also chat, and send files and URL's to others. All these functions are within one easy to use client software. Version 99b of ICQ client comes with a new feature, the ICQ Active List (ICQ AL). Users can create or join ICQ communities based on a common interest and easily access them from their ICQ client software. Once users join an AL, they can broadcast messages to all of the members of the list, receive events from other list members, chat in a virtual room, post and view messages in a threaded discussion group, and e-mail each other. Users can also become an AL owner, which gives them total control over the AL. In order to run an AL, Active List server software needs to be run. As long as the AL server software is running, the AL will be accessible by all ICQ clients.

Our Use of ICQ Active List to Bring Teachers Together in an Online Learning Community

In our learning community, we adapted the learning model identified by Wilson & Ryder (1996). This linear model has seven components which are articulating the learning need, seeking help, engaging in the help consultation, assessing the learning, sharing the solution with the OLC, archiving the solution to the problem, and the repetition of the process.

When a member of the OLC needs help, he/she may seek help in a variety of ways. The member might broadcast an instant message to other members of the OLC, who are online at that time. Or, the member can open the threaded discussion forum, and create a new thread by posting the problem. For example, one of the preservice teachers in our OLC asked for sample lesson plans for science education by sending an instant message to the group and by posting a message in the threaded discussion group.

After the problem is stated, OLC members may help to the member who has a problem. Helping might be implemented in a variety of ways, like giving instruction in the chat room, sending an instant message to the member, sending a Web address (URL) that will explain a solution to the problem, posting a solution to the threaded discussion group, or sending a document. In our example, one of the OLC members sent a lesson plan in the word processing format to the member in need of help. Another member posted a message in the threaded discussion group, which contained web addresses for sample lesson plans.

At the assessment stage, the member who asked for help evaluates the solutions offered through different channels. If these solutions are not enough or complete, he/she can seek for help again. In our case, the preservice teacher was satisfied with the lesson plan sent to him by another member; however he indicated that the Web addresses posted in the threaded discussion group didn't contain lesson plans for science education.

When a solution to a problem is found, this solution might be shared with other OLC members. Threaded discussion group is a convenient place for sharing the solution with the OLC, since every posted message stays there as long as it is not deleted by the administrator of the AL. In our example, the preservice teacher posted a message in the threaded discussion group, explaining how he found solution to his problem.

Interactions in the OLC should be archived for future reference. Current or future members of the OLC might seek help for a problem that was already solved in the past. In such cases, the archive of the OLC might serve as an EPSS (Electronic Performance Support System) or as an FAQ (Frequently Asked Questions). In our OLC, we created a thread in the threaded discussion group called 'Solutions to past problems'. There are also sub-threads under this general thread for such domains as 'Science', 'Computers', "Mathematics', and etc. Such a categorization allows members to browse the solutions easily in a timely manner.

Conclusions

With the help of ICQ active list, an Internet tool, we have created an online learning community for teachers, in which every member can learn from each other. We have observed that such a learning community can be utilized by teachers successfully to close the gaps in their skills and knowledge. Since this is an ongoing research, our future research agenda includes nurturing the learning community, fostering communication in the learning community, and examining interactions in the learning community.

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A Technology Based School/University Partnership

Peter West, Northern Illinois University, US
Donna Wiseman, University of Maryland, US
Moses Mutuku, Northern Illinois University, US

This presentation will describe an initiative designed to better prepare teachers for the rapidly changing demands that technological and sociological changes are imposing on how they teach and how students learn. It goes without saying that few technologies have grown as eposively as telecommunications overt ythe last decade. By simply connecting a computer to a phone line, anyone can access untold worlds of information. One of the biggest challenges facing educatino today is harnessing the tremendous opportunities created by those advancements and putting them to work in the classroom.

This session will describe this program and outline how a partnership between schools, universities and businesses have been working together to create solutions to technology integration.

Nuts and Bolts: Authentic Educational Web Project Development

Harrison Yang, State University of New York at Oswego, US

World Wide Web is a rich learning environment that can be used for designing direct instruction, learner oriented learning activity, and professional development. To design any kind of educational Web project, it is necessary to understand how teachers' experience and the insights of researchers can be linked together. This paper synthesizes both action and reflection of pre- and in-service teachers' ideas on four different kinds of educational Web projects: Internet educational resource book, inquire-based learning activity, class Web, and Web-based portfolio. Descriptions of distinctive characteristics, benefits, and challenges on each education Web projects are included.

TELECOMMUNICATIONS: PRESERVICE

SECTION EDITOR:
Sue Espinoza, Texas A&M University-Commerce

Telecommunications and education – the two are becoming increasingly intertwined in our classrooms and programs at all levels, especially in teacher education programs that are preparing educators to effectively use these technologies in their classrooms. The range of applicable technologies is growing as new ones are emerging and current ones are expanding. The number of schools with Internet-connected computers in libraries, labs, and classrooms continues to grow, providing potential opportunities for students and teachers to participate in global learning communities, and to both retrieve and produce educational resources. Teachers must learn to use and feel comfortable with these technologies, as tools to enhance teaching and learning. So where and how does this take place? The papers in this section demonstrate the wide range of approaches, for both preservice and inservice teachers, in university, field-based, and alternative programs, with delivery 'sites' being online (Internet), videoconferencing, university classrooms, or k-12 schools – either individually or in combination.

Both video-conferencing and online Internet-based courses are described, as are uses of these technologies as integral components of classroom-based courses and/or faculty development. Also discussed are general support and community resources that are not course-connected, and that speak to the concept of lifelong learning. Taken as a whole, these papers provide a snapshot of ways that telecommunications can be used to support and promote effective teaching and learning in today's educational settings. Accounts of both successes and lessons-learned, as well as discussion of methods of assessment of the use and/or effectiveness of various technologies provide guidance for current and future educators.

The Internet may be a veritable goldmine of resources, or it can be an endless maze through which educators wander in a fruitless quest for those resources. Growing numbers of portals and other methods of organizing Internet resources are appearing. Levin and Grotto introduce one such effort – discussing how resources are selected and evaluated for inclusion in a database, and how teachers can become a part of that process. In addition to finding resources, the Internet also provides a forum in which educators can share resources they have created, thus contributing to others in their profession. Repman, Carlson, and Downs describe and provide links to a number of web-based tools that they have found helpful for productivity and instruction. Gersh, also explores web-based tools, discussing those that facilitate "Internetized" lessons and internet-based projects. Specialized applications provide opportunities such as the use of remote scientific instrumentation technology in K-12 and teacher education classrooms, as described by Thakkar, et al. This use of Internet-based activities is basic to the world of telecommunications for classroom instruction, and opportunities to learn more are often available at universities and colleges, as well as at school districts.

E-mail has become almost as common, if not more so, than the postal service it sometimes seems, and is but one of the methods of communication enabled by telecommunications. Several papers explore the communication and community building aspect of the Internet and related tools. Thomeczek examined electronic communication in an undergraduate teacher education course, and compared an e-mail discussion list with a web-based discussion board. Collier and Yoder suggest techniques, based on existing literature, for conducting successful online discussions and collaboration. Tuzun and Yilmaz describe an online learning community of inservice and preservice teachers, communicating via ICQ Active List. Leh and Winograd present some moderating strategies for instructors who are managing online computer conferences. Online communication forums may promote life-long learning, as students continue with these communities after completing their university studies.

Communication is also enhanced by the use of telecommunications to link university classrooms with those in K-12, a practice that has provided unique opportunities for preservice teachers to observe and interact with schools at a distance. Adcock and Austin discuss their experiences with a preservice observation project that connected the university with public school classrooms via a two-way audio/video conferencing system. Lehman and Razzouk describe a method of observation/interaction using IP-based videoconferencing. Boccia, Fontaine, and Lucas describe a "two-way television teaching, debriefing, and general mentoring" program that led to the development of a CD to help better prepare preservice teachers for observations. Videoconferencing permits students to broaden their perspectives and experiences, as they 'visit' schools, often at a distance.

Online courses also provide experiences 'at a distance,' and studies relating to faculty and students are being conducted to help guide the development of successful educational experiences for all. McKenzie, Waugh, Bennett, and Mims report the findings from their study of what faculty should know about course preparation for online learning. Tucker and Blocher review characteristics of successful distance education students and then describe their study of students and online collaboration. Other papers describe online courses for high school students, and for faculty development.

Integration of technology is one of the 'buzz-words' of the day – teacher preparation programs debate whether to have a stand-alone computer course, or whether to integrate technology throughout the teacher preparation program. What is the best method of introducing preservice teachers to ways to integrate technology into their future classrooms? Redmond and Albion used a newsgroup and a guest 'expert' in communication with preservice teachers to explore that question, and they report the results and explain their choice of methodology. Koro_ec, Kumpulainen, and McManus have also addressed the integration issue – they describe a survey they developed to obtain information about technology integration from faculty and students, on an institution-wide basis.

The papers in this section demonstrate a wide range of uses for telecommunications throughout the educational arena. There are full courses offered via video-conferencing, while others are online over the Internet. There are classroom-based courses, with online or video components. The modes of communication vary, as do the uses to which this technology is put, and the authors provide a view into successful implementations, as well as a discussion of lessons learned and some suggestions for improvement. The body of literature is expanding, as are the technologies. These papers provide a snapshot of ways telecommunications technologies are being used in support of teaching and learning.

Alternative Classroom Observation through Two-way Audio/Video Conferencing Systems

Phyllis K. Adcock
Department of Teacher Education
University of Nebraska at Omaha
United States
padcock@mail.unomaha.edu

William Austin
Department of Teacher Education
University of Nebraska at Omaha
United States
waustin@mail.unomaha.edu

Abstract: Research has shown the more classroom experience teacher candidates have, the better prepared they will be as teachers. However due to time constraints, liability concerns with on-site visits, and issues of school safety, many teacher preparation programs are seeking alternative observation methods. One such alternative that is being used at the University of Nebraska at Omaha is a two-way audio/video conferencing system. This type of system uses a computer's internet protocol number through the internet for remote viewing of the school site from the university, which enables panning the room to follow teacher-directed large group or small group learning activity. A qualitative study is being conducted to compare the responses of university students who experienced both remote and on-site observations, to determine if there is a significant difference in these two types of observation methods.

Introduction

In the past the only observation experience available to teacher preparation programs was through the student teaching experience. Studies have shown that the more experience in the school classroom, where learning takes place, the better for teacher candidates (Darling-Hammond, 1998). Consequently many teacher preparation programs have teacher candidates in classroomobservation visits in every year of the college experience. However considering the time involved, the liability issues of on-site observation visits, and safety management concerns in schools, it is a possibility that visits to community schools from outside institutions such as colleges or universities could be limited or eliminated all together. Therefore, due to the reasons stated above, along with the intrusive nature of observation visits in the school classroom, teacher preparation programs are looking for alternative methods for observation experiences.

Alternative Observation Technology System

At the University of Nebraska at Omaha, federal grant money was secured for a two-way audio/video conferencing system called PictureTel. This two-way conferencing connection is possible through a computer's internet protocol (IP) number that allows for remote viewing of any classroom with ethernet connections to the internet. A port in the firewall, which block incoming and outgoing electronic traffic, must be opened at each site to allow for the two-way connection. A T1 line of a high bandwidth is preferred to handle the high traffic these audio/video presentations generate. One thing to remember is the amount of internet traffic an institution has can make a difference, especially in the video display. This conferencing system allows for two-dimensional viewing of the school classroom through a camera that is very small, only about 8 inches high and 4 inches wide, which is virtually soundless. The microphones are placed strategically around the room to pick up the voices of the teacher and the children. At the university the professor has remote camera controls that permit one to follow the learning activity, whether following the teacher in large group learning or zooming in on small group learning activities. The video display also allows for viewing of both classrooms simultaneously with the picture-within-a-picture option. The microphones, cameras, and controls can be connected and used at each of the sites, creating a form of distance learning, The remote video observation can be taped, which gives the university classes flexibility for viewing during class, or at a later time for classes which meet in the evening. This taping feature is also helpful with children's classroom schedules which do not provide quality observation time, such as when a child is engaged in quiet reading time, or when children are away from the classroom for lunch and other activities.

The Study

In Human Growth and Learning class, university students have five observation experiences at the preschool, kindergarten, special education, elementary and secondary levels, which are guided by field competencies. By being a part of these observation experiences, university students can gain an understanding of how children learn, in what type of setting children learn, and how children are different in intellectual development and language acquisition due to the physical, cognitive, and psycho-social domains (Flavell, 1993).

In the pilot study university students observed on-site at the preschool, kindergarten and special education classrooms during the first part of the semester. Later in the semester observations were completed using the two-way conferencing system for observing at the elementary and secondary levels from the university classroom. From this pilot experience, several valuable lessons were learned. The two-dimensional remote video observation is more limiting than three-dimensional on-site visits. Therefore it was determined that the best classroom observations using technology are when there is more interaction between teacher and the children, such as in situations involving younger children, or children with special needs. As a result during the next semester, the remote video observations were scheduled earlier in the semester with the preschool, kindergarten, special education, and the on-site visits by university students, in the elementary and secondary classes were scheduled later in the semester. As a result of this change in the observation schedule, university students felt their experiences via technology were more beneficial

Summary

At the end of the semester a qualitative study using an interview was conducted. Five university students from each of the four classes were randomly selected, of which nineteen students completed the interview. The students were asked to compare the remote and the on-site experiences. In their comparison, the university students were to consider the physical setting of the classroom, the nature of the instruction between the teacher and the children, and the development of an individual child in the physical, cognitive, and psychosocial domains. This study will compare the responses of students having experienced both methods. In consideration of the observation competencies, the faculty will determine if there is a difference in the two forms of observation methods, and if this difference is significant. This study will be used as a guide for future studies of observation methods to determine if these alternative forms are meeting the needs of the university student in their preparation as teacher candidates.

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Looking into Classrooms: A Technology Mediated Observation Program for Preservice Teachers

Judith A. Boccia, Center for Field Services and Studies, University of Massachusetts Lowell, USA
Judith_Boccia@uml.edu
Patricia L. Fontaine, Graduate School of Education, University of Massachusetts Lowell, USA
Patricia_Fontaine@uml.edu
F. Michael Lucas, Center for Field Services and Studies, University of Massachusetts Lowell, USA
Michael_Lucas@uml.edu

Abstract: (75-100 words) This paper reports on a three year federally funded project that demonstrates the feasibility, effectiveness, and replicability of a technology -mediated classroom observation program for preservice teacher education. The study describes technical, staff and programmatic requirements for the project and some of the challenges likely to be faced during implementation. While not a replacement for in-person school visits, the virtual observation offers groups of preservice teachers the opportunity to watch and discuss high quality, real time teaching. The utility and value added of a carefully constructed technology -mediated classroom observation program for teacher education is evident from this study.

Introduction

Intensive, supervised field experiences are widely accepted as critical components of successful teacher education programs. "Prospective teachers learn just as other students do: by studying, practicing, and reflecting; by collaborating with others, by looking closely at students and their work; and by sharing what they see. For prospective teachers, this kind of learning cannot occur in college classrooms divorced from schools..." (National Commission, 1996, 31) In most teacher education programs, preservice teachers are placed in public schools for a variety of observation and assisting activities linked to academic courses in the teacher preparation curriculum. Debriefing of these field experiences usually occurs in the related courses and not onsite with the classroom teachers. Yet, "access [to] expert teachers' knowledge-in-action" is a powerful source of learning about the connections between theory and practice for preservice teachers (Ethell & McMeniman, 2000, p. 99). All too often, the public school schedule, particularly at the secondary level, provides no time for teachers to talk about their work with preservice observers. At institutions that use public schools as field sites, the quality of preservice teacher education is diminished to the extent that opportunity for dialogue about observed practice is missing or limited. Instead of serving as powerful sources for preservice teacher learning, school based observations become little more than time served in schools.

A related limitation of onsite observation is the narrow range of schools accessible to preservice teachers within most regions. For universities located in suburban or rural areas, access to urban educational settings is severely limited. Yet "prospective teachers need experience in schools in which cultural pluralism is valued, and where talk about racial, ethnic, and social –class diversity is a central item in faculty discussions." (Holmes,1990, 36) Increasingly, teacher educators are turning to technology to address the limitations of traditional onsite observation experiences, and in some cases to improve upon them. This paper reports on the *Looking Into Classrooms* project, a three-year, federally funded two-way interactive television classroom observation and dialogue program that linked preservice teachers at a university and public school teachers and students in 8 communities.

Project Overview

Looking Into Classrooms is a technology-mediated observation program for preservice teachers that is designed to expand and enrich their field experiences while simultaneously engaging master teachers in reflection and dialogue about instructional practice. The model uses two-way interactive television technology to provide preservice teachers real time observations and debriefing opportunities with a broad range of high school classes and teachers. The technology involves simultaneous audio and video communication between university classrooms and high school classrooms, allowing teachers and students in the high school classroom to be seen and heard by preservice teachers and their faculty. The high school students and their teacher can also see and communicate with the preservice teachers as part of a debriefing process. In addition, a web site was established to facilitate master teacher and preservice teacher discussion about the observed classes.

The foundation for the pedagogical model of the project is the Principles of Effective Teaching, developed by the Massachusetts Department of Education. These principles address Currency in the Curriculum, Effective Planning and Assessment of Curriculum and Instruction, Effective Management of Classroom Environment, Effective Instruction, Promotion of High Standards and Expectations for Student Achievement, Promotion of Equity and Appreciation of Diversity, and Fulfillment of Professional Responsibilities. Master teachers for the program were selected in part based on their awareness of and commitment to implement these Principles in their classrooms. Other frameworks of effective teaching could be used for the same purpose, such as the Model Standards for Beginning Teacher Licensing and Development developed by the Interstate New Teacher Assessment and Support Consortium (INTASC Standards).

Project Description

The *Looking Into Classrooms* project and model have the following components:

- A 2-way television connection that provides simultaneous audio and video broadcast and recording capability between the base site (i.e., the college) and the observationsites (classrooms).
- Technology support personnel to develop, implement, troubleshoot, and manage technology-related aspects of the program.
- Camera persons who know where to set up cameras and microphones in accordance with the goals of the teacher and college supervisor
- Email accounts for all participants (preservice teachers, college faculty, program coordinators, classroom teachers, technical personnel) for scheduling and communication.
- An electronic forum with interactive dialogue capacity.
- Master teachers who represent a variety of teaching styles and disciplines in as broad an array of structures and settings as possible.
- A sound framework for defining exemplary pedagogy, such as the Massachusetts Principles of Effective Teaching or INTASC standards.
- Courses of study related to instruction to which the 2-way observation is linked. Course should include, but not be limited to, a methods teaching course where practices are embedded, a pre-practicum or clinical observation program, and an onsite observation program that complements the 2-way observations.
- Permission of participating preservice teachers, master teachers, and classroom students to be videotaped.

As part of the evaluation process, a detailed profile of the *Looking Into Classrooms* model was created based on the "Innovation Configuration and Practice Profile" methodology developed by researchers at the University of Texas at Austin more than 25 years ago. This methodology has been used in countless programs to define the specific requirements for implementing a program faithfully, including Unacceptable, Acceptable, and Ideal levels of fidelity. The Practice Profile for *Looking into Classrooms* can serve as a guide to further implementation of the program or its components not only at the originating site, University of Massachusetts Lowell, but also at other institutions.

Project Outcomes

In the first year of the project, eight secondary-level classroom practitioners, representing a variety of disciplines, were recruited to serve as master teachers. The master teachers were nominated by their principals or by university teacher education faculty based on their excellent teaching and ability to work with newcomers to the profession. The first master teacher group then served as a mentor team to teachers who joined the project in subsequent years. By the project's end, twenty-three teachers were involved as master teachers. These experienced teachers (12-35 years teaching) are well educated and have participated extensively in professional development related to their subject area, teaching, and/or a specialty area. In addition, their motivation to participate in the program indicates a strong commitment to their own growth (making them excellent role models) as well as to the development of preservice educators.

Over a three-year period, the master teachers conducted a total of 33 two-way television classes and debriefings from eight different communities, including urban and suburban settings, as well as middle, secondary and technical schools. Classes included math, science, English, history, American Studies, special education, bilingual, English as a second language, and a K-16 Life Skills program. In addition, the master teachers participated with preservice teachers and university faculty in an electronic forum for extended discussion of the classes observed and, in the third year, in a student teacher support forum to help novices deal with the myriad issues of the practicum experience. In several instances, the master teachers were selected by preservice teachers to serve as their cooperating teachers in the practicum experience.

Master teachers found the two-way television teaching, debriefing, and general mentoring of preservice teachers a powerful learning experience. For many of these veterans, teaching had become instinctive and they were not easily able to articulate the rationale and purposes for what they did in the classroom. However, in order to respond in the debrief sessions to preservice teacher questions about teaching practice, the veteran teachers began to reflect on and express their professional skills in the pedagogical language used to frame the project. Examples of their reaction to the technology-mediated observation program include the following comments:

"I think the program forces me to look at my own teaching methods - to focus in on discussion and student thinking - not leading."

"I was very interested in interactive teaching. The idea of seeing myself in action as well as talking with teachers about teaching was very appealing."

"This program provides an opportunity for all of us to engage in activities designed to promote better teaching practice."

"I am interested in better education for my students, my colleagues, and myself. This program provides an opportunity for all of us to engage in activities designed to promote better teaching practices."

The 50 preservice teachers who experienced two-way television classroom observations over a three-year period generally agreed that the experience provided a more focused look at teaching than the traditional classroom visit. In addition, sharing the observation and debriefing with classmates enriched the learning experience as preservice teachers compared notes and formed questions about what they had seen in the observation. Finally, the preservice teachers recognized that the quality of teaching provided in the two-way observations was consistently excellent, illustrative of a teaching principle, and varied in methodology, conditions not guaranteed in traditional classroom observations. Another benefit of two-way television observation that preservice teachers listed was the psychological distance afforded by the physical separation of master teacher and observers. This distance empowered preservice teachers to ask hard questions of master teachers, questions that might have seemed too direct or even challenging in a face-to-face encounter. Examples of the preservice teacher comments about the observations and debriefs include:

"2-way observations are very effective. It's very helpful to watch and question real teachers."

"I have enjoyed this portion of the program. This is good quality control because there is too much of a chance students will have bad field observations. The 2-way (observations) are more effective and a better use of time."

"It's especially great to actually see Principles of Effective Teaching in action, which wasn't always happening with onsite observations."

"I thought the teachers used in the 2-way were superlative. It was a very good variety of styles and levels."

"Discussion (live) with peers and master teachers was by far the most valuable aspect of the semester."

"The debriefs were great. Don't change them. Talking to the teachers about their methods was extremely effective."

Although not part of the original project plan, a CD-ROM was created using clips of the first year's two-way classes as a tool to train preservice teachers in classroom observation skills. This component of the project was well received by all participants and led to a supplemental funding application to create a CD using higher quality video and focused questions for observation training in the future.

Preservice teachers also found the observation booklet to be "very useful in organizing thought and a great tool to explain what you should be looking for." The electronic forum was less well received in part because, in its original design, it was cumbersome to access and demanding to use. Subsequent versions of the forum alleviated the initial design problems but preservice teachers continued to resist discussing their observations after the experience. Only when master teachers joined the forum, and preservice teachers were required to make weekly postings to the forum, did the participation rates and quality increase. Indeed, from beginning to end of the third project year, the length, depth and quality of preservice teacher comments, reflections and questions to master teachers increased substantially. The public and professional nature of the electronic forum, as well as preservice teachers' experience with the tool and their own emerging identities as teachers, may explain the marked improvement in the dialogue over time.

Conclusions

The Looking Into Classrooms model has demonstrated substantial viability as a complement to more traditional methods for providing preservice teachers with opportunities to observe master teachers at work. The main reason for developing a technology-mediated classroom observation model was to expand the range and quality of classrooms and teaching styles preservice teachers could observe, and to provide the opportunity for dialogue about teaching with master teachers; the project achieved these goals. It also achieved a number of other outcomes that were not anticipated in the original study design, but emerged in the course of project implementation.

Some of the unanticipated outcomes had positive impact on the project. For example, the need for preservice teacher observation training that included demonstrations of what to look at in classrooms became apparent in the first year and led to development of the Beta version of the CD-ROM and eventually to a purpose-shot CD linked to the national INTASC standards. The dramatic improvement in preservice teacher questioning and reflection skill as a result of the debrief experiences and electronic forum assignments suggests the power of group learning and public discourse on practice, learning principles worth extending into other educational arenas. The unexpected assumption by master teachers of an active, sustained mentoring role led to them being viewed by preservice teachers as the experts, not only in the classroom but also in the electronic forum. The uncustomary collaboration of university faculty in planning and viewing classes via two-way television meant that preservice teachers from a variety of disciplines and grade levels came together to watch and debrief classes in fields and levels outside their own. These "out-of-field" observations were reported by preservice teachers to be among the most powerful experiences in their preparation experience. At the school level, too, there were unlooked-for outcomes. The high school students being observed via two-way television found the experience exciting and important. Their teachers reported that the students always wanted to know "how they did" and what the preservice teachers thought of the class. If there were more time in both the high school and university schedule, conversations between the students and preservice teachers could prove very informative for both groups.

Not all outcomes, however, were positive. We were surprised to find how many university faculty were reluctant to give up scheduled class meetings to have their students participate in two-way observations. The logistics of planning two-way television observations in high schools, with their different and often changing schedules, was a constant challenge for the technical staff as well as project directors. Even when the schedules worked, the technology infrastructure in some communities and at the university was not always reliable. A promised cable connection to one high school did not materialize, the sale of another cable company resulted in an end of linkage between another community and the university, a snowstorm damaged the university microwave. Fortunately, rapidly evolving technologies made it possible to connect schools and university via ISDN lines using compressed video. While not originally considered a quality connection, the new versions of this equipment provide high quality audio and video signals without dependence on public access cable channels and all the complex politics that accompany use of these services.

We have learned a host of lessons about school-college collaborative projects, about distance learning technologies, and teacher education in the course of directing what became a four-year program linking eight school districts to a university. Our advice to people who might replicate this project, or undertake a similar one, is to use the simplest and least expensive technology available, a feasible approach given advances in the Internet and bandwidth size; to involve school people in the planning and guidance of the project from the outset, especially onsite technicians who understand the infrastructure of the different buildings in their school districts; to expect higher education faculty resistance to any instructional methodology different from their prevailing practice, and to create powerful motivators to get faculty onboard; to be flexible in project implementation so as to accommodate unforeseen challenges and opportunities; and to talk to other people doing similar projects at other institutions for ideas about solving problems common or endemic to the work. Finally, we would caution project replicators about the complexity of creating high quality CD-ROMS. Both pre and post production efforts are far more complicated than we had envisioned based on our Beta CD and may be better done by a professional organization than an in-house. staff. These cautions notwithstanding, we would also strongly encourage others to undertake school-university collaborative projects to support preservice and inservice teacher development using technology. The common cause of preparing the next generation of teachers and the challenge of using technology to do so created a powerful, sustained partnership between schools and universities that continues beyond the funding period and has become an integral part of teacher education at the originating university.

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Tour, Think, and Tell: A Video Conference Virtual Field Trip

Lois Christensen, University Of Alabama At Birmingham, US
Diane Tindol, Avondale Elementary School, US
Jiang Lan, University Of Alabama At Birmingham, US
Betty Nelson, University Of Alabama At Birmingham, US
Jeff Anderson, University Of Alabama At Birmingham, US
Carla Kelly, University Of Alabama At Birmingham, US
Tim Clemons, Birmingham City Schools, US
Lisa Chambers, University Of Alabama At Birmingham, US

Objectives:

Conferees attending this session about a video conference will discover how:

1. Urban schools with limited funding and resources can present otherwise unattainable learning experiences for underprivileged students.
2. To maximize school/university and PT3 partnering and learning through video conferencing.
3. To involve elementary students, preservice and inservice teachers, PT3 teacher educators, and technical assistants to collaboratively provide authentic, virtual classroom learning.
4. To collaboratively work together across educative roles to technologically prepare and implement meaningful learning opportunities for learners at multiple levels.

Presentation Outline and Format:

Beginning this presentation, the technology coordinator and a PT3 inservice participant at the urban elementary school will detail how a video conferencing project moved from idea to actuality. Each representative involved in the grant activity, the technology support director, and the school/university partnership liaison, will describe their role in making the video conference a reality for the third grade students and preservice teachers on site at the urban school and at the secondary university site. Digital photos and video clips inserted into the PowerPoint™ presentation highlight aspects of the descriptive portion of the project and image the realms involved in this collaborative technological effort. The project offered urban students an opportunity that most have not had, that is to virtually travel to the Tennessee Aquarium as a culminating activity to classroom study. Additionally, it provided elementary preservice teachers with a first hand, technological experience that made virtual resources available to field settings with limited resources. Educators at varied levels collaborated in partnership and modeled effective education. The third grade students accomplished literacy standards outlined by the ISTE, especially standards 6 & 7 for grades 3 –5. The performance indicators for teachers were met in this project. The ISTE professional performance profile was met by preservice teacher involvement. The format for this presentation is a panel, with interactive discussion. Questions and answers will be encouraged.

Research Implications

Because the teaching force will change dramatically over the next decade, and the fact that the nation's schools will need to hire 2.5 million teachers over the next 10 years (Hussar, 1999), provides an unequaled opportunity to transform the quality of teachers serving our nation's schools. Researchers' work led to clear conclusions. Teachers exert a powerful influence on the academic performance of students, and some teachers are consistently more effective than others. The success of teacher education programs ultimately will be judged by how well the K-12 students of our graduates perform. Furthermore, we recognize that to prepare students for success in careers and life within a technologically advanced society, teachers and higher education faculty must be able to model and reinforce effective use of available technology through teacher preparation: disciplinary knowledge, pedagogical practice, and clinical experience.

Technology implementation during teacher preparation is a predictor of whether preservice teachers use technology as inservice teachers. Unfortunately, most do not use it during field experiences, nor do they apprentice with teachers who do (ISTE, 1999). It is our commitment to establish sound pedagogical practice in effective learning environments to better educate youth, while providing model technological conditions for involved educators at every level (Wiseman, Cooner, & Knight, 1999). Tracing Virtual Travel: Touring, Thinking, and Telling about Video Conferencing, our presentation, is a component of a PT3 grant funded by the U.S. Department of Education. By this activity, we prepare teacher/leaders through infusing technology into curriculum with the collaborative mentorship of inservice and teacher education faculty in clinical and university settings. This presentation features quality, educative, technology methods from a PT3 mentorship initiative. Conferees will see, hear, and discuss a project in which third grade students in an urban school/university partnership learn about animals/insects at the aquarium through a video conference session which was also viewed on the university campus by preservice teachers not yet placed in field settings.

The presenters' qualifications range from technology coordinator/teacher in the elementary school, associate and assistant professors in teacher education, and a technical support director within the school of education.

Video Conferencing as a Tool to Link Colleges of Education with K-12 Schools: A P3T3 Project Initiative

James D. Lehman
Purdue University
1442 Liberal Arts and Education Building
West Lafayette, IN 47907-1442
lehman@purdue.edu

Rabih Razzouk
Purdue University
1442 Liberal Arts and Education Building
West Lafayette, IN 47907-1442
razzouk@purdue.edu

Abstract: Distance education technologies offer capabilities that can be used to enhance teacher preparation while addressing technology integration issues in teacher preparation programs. Video conferencing allows pre-service teachers to observe and interact with K-12 classrooms at a distance. This can provide needed access to diverse student populations and examples of exemplary technology use that may not be available in nearby schools. As one part of P3T3: Purdue Program for Preparing Tomorrow's Teachers to use Technology, two-way video conferencing is being used to link college students and classrooms with K-12 students and classrooms. Particularly promising are new IP-based videoconferencing systems, which support high quality video conferencing over the Internet. Initial experiments in the use of this technology suggest that it provides a viable alternative for some types of student observations and interactions with K-12 teachers and students that typically occur through traditional field placements. Advantages include support for directed observations, linkages with diverse settings, and integration of technology. Limitations include issues with school firewalls, classroom audio, and the fact that these are not true field experiences.

Introduction

Distance education technologies can be used to enhance teacher preparation while addressing technology integration issues. Future teachers can use distance education technologies to observe and interact with K-12 classrooms from afar. Experiments involving the use of closed-circuit video technologies to link colleges of education with K-12 classrooms date back many years (e.g., Abel, 1960). In the 1980s, Iowa State University's Teachers on Television project used microwave-based video connections to link the campus with multiple public school classrooms and teachers. Project results showed that the observation skills of pre-service elementary teachers could be improved through training involving the use of these video connections to classrooms (Hoy & Merkley, 1989). However, these older video technologies were expensive and difficult to set up and maintain. Today's video conferencing technologies offer a flexible and cost-effective option.

P3T3 Project Video Conferencing

Many colleges of education face difficulties placing students in field situations that provide for needed experiences such as access to diverse student populations and examples of exemplary technology use. This problem is particularly acute for Purdue University, which is not located near a major metropolitan center. As one part of its P3T3: Purdue Program for Preparing Tomorrow's Teachers to use Technology project, two-way video conferencing is being used to link Purdue students and classrooms with K-12 students and classrooms. Particularly promising are new IP-based videoconferencing systems, which support high quality video conferencing over the Internet. These newer technologies are more flexible and less expensive than preceding video technologies.

We use equipment from Polycom (http://www.polycom.com), which makes room-to-room as well as computer-based desktop video conferencing units. Viewstation SP or Viewstation FX units are used for room-to-room conferecning. The Viewstation SP connects two sites at data rates up to 768 Kbps. The Polycom Viewstation FX is a high-end room-to-room unit that has a built in a Multiple Control Unit (MCU), a device that bridges together multiple inputs so that up to four sites can participate in a video conference. Computer-based desktop video conferencing is done with Polycom's ViaVideo, which offers video and audio of high quality at connection speeds of up to 384 Kbps. ViaVideo, which is available for Windows-based PCs, supports file sharing, whiteboard, chat, and file transfer along with video conferencing.

A year-and-a-half experience with IP-based video conferencing technology suggests that it provides a viable alternative to traditional field placements for some types of student observations and for interactions with K-12 teachers and student. The technology offers several advantages. (1) Beginning pre-service teachers are poor classroom observers. Using video conferencing, pre-service teachers can make observations under the direction of a faculty member and so improve their observational skills. (2) Students cannot observe a full range of school settings in close proximity to the college campus. This technology supports linkages with schools at remote sites that can provide access to diversity, technology use, etc. (3) The technology is relatively inexpensive, easy to use, and flexible. Because it requires only a fast Internet connection, it can reach places that other technologies cannot easily reach.

However, as with any new technology, there are also shortcomings. (1) IP-based video conferencing equipment requires access through the school's Internet firewall. School technicians must make the necessary arrangements, which can be time-consuming and difficult if the school's technical support staff is not fully knowledgeable about firewalls. (2) Video conferencing over the Internet requires high bandwidth (typically 128 Kbps or better) to insure a stable connection of acceptable quality. Network traffic can lead to degradation or even interruption of the connection. (3) This is a new way of communicating for most people. Participants have to take time in the beginning to get used to the technology and become comfortable in using it. (4) Audio problems can limit observations and interactions. Typical classroom noise makes it difficult for pre-service teachers to listen to particular conversations in a busy classroom. This is not usually a technical problem per se, but it can cause problems. For more information, visit our website at: http://p3t3.soe.purdue.edu.

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In Their Own Words: Pre-service Teachers' Perceptions of ICT Integration

Petrea Redmond
Department of Education, University of Southern Queensland, Australia, redmond@usq.edu.au

Peter Albion
Department of Curriculum and Instruction, Purdue University, USA, palbion@purdue.edu

Abstract: Pre-service teachers participated in an online discussion that included a guest who facilitated conversation about integration of ICTs. Students mostly agreed that integration of ICTs was desirable but differed in their views about specific practices. They demonstrated awareness of the challenges facing teachers and schools in integrating ICTs but appeared to have had little personal experience of ICT integration during field experience.

Prologue

One of us is old enough to have taught in the 1970s, when the other was a child in primary school and the place of information and communication technologies (ICTs) in education was very different from today. The terminology of ICTs had not been invented; hand-held four-function calculators were new technology; and a few pioneers were beginning to use computers in schools. Where computers figured in the curriculum, they were objects of study in "computer awareness" or "computer literacy". Most often these topics were the province of teachers of mathematics or science and they frequently involved consideration of binary notation, boolean algebra, half- and full-adder circuits and programming in BASIC. In the late 1980s, there was an expansion of ICTs from mathematics into business education with a focus on teaching skills for generic software such as word processors and spreadsheets in an office environment. The focus throughout those decades was on teaching *about* computers.

Now, over 25 years later, personal computers have been available long enough that one of us has an adult daughter who cannot remember home without computers. Personal computers are common and easy enough to use that his grandchildren regard email as a basic form of communication with extended family and one grandson had digested his knowledge of dinosaurs, gained largely from independent use of CD-ROMs, into a personal web site before beginning school. The other of us has owned a computer since the beginning of her teaching career and her son, considers the use of an eyeball camera and computer as a normal method of communicating with his godfather who lives 1500 kilometers away. Our grandchildren and children consider technology as part of their every day life. For them, ICTs are thoroughly integrated. Our task is to prepare teachers to integrated ICTs in their teaching.

Context

Recent Australian reports have referred to the "information economy", the "knowledge society" (DETYA, 2000) or "knowledge nation" (Jones, 2001). Regardless of terminology, it is clear that the impact of ICTs requires changed approaches to education. It is no longer sufficient, or even, perhaps, necessary to teach *about* computers as in the 1970s. It is necessary to teach *with* and *through* ICTs to prepare students for life in a rapidly changing world.

Queensland policy on computers in education began in 1983 (Galligan, Buchanan, & Muller, 1999). Its focus was on computer awareness, basic skills, computer assisted learning and vocational programs. In 1991 the effect of rapid technological change on learning and teaching was identified as one of eleven key issues for Queensland education and the integration of information technology for learning and teaching was listed as one of four goals for schooling (Queensland Department of Education, 1991). In 1994 a revised policy document, emphasized the use of computers to support learning across the curriculum at all year levels, while still acknowledging the importance of computer skills for future employment (Queensland Department of Education, 1994). *Schooling 2001* (Education Queensland, 1998b) set system-wide targets to be achieved by 2001. These included the provision of one computer for every 7.5 students, the connection of every classroom to the Internet, and the use of computers "in all key learning areas, P-

12". Minimum standards for teachers in the use of learning technology were set (Education Queensland, 1998a). More recently the *New Basics* project has shifted the focus to the application of ICTs within *rich tasks*, which span multiple curriculum areas. Examples include the construction of multimedia profiles and web pages by children in their third year of schooling (Education Queensland, 2000).

Australian education has two goals for ICTs in education (Toomey, 2001). They are that students leave school as "confident, creative and productive users of new technologies" and that schools integrate ICTs to "improve teaching and learning". These same themes have emerged through the development of Queensland policy. As ICTs become more deeply embedded in society, the focus on teaching ICT skills as distinct from the use of ICTs for teaching and learning blurs and the two goals merge. Although teacher education programs will need to adapt to these changes, there is, as yet, no mandatory requirement for teacher preparation programs in Queensland to ensure that graduates meet the minimum standards in learning technology nor even to address the issues of technology integration. However, most programs have responded. A previous paper described some approaches being adopted at the University of Southern Queensland (Albion, 2000) including modeling of ICT integration within classes and the design of a course (85045) focused on preparing graduates to meet the minimum standards and to integrate ICTs. This study was situated within that course which is described in more detail elsewhere (Redmond, 2002).

Method

Both authors and a colleague taught in the 85045 course in first semester of 2001. In the belief that computer mediated communication (CMC) was an important tool for teachers and that there was value in learning through practical experience, students were required to complete minor group projects using CMC in the form of mailing lists and newsgroups. The activities provided a context for CMC experience but, given that the tasks could have been completed in face to face meetings, were somewhat contrived. In reviewing the course, a less contrived CMC activity was sought. Previous studies have demonstrated the value of an "online guest" in providing a "focus for dialogue" and directing conversation (Williams & Bowes, 2000). It was thought that an online guest would provide purposeful focus for the CMC activities in the 85045 course and be less contrived than the original activity.

In second semester of 2001 one of us (Albion) was working in the USA. This provided an opportunity to engage students from the 85045 course in a CMC activity involving a member of the course team as an online guest. The proposed activity would allow the absent team member to maintain contact with the course and enable students to experience, by modeling, a teaching approach which might be applied in their own future classes. Experience with students in previous offers of the 85045 course had suggested that many found difficulty in grasping important concepts associated with integration of ICTs into teaching and learning. Hence integration of ICTs into teaching and learning was selected as the topic of discussion with the online guest. As it happened the "guest" was concurrently teaching two sections of a course discussing technology integration with teacher education students in the USA.

To allow time for introductory work, the activity was scheduled for a block of six weeks in the middle of the course which, allowing for a two week recess, corresponded to four weeks of scheduled classes. The activity was announced early in the semester when the classes were introduced to the use of CMC. Because students in this group had some prior experience of electronic mail including listservs and personal mailing lists, a newsgroup was selected as the CMC venue for this activity in order to provide students with experience of threaded discussion. The newsgroup was created two weeks prior to the date set for introduction of the guest who was to join the group on Monday, September 7. The first author posted a message introducing the guest four days prior to the scheduled start of the activity. By that time one student had already posted an anticipatory message and three others did so before the guest made his first posting.

Results

Figure 1 shows the distribution of postings over time. The recess is visible as a period of reduced activity. Most postings occurred on days when classes met in computer laboratories and tutors were able to prompt activity.

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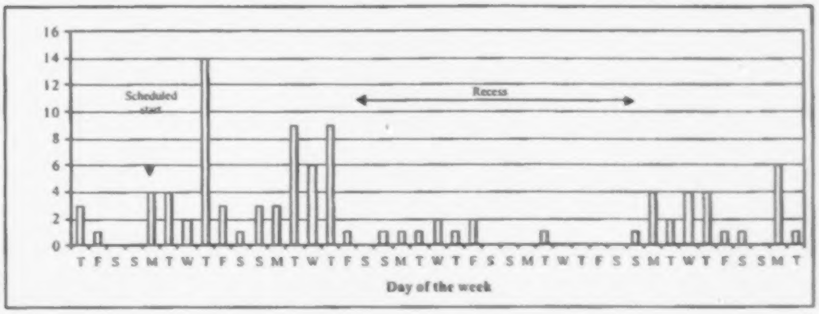

Figure 1: Distribution of postings over time

Table 1 provides the distribution of frequency of posting by individual students. Most students posted just once and relatively few posted more than twice. Several of those who posted twice appeared to have done so in error, possibly because the repeated the process when their first attempt was not immediately visible in the list of messages. Assessment credit was available for posting, so many of those who posted once did so for that reason although their posts were typically no less relevant than those of the more frequent correspondents.

Number of postings	0	1	2	3	4	5
Frequency (N = 80)	24	41	10	3	1	1

Table 1: Distribution of postings among students

In his introductory posting the guest commented on the value of having a sense of direction in daily life and invited students to comment on the need for teachers in a school to have a common understanding or sense of direction in regard to ICT integration. Students were also invited to explain why they thought a common view was or was not necessary. The first responses tended to agree that some common view was necessary although it was not long before ambivalent and contrary opinions surfaced. The earliest responses suggested that the common view:

> *"should be couched in plain language, simple, ... that can accommodate people from disparate backgrounds"*
> *"serves as a direction for how the school functions with technology, (having different understandings) may result in conflict among teachers"*.

Most students agreed with the proposition that a common view was desirable. Their reasons for thinking so varied:

> *"(communication among teachers is possible) only ... if all parties are coming from the 'common view'"*
> *"(a mutual decision is needed) about the importance of children learning, understanding and interacting with technology in the classroom."*
> *"If teachers don't know what they are talking about, or have a different understanding of what technology integration is, then the students we are teaching will be even more confused than they already are."*
> *"so that students don't miss out regardless of a teachers perception of information technology"*
> *"in order to benefit children's learning and also to share a common school goal and understanding"*

Some thought that an effort to develop a coherent shared view of technology integration might be doomed to failure:

> *"How can you possibly get a bunch of diverse adults with different ideas on what technology should be used, then get them to agree on what technology integration means? I foresee a turbulent time. ☹"*
> *"Since there are so many divergent views on what education is, and how it should be approached, I doubt that teachers will ever agree on what technology integration is and how it should be approached"*
> *'I think it would be very difficult for all teachers to agree on technology integration within classrooms. For one, the broad range of abilities of teachers gives a large range in classrooms with regards to the amount of technology being integrated."*

There were others who expressed ambivalence or, perhaps, an appreciation of the complexity of the issue:

> *"... do they need to have a common view? Well... yes and no. Yes they do need to have a basic understanding or platform, but every teacher will interpret technology integration as appropriate for their curriculum area*

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> *and age group. It will be different and so it should be. Teachers are individuals with varying abilities, experiences and personalities. Their approach to technology integration will reflect this. If teachers integrated technology in the same way for all subjects, what a boring place!"*
>
> *"Common views improve communication and make the use of time more efficient. They can however exclude new ideas or perceptions which could make education an easier more productive experience"*
>
> *"The common understanding is important as this will provide continuity throughout the grades and between classes. However some diverse views may stimulate some discussion, critical reflection and evaluation that makes the curriculum integration plan better. Thus I think it is important to have a common understanding but one that is open to discussion and change"*

Although few threads developed beyond two levels – message and response – it was evident from the references to other postings, mostly agreement, that students were actively reading the postings. At the end of the first week it was one of the mature age students who anticipated the guest's intention by writing

> *"Most agree that Yes most teachers should have a common understanding of Technology Integration. But most also agree that the task may be quite impossible with the current abilities of teachers ... (for this discussion) we should at least have a common understanding of the meaning ... I would like everyone to give their definition.'*

Acknowledging this response, at the beginning of the second week the guest briefly summarized the postings to that point, expressed an interest in having students define "technology integration" and drew some parallels between ICTs and literacy education. He then invited responses to two new questions. The first was to provide a definition and the second to make a comparison between the position of ICTs in education and that of basic literacy or reading and writing. Some students appeared to agree that there were parallels and developed the idea further:

> *" 'integrating technology' into the classroom is about being able to use technology as a tool in the classroom to enhance learning, just like any other tools such as books ... Books opened up the world to people from the time of the first printing press ... just as technology of another sort, computers, can open up the world for people. As always though, equity is a problem"*
>
> *"If you regard IT as a Literacy, just as English is, then it obviously needs to be deeply integrated into school activities, as well as being explicitly taught. But don't mathematicians and scientists (for example) also believe that mathematical and scientific thinking should permeate all areas? Don't you think it could get a bit top heavy if all learning areas are regarded as a dominant discourse?"*
>
> *"When I think about the concept, I see it as a teaching tool - a way of teaching the skills and knowledges within the (curriculum). It seems to be closer to ... principles of teaching and learning, than a specific subject area ... The problem is that IT as a 'subject area' within schools is not the same as 'IT integration' across the curriculum - a bit like the difference between teaching literacy as a specific subject, and using literacy techniques within teaching of other subjects ... while individual teachers may hold a common understanding of exactly what that is, the way they use it within the classroom is going to be different"*

As early as the second day of discussion there had been comments about resources and teacher preparation for ICT integration. One student had commented that some teachers are "*dead scared of computers*" and "*ignorant of the ways they can be used*". He called for additional funding for resources and trained support personnel in schools and others offered similar comments. Continuing this line of practical comments, students wrote:

> *"... there are millions in this country (who are not computer literate) and many hundreds of millions who are struggling to become literate in any sense ... ICTs would have to be all pervasive for the need of another 'literacy', that is when all of us have access to these technologies all of the time ... in a typical high school classroom there isn't any access to these technologies!!!!!"*

As might be expected in a conversation of more than 50 voices, albeit each only briefly, many ideas were expressed in no particular sequence. Some students waited until the end of the activity to express their thoughts, which were as likely to be linked to the first postings as the later ones. Despite that there did appear to be some development in ideas as the conversation progressed although there were dissenting opinions even in the closing stages:

> *"I think there is too much emphasis on technology. Children cannot spell any more ... Even though I don't mind computers, children should not be exposed to them at such a young age. ... Why can't we teach younger to type on typewriters and then at a later stage - high school- put them on computers. I also had given an assignment ... one of the tasks was to write the assignment out by hand. A lot of children were complaining. What does this say about our emphasis on technology?"*

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> *"I too think there is to much emphasis on technology especially in primary schools. Within a high school computers become more important in the publication of assignments and important for future employment or university studies."*

During the second week of discussion, the guest had recounted an example of a teacher integrating ICTs and invited students to contribute their own examples. Few chose to do so, which was, perhaps, a reflection of the paucity of examples they had seen during field experiences. There were some comments in response to the invitation:

> *"I am quite concerned to say that I cannot think of a specific example!! This worries me a little. All I can say is that we are the new fresh faces going out to teach and we need to integrate technology into our lessons and provide variety."*
>
> *"I think it is quite unfortunate that we have so few positive experiences to contribute to the group of how to integrate technology into the classroom. ... I saw some examples where IT was used satisfactorily, such as researching assignments and preparing either the essay or the presentation, and some examples where the teacher stopped teaching and just expected the IT to do the job for her without effective monitoring."*
>
> *"From what I have seen out there the students know more than a lot of the teachers and have better facilities at home."*

Conclusions

Possibly without exception these pre-service teachers saw ICTs and their integration as important issues in their future careers as teachers. However, some seemed to experience some difficulty in articulating a view of what ICT integration might mean in practice and others appeared skeptical about what they saw as an emphasis on ICTs rather than the more traditional values of education. Both of these findings are perhaps related to the relative paucity of good examples of integration encountered during field experience. It is inevitably difficult for them to imagine how they might engage in behaviors for which they have few models. There is a clear need to continue developing university programs which model ICT integration and to develop stronger partnerships with schools where appropriate models are in practice.

There seemed to be a substantial level of awareness of the challenges faced by schools and teachers seeking to integrate ICTs. Among those referred to in the discussion were curriculum pressure, lack of ICT resources, inadequate technical support and a continuing need for teachers to receive appropriate professional development. As a group they appear to harbor few illusions about the challenges they will face after graduation.

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Helping Students Pass PRAXIS I

Karen Smith-Gratto, North Carolina A & T State University, US

North Carolina Agricultural and Technical State University and Winston-Salem State University were awarded an eLearning grant from the state of North Carolina to develop computer based resources for helping students prepare for PRAXIS Exams. The resource for the Elementary Education PRAXIS II was developed by a team of content experts and an instructional designer. The PRAXIS I was developed by the instructional designer.

First the general areas of the test were examined and the initial design broken down into the three major sections found on the test. These three major sections became the main menu which also informed students how long each portion of the test is and the type of items on the test. From the main menu students are linked to Reading, Writing, and Mathematics sections. These sections are further divided into submenus.

One submenu contains the basic areas that are addressed in Reading. This section is divided into a section that provides vocabulary-building tips, different ways to determine the meaning of unfamiliar words, and steps that can be used to help interpret passages and answer questions about those passages. In addition to the information contained in each of these sections, there are links to websites that address vocabulary development.

Another submenu deals with writing. There are three major areas represented on this menu: sentence correction; writing essays; and links to web sites that can be used to help improve writing skills. The sentence correction menu provides information about parts of speech, mechanics, homonyms, and sentence structure. The section on writing essays gives a basic procedure for writing an essay. The links to web sites include sites that explore and teach about a variety of writing related information such as, grammar and graphic organizers.

The last section of the resource deals with the areas of mathematics that are addressed on the PRAXIS I. The areas covered through information and links are whole numbers, exponents and square roots, order of operations, decimals, fractions, number theory, ratio and proportion, percents, probability, statistics, logic, permutations, scientific notation, equations, geometry, coordinate grids, formulas, graphs, and problem solving.

This study resource is not meant to initially teach or tutor students. The function is to provide an organized resource that students can access and use to review areas where they are experiencing difficulty. Students at North Carolina A & T State University are given practice tests and the areas of the test where they show weakness are identified. It is hoped that the study resource will help students review their weak areas and be better prepared to take the exam.

Improving Experiment Project Evaluation through Web-based Self- and Peer Assessment

Yao-Ting Sung Chen-Shan Lin
Department of Educational Psychology and Counseling
National Taiwan Normal University, Taiwan
sungtc@cc.ntnu.edu.tw
Chee-Lung Lee Kuo-En Chang
Department of Information and Computer Education
National Taiwan Normal University, Taiwan

Abstract: This study attempts to incorporate the Web technology into the self- and peer assessment procedure, and then to make it a part of the instruction activity. The results of this study indicate that the Web-based self- and peer assessing activities could be successfully incorporated into classroom instruction of experimental psychology. Moreover, the discussion among peers over their opinions and feelings about the observation and assessment results helps consensus-building among participants in evaluation and improves the objectiveness of their assessment.

Introduction

The study on learning in the last decade can be generally described as being dominated by the situative/interactive perspective (McCaslin & Hickey, 2001; Greeno, Collins & Resnick, 1996). The situative/interactive view of learning has not only created major impact on curriculum design and teaching methods in recent years (Palinscar, 1998), it has also greatly promoted the reform of learning assessment (Cizek, 1997; Gipps, 1999; Shepard, 2000). To sum up the opinions of the scholars advocating this new culture of learning, they share some common views on the new learning assessment: 1. Students should actively participate in the process of assessment. 2. The assessment should reflect the process and results of learning at the same time. 3. Assessment should be effectively combined with instruction. 4. The subject of evaluation should be extended from the cognitive aspect to cover the student's social interaction and practical participation in the community. 5. Increased attention to evaluation for high level thinking and complex operations.

In recent years, some classroom evaluation methods that conform to the new expectations for instructional assessment began to emerge. For example, self- and peer assessments are enjoying growing prestige. From the perspective of learning, these two evaluation methods are not only special in letting students actively participate in the evaluation. They also allow the students to reflect on the amount of their effort invested in the process by observing their own products, and to decide whether the standards they set are appropriate. This can be very beneficial for the students' self-monitoring and adjustment. Furthermore, self- and peer assessment can be combined with performance assessment and portfolio assessment. The combination may generate even better evaluation effects (Paris & Paris, 2001). Because they have those evaluative characteristics that conform to the new learning culture, quite a number of scholars have advocated the adoption of these methods as one of the effective methods of class evaluation (Boud, 1995; Falchikov & Goldfinch, 2000; Shepard, 2000).

The first objective of this study is to explore whether there is a decrease of over-marking or under-marking in self assessment results under the situation where self assessment and peer assessment are integrated. The second objective of this study is to explore the observation among group members on the scoring results and the discussion process. Is it possible to make the scoring behavior of team members more consistent, thus improving the inter-rater reliability? And is it possible to make the evaluation standards more consistent with those of the experts, thus decreasing the over-marking and under-marking in self- and peer assessment and improving the correctness of the results? As evaluation activities, self- and peer assessments are also fit to be embedded in the instruction activities as part of the instruction. The third objective of this study is to attempt to design self- and peer assessment activities based on the World Wide Web environment that are more suited for application in the instruction situation as the extension of class instruction activities. Meanwhile, we try to observe through computer records the changes in the evaluation behavior of self- and peer assessment under peer interaction.

Method

Participants: the participants in t his study are 34 sophomore students in the Experimental Psychology class.

Tools/materials:

Web-based Self- and Peer Assessment System: the tool used in this study is Web-based Self- and Peer Assessment System (Web-SPA), developed by the researchers. The system contains several modules: setting evaluation standards, observation of products, observation of evaluation results, discussion, self assessing, and peer assessing and is capable of synchronous and asynchronous assessment on the Web.

Evaluation scales for the experiment projects: Eight Likert five-point scales for evaluating the quality of experiment plans. The contents of the eight scales are the evaluation of the following aspects of the plan: theoretical basis, criticalness, innovativeness, logical coherence of thinking, and appropriate hypothesis verification method.

Experiment project: the five teams chose their own topic for the five projects before writing them down. The projects must contain the following elements: motives and objectives, literature review, research hypothesis and research method.

Procedure: In the first week of experiment evaluation, the groups uploaded their products to an assigned Website and made self-assessment according to the eight scales in class. After that, the participants may go online to conduct observation and peer assessment at the time of their choosing. Self-assessment can also be revised as the peer assessment proceeds. The participants may leave messages in the guest book on the Website. In the 110-minute class lecturing session in the second week, the following activities were performed in five stages: (1) reenacting the observation, peer assessment and self assessment activities. (2) the system compiled the results of the scores given to the groups by their own members, and showed them to the group members along with rankings and comments. Discussions were conducted within the groups, and re-scoring was allowed after the discussion. (3) The system compiled the scores and ranking of the groups by other groups, and the total ranking was made according to the scoring of the whole class. The participants were asked to conduct discussion on the merits and flaws of the works by their own group and those by other groups, the basis on which they scored (ranked) the groups as well as their degree of satisfaction with how other groups scored (ranked) the works by their group and other groups. (4) Each group then sends a representative to present oral report and defense of 5 to 8 minutes about the conclusions reached in the discussion in stage (3). (5) The teacher made comments for about ten minutes.

Results

This study collects the results of the self assessment before observing the projects of others, the first self- and peer assessment after the observation and before peer interaction, and the results of the last self- and peer assessment after peer interaction (reading the scoring results within and among groups and discussing the results). The average scores of each group (Table 1) are calculated by summing the scores in the eight five-point scales of group members (the scales 3, 6, and 8 are reverse marking), and then divided by scale number and the number of members in each group. Numbers closer to 1 means low score, and numbers closer to 5 means high score.

This study calculates the Kendall's coefficient of concordance (W) of the last assessment results by group members before the observation/discussion and the last assessment results after the observation/discussion (Table 2). The outcome shows that the Kendall's coefficient of concordance increases in all five groups when the materials for assessment include their own products. In groups 4 and 5, the results change from lack of significant consistency to significantly consistent (W changed from .342 and .101 to .491 and .355, respectively). When the rating data from one's own group are deleted from the assessment material, calculation is only done on the data of peer assessment. The results show that except for group 1, whose coefficient of concordance lowers slightly, all four other groups show the trend of increase. Groups 3 and 4 changed from lack of significant consistency to significantly consistent (W changed from .336 and .303 to .428 and .445, respectively). The results above indicate that through the sharing and discussion of assessment results with each other, the participants indeed managed to build better consensus about the substance of the products and gain better understanding of each other's viewpoint. As a consequence, the consistency of scoring behavior is improved.

It is certain that the process of sharing and discussion helps improve the consensus-building among group members, but would this kind of consensus lead to even more inflated (over-marked) or self-deprecating (under-marked) scoring, thus deviates from the expert scoring even more? Or would it make the results clearer and more correct, bringing them closer to the expert results? To clarify this problem, this study makes a comparison of the expert rating with the assessment data before the discussion and after the discussion. The Spearman's ? were calculated (Table 3). The result shows that except for groups 1 and 3, the Spearman's ? of the expert data and the data of all three other groups shows inclination of increase. Groups 2 and 4 changed from the opposite direction of the experts (? is -.20 and -.70 respectively) to the direction consistent with the experts (? is .80 and .30 respectively). The reason why the Spearman's ? for group 1 changed from positive value to negative is that the group started with a view quite consistent with the experts' before the discussion, but dramatically elevated the ranking of their group product to number one after the discussion. The excessive deviation from the expert assessment data changed the Spearman's ? from positive to negative value. We can see from the information above that the sharing of opinions about assessment and products through peer interaction not only helps to build the consensus among group members regarding the rating of products, it also helps to improve the correctness of their assessment to a certain degree, thus improving the criteria-relevant validity.

From the process of group discussion and concluding report, one can observe a participant's view of his own product, his criticism of the products of others, his response to other people's criticism in defending the substance and value of his product, and his decision-making process of whether to revise his ratings after reading the rating results of his own and other people's works. The discourse data help to give a clearer insight of the influence of peer interaction on self assessment and peer assessment.

This study finds that in the process of self- and peer assessment, the students can indeed have more direct application and discussion about the evaluations standards for experiment projects they have learned. They have more reflection and reexamination of their own products and other people's products. They have more direct feelings and response for the comments of others. This study also shows that using the World Wide Web to be a potential device for classroom instruction, the data of self- and peer assessment—such as the materials for evaluation (experiment projects) and the results of assessment—can be recorded and shared through the mechanisms of Web-based systems. Therefore, they can be conveniently used in real classroom instruction situations, making the combination of evaluation activities and instruction more feasible.

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A Comparison of Two Types of Electronic Communication in an Undergraduate Teacher Education Course.

Melissa A Thomeczek
School of Education
Indiana State University
esthome@isugw.indstate.edu

Abstract: In education, teachers face the dilemma of increasing job requirements and decreasing time available to students. This leaves faculty with a dilemma of how to be available to their students for questions and concerns as well as how to provide feedback to their students in a timely manner. This research study looks at the use of two different electronic discussion forums in an undergraduate teacher education course. The amount of student use and student attitude toward the two different types of communication are examined.

Purpose

The goal of this research study was to better understand the role computer-mediated communication (CMC) plays in the classroom. Two common types of CMC were selected for comparison. The first is communication through an organized email discussion group (often called a listserv), and the second is online discussion utilizing a web-based discussion group. This study examined if differences exist between email-based and web-based discussion groups as determined by: (1) total number of messages posted and (2) user attitude.

Introduction

Electronic communication may benefit the learner beyond traditional classroom communication. In a traditional classroom, when class time has ended, discussion ceases. However, with electronic communication, the conversation can continue. The instructor can pose questions or make comments on the discussion to further provoke the student's thought processes. CMC can also be used to increase participation. Zahn et. al. (1999) supported the use of electronic communication, stating that the engaging nature of computer technology enhances communication. Further support of electronic communication is offered by Garner and Gillingham (1999) who followed a high school literature teacher in California. The teacher encouraged his students to use the Internet to tell stories about themselves to age-mates in geographically dispersed classrooms. As one might expect, the "A" students were highly productive, but more importantly, the authors found that six of the students in the most productive group were labeled "at-risk". These students were failing, in danger of failing, disengaged in the classroom, or did not complete written assignments. This finding lends strong support to the idea that electronic communication can not only be used to communicate, but that it might also enhance communication by including those students who would not participate in traditional settings.

While research supports the learning benefit of CMC, a more practical consideration of using CMC is time constraint. With the increasing amount of content being placed on faculty and teacher education students (Handler & Strudler, 1997, ISTE, 2000, NCATE, 1999) the amount of material that needs to be covered cannot always be addressed in the available class time. The use of CMC in conjunction with a traditional classroom setting allows an instructor to introduce a subject or an idea briefly and then discuss the topic in detail outside of class time. Additionally, the instructor can provide guest speakers in an online discussion, which allows students to have access to experts in the field that may allow further student development. Students who utilize a type of CMC in conjunction with an education course are generally satisfied with the results (Johnson & Huff, 2000). Johnson and Huff also reported overall student satisfaction with the discussion group used in their study. The authors found that the use of the discussion group allowed the instructors a means to exchange information with the students and thereby preserve class time for instruction. As a result, the authors strongly recommended CMC as a tool for communication.

Methods

Thirty students from the Elementary and Early Childhood Education (ELED) 259 class at Indiana State University served as participants for the study. This class was selected due to the already existing requirement of electronic communication within the course and the willingness of the professor to involve her students in this research project. As a requirement of the class, students participated in both forms of communication. Students were required to participate in the electronic communication as a part of their course grade, but were given the option of not participating in the survey. Students were randomly assigned into two groups. One group communicated using the email discussion list for six weeks followed by web-based discussion board for six weeks while the second group did the reverse. Following each six-week segment, students completed the Messaging System Survey developed for this study. This survey contained 19 questions regarding user attitude toward CMC. Items were set up in a forced choice Likert-type rating system. The survey also contained demographic questions. Data was analyzed using a repeated measures t-test.

Findings

Results indicate that, when using an email based CMC ($M=3.18$, $SD=.36$), students had a significantly more positive attitude about CMC than when they were using a web based CMC ($M=2.57$, $SD=.29$), $t(29)=7.16$, $p<.001$. Results further indicate that students will post a significantly greater number of messages when using an email based CMC ($M=3.61$, $SD=2.84$) than when using a web-based CMC ($M=1.03$, $SD=.87$).

Conclusions

Based on the survey questions, it is clear that students found the email-based discussion to be more convenient, more organized, less time consuming, easier to sort through unwanted mail, and easier to read, respond to, and post messages. Students also indicated on the survey that they were more comfortable using the email based discussion forum. From this study, it is clear that a distinct difference exists between using email-based and web-based CMC. Students definitely have a preference when it comes to CMC and that preference results in more posted messages and a more positive attitude toward CMC. While there was a significant difference between the standard deviation of email-based and web-based CMC, with regard to number of messages posted, a repeated measures t-test is robust to violations of the assumptions when there is a large N.

The research has been unclear regarding if one method of communication is more beneficial than another and if a difference exists, what the contributing factors might be. Clearly, this study has identified that the functional differences between various types of communication, such as method of grouping messages or method of accessing messages, can cause preference of one type of CMC over another.

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The Collaboratory in Your Program

Bonnie Thurber, Northwestern University, US
Bob Davis, Northwestern University, US

Abstract:
Learn how to participate in the Collaboratory, a web-based environment educators use to build Internet collaborations, create and engaged learning projects, and communicate. Session participants will also view student contributions to the Collaboratory. Practitioners and future teachers use the Collaboratory to create collaborative classroom projects online.

The Collaboratory Project, http://collaboratory.nunet.net, is a Northwestern University initiative that provides consulting, training, technical support, and information services to K-12 teachers and their students who are interested in using Internet technologies to advance education.

The Collaboratory is an easy-to-use web-based collaborative environment that enables teachers to develop innovative curricular projects in a framework for engaged learning that is activity-based, linked to Illinois Learning Standards, and provides for assessment. It provides a supportive and secure environment that teachers use to meet their specific curricular needs. By removing technical barriers to accomplishing objectives and delivering services, the Collaboratory is making it possible for teachers to successfully carry out significant and meaningful educational activities.

Collaboratory Communication Services include messaging, conferencing, discussion forums, invitations, announcements, instant messaging, and calendars to support collaboration among teachers and students. Automatic alerts and notifications keep participants up-to-date about activities, new projects, and events. Search capabilities enable participants to easily find other people and projects.

Collaboratory Resources provide the scaffolding teachers use to develop innovative curricular projects. These resources include:

- THE CYBRARY, customized, curriculum-specific virtual libraries of Internet resources;
- MEDIASPACE, "electronic multimedia postcards" containing text, graphics, sound, and/or video are used to share projects and information;
- THE INTERNET BOOK CLUB, students share book reviews, compositions and poetry;

THE SURVEY STUDIO, online surveys, questionnaires, and data collection forms.

Prerequisite participant skills/knowledge required for Collaboratory participants include:

1. Participants must have Internet experience including using email and the internet/web.
2. Participants should have an Internet-connected computer access either in their classroom or sufficient access to their school's computer lab to support the project.

The Collaboratory in Your Classroom eCourse is a no cost online course for educators who want to use the Collaboratory to develop technology enriched, project based learning activities for their students that meet Illinois Learning Standards and Goals. Librarians, media specialists, and technology facilitators who are collaborating with classroom teachers attending the Collaboratory Online Class are encouraged to participate.

Examples of Teacher Created Projects in the Collaboratory

100 Ways to Count the Days (Grade K-2)

This project will provide first grade students with a variety of learning experiences related to counting to one hundred using traditional and technological resources to complete language arts and math activities.

A House Divided - The Election of 1860 (Grade 8)

Students will gather information and report on the presidential election of 1860 and its importance in American History. Their reports may be presented in many different mediums.

Air Quality Chicago (Grade 6-8)

You will investigate the history of environmental laws from 1938 to the present that pertain to air quality and propose new city/state legislation in hopes of curbing air pollution.

Costa Rica through "El Ojo de Agua" (Grade 9-12)

After having read the book "El Ojo de Agua" in class, the Spanish level III students of Warren Township High School will investigate and report on various cultural and geographical aspects of Costa Rica.

Creating A Butterfly Garden (Grade 3-5)

Students will research the butterflies of the Chicagoland region and find out what plants and other needs a garden would require to support a butterfly of their choosing.

Dinosaurs Part 1: Discovering (Grade K-2)

Imagine discovering the bones of a dinosaur that lived millions of years ago! You probably won't make that kind of discovery, but there are other ways of discovering wonderful things.

Kid- made Toys from Around the World(Grade K-6)

Join us as we celebrate children's creativity through the toys they make all over the world! In
this project, students will research, recycle, design, and explain a new toy.

Shape Up Third Grade Geometry (Grade 2-4)

Students will identify and describe plane and solid shapes by their attributes (number of sides, number of edges, corners/vertices).

Steps to Success (Creating Great Science Fair Projects) (Grade 7-8)

This project enables 7th-8th grade students at Jordan Community and Norwood Park Schools to create meaningful science fair projects.

Strike for Bread and Roses - Lawrence Textile Strike of 1912 (Grade 8)

Students will use the story "Strike for Three Loaves" to enhance the study of U.S. Labor History of the early 20th Century. The story involves the issues of labor unions, immigration, child labor, and strikes.

The Rise and Fall of the Aztec Empire (Grade 4-5)

Our 5th-grade students will research the Aztec Empire and create hands-on materials that depict the culture, history, economy and present-day aspects of the Aztec way of life.

Thermodynamics and Heat (Grade 7-12)

Students working in groups of two or three students, third student must me a member of another class, students will explore the concepts associated with heat. Topics to be included in this exploration are, gas laws, specific heat, calorimetry, heat transfer and, the laws of thermodynamics

WTHS Roadkill Study (Grade 7-12)

The Warren Township High School Roadkill Project involves the monitoring by 11th and 12th grade Environmental Science students of a one mile stretch of roadway for roadkills during several two week periods throughout the school year. Monitoring sessions will occur in the Fall, Winter, and Spring.

More specifics about several projects include:

- Shape Up with Third Grade Geometry (3rd grade)
  In the Shape Up with Third Grade Geometry project, teachers and students use the Cybrary to provide web-based math resources for students and teachers. Students learn about geometric shapes by looking at images other students have selected. They identify geometric shapes on their school playground, at the local zoo and in the nearby community. They post their information about shapes in MediaSpace, a place where participants share information through images, text, sounds, and short movies.

- Immigration Studies and Oral History
  In the Immigration Studies and Oral History fourth grade students from around the USA learn about each other by interviewing family members and using real time conferencing and messaging to exchange information about each other. They use a discussion forum to develop group poetry. Students use the Survey Studio to create surveys for collecting family facts and information about social happenings so they can better understand the cultures and customs of their ancestors. They use The Cybrary that their teachers created for Web research. As part of a culminating project, fourth graders recreate or create family shields and do presentations about what the art in the shields represents. The artwork is posted in the MediaSpace, a community for the sharing of information electronically.

- Creating a Butterfly Garden
  The Creating a Butterfly Garden project is designed to teach students about using the Internet, conducting research on the Internet, posting information on the Internet, and working in teams while planning a garden to attract local butterflies. They study these butterflies and post information about them on the Collaboratory to share with their peers. This shared information is in the form of poetry, short stories, pictures, text, sounds, and short movies.

Prerequisite participant skills/knowledge required for Collaboratory participants include:

3. Participants must have Internet experience including using email and the internet/web.
4. Participants should have an Internet-connected computer access either in their classroom or sufficient access to their school's computer lab to support the project.

About the lead presenter:
Bonnie Thurber has worked for The Collaboratory Project, Northwestern University for the past four years. At the Collaboratory she develops programs, facilitates workshops and presents sessions about using the Collaboratory to collaborate and integrate Internet technologies in to the Classroom to educators.

Collaboratory eCourses have been facilitated Winter 2001, Summer 2001, Fall 2001, and Winter 2002. Recent Collaboratory workshops and presentations include:

Presentation at Chicago Learning Technology Center's TLCF Grant Recipient Workshop, Fall 2001.Chicago, IL.

Presentation at World Conference for Computers in Education, Summer 2001.Copenhagen, DK.

The Collaboratory Project Networking Session for eCourse Participants, Northwestern University, Summer 2001. Northwestern University, Evanston, IL.

The Collaboratory Project's Symposium, Spring 2001. Northwestern University, Evanston, IL.

The Collaboratory Project Networking Day for eCourse Participants, Northwestern University, Winter 2001. Northwestern University, Evanston, IL.

TELECOMMUNICATIONS: SYSTEMS

SECTION EDITOR:

Gertrude (Trudy) Abramson, Nova Southeastern University

We are bringing the world to the classroom and the classroom to the world with the aid of computer networks, hardware and software. Educational telecommunications systems include one-way and interactive television, one-way and interactive video teleconferencing, computer-based learning, and most recently, interactive web-based learning. Almost all the papers in this section address web-based learning that has caused the explosion in distance education across all grades and around the globe. There are many papers within this annual that could have been included herein but the authors determined that their focus was not on the technology but on what was being accomplished with it. See, for example, the papers in Distance Education.

In order to achieve our collective goal of improved teaching and learning with technology, we require reliable, cost-effective, and secure telecommunications systems and services with access for all. In this new century, we are realizing the dream of computer as pencil (Papert, 1980) or ubiquitous computing (Weiser & Brown, 1997). The hot topic in hardware is wireless networks and in software, learning management systems.

Wireless Network Systems

Wireless telecommunications systems are beginning to establish themselves as the system of choice in higher and lower education. From the network administrator perspective, wireless networks eliminate the costs of cabling and wiring existing buildings and make it possible to add new users instantly (Charp, 2002). From the user perspective, the computer becomes as portable and ubiquitous as the cell phone and the ballpoint pen.

At the university level, major investments in campus-wide, wireless networks have been made by Cornell (http://wnl.ece.cornell.edu/) Carnegie Mellon (http://www.cmu.edu/computing/wireless/), and Tulane (http://www.tulane.edu/~tis/new_site/wireless/wireless_home.shtml). At the K-12 level, wireless networks are cropping up everywhere. Proxim, a wireless technology provider, (http://www.proxim.com/products/enterprise/solutions/k-12.html) offers case studies of school systems that have implemented wireless systems. Some of these schools are Hayt School in Chicago, IL, Edison Elementary in Alameda, CA, Baltimore (MD) County Public Schools, Campbell Union High School District in San Jose, CA, and Camp Hill School District in Harrisburg, PA.

In January, 2002, The Maine Department of Education signed a four-year, $37.2 million contract with Apple to supply the technology, training, and support to Maine's groundbreaking initiative that will equip all the State's 7th and 8th grade students and teachers with one-to-one access to wireless notebook computers and the Internet. The contract is believed to be the largest single purchase ever of personal educational technology (http://www.state.me.us/mlte/newsrelease1_7_02.htm). Closer to home, one of my doctoral students, Bruce Curry, is working with the implementation of wireless systems at St. Paul's Christian Academy in Nashville, TN (http://www.stpaulchristianacademy.org/ne/news/newsitem.asp?id=63).

Learning Management Systems (LMSs)

The need and desire to use telecommunications systems and services literally exploded. The number of schools and universities interested in getting aboard the Internet far exceeded the number of people able to create their own solutions. To accommodate the need, companies developed template programs into which teachers could upload their content and become distant educators. Some of the more popular providers are Blackboard (http://www.blackboard.com/), eCollege (http://ecollege.com/) and WebCT (http://webct.com). These systems are representatives of a class of software that provide learner tools and support tools. Some of the learner tools include web browsing, e-mail, bulletin boards, synchronous chat, white board and application sharing. Some of the support or teacher tools include course planning, managing and monitoring, presenting instruction and curriculum management. All providers work with higher and lower education.

Conclusion

Because ours is a conference of teacher educators, the papers in this section relate to applications of telecommunications systems and services. Each offers a unique perspective. If you are new to this area, read them all and investigate the links provided in this introduction.

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Using the Web to Provide Parent Progress Reports on Standards for All Students: Developing the System

Kevin M. Anderson, Ed.D.
Interim Assistant Superintendent of Instruction
Kenosha Unified School District
United States
kevander@kusd.edu

Cindy L. Anderson, Ph.D.
National College of Education
National-Louis University
United States
clanderson@wi.rr.com

Abstract: Reporting for students and parents of progress on academic standards is becoming a necessity in most school districts. Kenosha Unified School District is developing a comprehensive program to provide this for parents of students in both general and special education. A pilot project to use digital video with this system is being developed with plans to integrate selected videos into teacher education as training tools for future educators. This presentation will demonstrate the Kenosha system being developed and its pilot project for pre-service teachers.

Background

This presentation shares the progress made by the Kenosha Unified School District in southeastern Wisconsin to translate learning standards from theory into practice and to assess and report student achievement using these standards. Backed by a School Board mandate stating that "by fall 2003 all teachers will report out using standards and benchmarks", the district has been making plans to convert from a traditional report card format using single grades per subject each marking period. Statements from some teachers, such as " Glad I'm retiring by 2003", have made this a challenging process. Therefore, making informed, research-based decisions about daily assessment and methods of reporting student progress to parents will go a long way toward allaying the fears of teachers related to change in the traditional curricular process.

The Kenosha Unified School District began in 1995 to develop its own standards and benchmarks for academic content and lifelong learning in all grade levels PK-12. Teachers were actively involved throughout the entire process from development through Board adoption. Developed prior to the introduction of the Wisconsin State Standards, Kenosha's standards and benchmarks are based on the standards recommendations of numerous state and national organizations. When the Wisconsin Standards were released, the Kenosha standards and benchmarks were carefully aligned to ensure coverage of essential elements on the state assessments in grades 4, 8 and 10. With the addition of the Wisconsin State High School Graduation Test (HSGT), the alignment of the standards was extended through grade 12.

Following the production of notebook-based curriculum guides, the Kenosha Schools Department of Instruction contracted with the Technology and Information Educations Services (TIES) group of Roseville, Minnesota, to develop and electronic curriculum notebook using the *Filemaker Pro* database. While the design of the electronic notebook is not completely finished, the potential of using such an electronic version of the curriculum guide is readily visible to teachers and administrators. Current plans call for producing both a web version of the notebook and a CD-ROM copy for use by teachers without web access at school or home. As they design their lessons and units using the standards and benchmarks, teachers will be able to quickly refer to activities, vocabulary words, exemplary units, web links, and suggestions for teaching about the particular skill.

Then, they will be able to "drag and drop" information from the database into a lesson plan template and create their own customized plans. In addition, the electronic notebook is intended to provide video and audio clips of actual teaching lessons as models for teachers to follow. When the database is finally ready for use on the web, parents and students will also be able to access the district's standards at home to help with homework and to clarify class/course expectations.

Assessment and Reporting of Student Progress

A small group of middle school teachers began experimenting in 1999 with grading and reporting out to students and parents using a standards-based process. This pilot has now broadened to include all core academic subjects at the middle school level and to select elementary schools and high school departments. Teachers began piloting an electronic grade book for reporting on student success at the standards level during fall 2000. The district purchased *Easy Grade Pro* for all teachers in the district following a review of grading software. Previously some teachers had used software programs for grade reporting, but various limitations forced the district to look for a more complete reporting program. *Easy Grade Pro* met this need since it allows more fields for entry of data and a wider variety of options for innovative reporting. District teacher-consultants and classroom teachers have been testing the use of this grading program with the district's standards and have found it to be very good for current needs. Parents have also expressed satisfaction with the types of information now available to them at report card conferences. However, teachers are still using these reports as supplements to the traditional report card.

During the 2000-01 school year, teacher-consultants began visiting schools to present the overview of the reporting process to all teachers. They utilized a computer slide show, "The Show", to help teachers begin evaluating what is actually contained in the grades they award. Conversations have been sometimes heated as teachers redefine their philosophies of homework, late assignments, and what it means to reach a standard. Reliability and validity of grades have been discussed throughout the process to get teachers to talk with each other about common (and not so common!) grading practices in the district.

With this slowly growing shift in the thinking about grading, the Kenosha Schools have been working on developing a new grading policy that calls for a separation of the academic and non-academic grades. This shift in grading practice has drawn the most discussion at the district level due to the fact that teachers want to include "penalties" for late work that impact the final grade. The district is trying to move away from this practice so that the academic grade actually reflects what a student has learned and not how well he or she has pleased the instructor or met deadlines that may not appropriate for all students. In other words, the new reporting system is being developed to show what students know in relation to course standards rather than grades being given that don't always relate to course content. This grading policy change is still in the works and may face several revisions before finally being adopted.

Because of the size of the district (21,000 students and over 1,700 teachers), the Department of Instruction has faced its biggest challenge in affecting widespread change at a rapid pace. In an effort to bring all teachers on board at the same time concerning developing standards-based grading practices, the district is devoting its single district-wide in-service day this year to practicing how to set up a standards-based grade book. Similar in-services will follow during the 2002-03 school year to make sure that all teachers are ready to begin using the reporting system in fall 2003. Since the current district-wide computer network has not yet been set up for full web access of grades by parents, students, and teachers, training is being conducted on how to report to parents on a more limited basis at regularly scheduled conferences. The district is currently reviewing web-based software options, but funding will need to be planned for at least three years into the future to accomplish a switch in reporting systems. Current estimates of the cost to switch to a web-enabled system are running between $500,000 and $1,000,000.

Reporting Progress for All Students

The Individuals with Disabilities in Education Act of 1997 requires schools to provide progress reports to parents in a similar fashion to those of students without disabilities. However, often the activities of students with disabilities do not lend themselves to traditional evaluation methods. Standards-based reporting processes using electronic means enable teachers to vary their evaluation techniques depending on the needs of the students. Grade book software allows teachers to use multiple grading methods within the same class, while still maintaining the integrity of assessment.

The Kenosha Unified School District, in collaboration with National-Louis University, is undertaking a project to make such standards-based reporting a reality for all parents of the district. A pilot project is also underway to use the Internet to turn the district's Individualized Education Plans into electronic portfolios for students with disabilities. These electronic portfolios will feature parental progress reports identified by the appropriate standard and linked to the appropriate activity from the regular classroom standards report. In an effort to better demonstrate the progress of some students, digital videos will be used in the portfolio as a method for making these reports more meaningful to parents. A CD-ROM format for parents who do not have access to the Internet is being planned, as well as short videotapes for families without access to a computer.

With parental permission, selected videos of assistive technology being used to meet standards will be integrated into the National-Louis teacher education program. These videos will be used in general education technology courses to meet the requirement of the International Society for Technology in Education (ISTE) for students to become acquainted with technology used by students with disabilities. These videos can also be used to meet new requirements in special education teacher education programs found in the new Common Core requirements that include knowledge of assistive technology.

Summary

This presentation will provide a demonstration of the standards-based reporting program that is being developed for regular and special education students in the Kenosha Schools. Included will be examples of the electronic curriculum notebook, grading software, and plans for developing web-based reporting. This presentation will also demonstrate an example of the pilot portfolios being developed for students with disabilities.

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TITLE OF THE PAPER: COMPUTER AND NETWORK SECURITY

BY

ANU A. GOKHALE

PROFESSOR OF ELECTRONICS AND TELECOMMUNICATIONS

COORDINATOR, INDUSTRIAL COMPUTER SYSTEMS

DEPARTMENT OF TECHNOLOGY

ILLINOIS STATE UNIVERSITY

NORMAL, IL 61790

TEL: (309) 438-5576

FAX: 309-438-8626

E-MAIL: AAGOKHA@ILSTU.EDU

Introduction

With the introduction of open standards and communications over public networks, the need for automated tools for protecting information during transmission, as well as that stored on the computer, became evident. In an enterprise network, the idea that the security of the entire network is only as strong as its weakest part is termed the weakest-link axiom. Computer and network security can be defined as the protection of network-connected resources against unauthorized disclosure, modification, utilization, restriction, incapacitation, or destruction. The generic name of the collection of tools designed to protect stored data is computer security, while network security measures are needed to protect data during its transmission. Network security measures may be implemented at different layers of the OSI model. Security implies safety, including assurance of data integrity, freedom from unauthorized access, freedom from snooping or wiretapping, and freedom from disruption of service. This paper analyzes security threats, and outlines the development of appropriate security policy and measures.

Security Threats

Hundreds of thousands of systems are now connected to the Internet. There is no accurate way of measuring the threat that may be launched by an inimical agent. Security risks vary from uploading files with embedded malicious code onto a network to stealing information. Each time a company deploys a new Internet gateway, LAN, or distributed client/server system, it risks leaving another virtual window open for cyber-prowlers, disgruntled employees, or unethical competitors to work through. Security threats can be divided into two major categories: passive threats and active threats.

Passive threats involve monitoring the transmission data of an organization. The goal of the attacker is to obtain information that is being transmitted. These threats are difficult to detect because they do not involve alteration of the data so the emphasis in dealing with passive threats is on prevention rather than detection. Although they can be directed at communication resources (routers and lines), they generally perpetrate at the host level.

Active threats involve some modification of the data stream or the creation of a false stream. It is difficult to prevent active attacks because this would require physical protection of all communications facilities at all times. Instead, the goal is to detect active attacks, quickly recover from disruption or delays caused by the attacks, and possibly pursue legal action against the hackers, all of which have a deterrent effect and may contribute to prevention. These threats are most successful when directed to what could be the weakest link in the overall system, namely, at the host level.

Although the best solution for these threats is prevention, this goal is almost impossible to achieve. The next best approach is to do the following:

- Detect
- Purge
- Recover

Security Policy

Before an organization can enforce security, the organization must assess risks and develop an unambiguous policy regarding access to each element of information, the rules an individual must follow in disseminating information, and a statement of how the organization will react to violations. Establishing a security policy and educating employees is critical because humans are usually the most susceptible point in any security scheme.

Security Measures

Some of the basic security strategies that can be utilized to combat the threats include:

- Access control
- Encryption
- Authentication

The purpose of access control is to ensure that only authorized users have access to a particular system and/or specific resources, and modification of a particular portion of data is limited to authorized individuals and programs. The most effective way of securing the integrity of electronic data is by the use of encryption, which involves scrambling of data by use of a mathematical algorithm so that the scrambled information is undecipherable and meaningless. This can be done at various levels of the OSI model with software, hardware, or both.

Authentication methodologies include: one-way encryption to validate information transmitted, digital signatures that verify both the information sent and the sender, and digital certificates that are distributed by a Certification Authority (CA), to acknowledge the identity of the user.

Firewall

Firewall is a piece of hardware and software, a security device that allows limited access out of and into one's network from the Internet. It operates at the application layer, or at the network and transport layers of the protocol stack. In essence, it partitions an enterprise network into two areas, informally referred to as the inside and outside. Firewalls are classified into three main categories:

1. Packet filters
2. Application-level gateways
3. Proxy servers

Security Provisions in a VPN

VPNs share similar features at varying degrees of sophistication, cost, and ease of implementation. The main components integral to VPNs are: encryption, authentication, and tunneling protocols, where each one provides a different way of ensuring privacy. Combined, they complement and strengthen each other, enhancing the integrity of the transmission and ensuring security. A VPN has three main components:

- Security gateways
- Security policy servers
- Certification Authorities (CAs)

Summary

The manager of a network configures the network, monitors its status, reacts to failures and overloads, and plans intelligently for future growth. Security is of vital concern among both users and network mangers; it is indicative of a mindset that believes no system is completely unhackable. An ideal network management system is an intelligent self-learning system that learns what and where a problem can arise and tries to resolve it automatically; and at the same time alerts the network manager and calls attention to any special characteristics of the situation.

Finding Quality in Online Publications: Observations and Suggestions

Kendall Hartley
khartley@nevada.edu - http://teach.nevada.edu/
University of Nevada, Las Vegas

Abstract: The explosion of information via the World Wide Web has resulted in a large number of educational research related documents being easily available. Finding appropriate, quality materials has become difficult due to the volume of information available. This poster will review the advantages of online publications and provide suggestions as to how the educational research community can identify important works.

Tim Berners-Lee (2001) had a very simple objective when he developed a system for a *global hypertext space* at the European Particle Physics Laboratory. That objective was to enable the users to share a *common information space*. What is unclear is whether Berners-Lee had considered how unwieldy this space would become in such a short amount of time. Thus, while access is certainly much easier, the determination of what is *worth accessing* has become incredibly cumbersome.

Like the physical scientists at that laboratory, educational researchers are also interested in sharing important documents. (The use of documents is a bit of a misnomer since we are truly interested in information in any form, however, in the present state of educational research, the document, or paper, is the standard unit). Currently we share documents in an extremely cumbersome manner – via peer reviewed, hardcopy journals. The problems with this system of distribution are numerous (for a brief review see Glass, 1999) and the movement away from it towards a Web-based distribution system appears inevitable. As we move away, it is important that we recognize what the current system does well and attempt to retain those characteristics while also taking advantage of the new opportunities provided by electronic distribution. One thing that this system does well is to establish the important works in our field. What becomes considered an *important work* begins with acceptance into, of course, an *important journal*. Once in the important journal, it is read by the *important* scholars in the field represented by the journal. These scholars then refer to this important work in their subsequent articles. While on the surface this may seem a bit innocuous, it works quite well.

The key steps in the process outlined above include the peer-review and then the subsequent citation. As we move to the electronic distribution of our work, it is essential that we retain these characteristics in a meaningful, and possibly improved manner. The peer-review can easily be accomplished in a manner that is equivalent to, and possibly superior to, the way it has been done in the past. It may be improved because the distribution of review copies becomes much more efficient and thus more reviews are possible (Glass, 1999). The second component, the citations, can also be completed in a similar manner. It is this second component that, in the world of electronic publishing, can be taken to a much more sophisticated level. To explain why requires a brief digression into the world of Web search engines.

Most Web search engines depend upon matching terms provided by a user with terms found in the Web page (Sullivan, 2001). Simply matching the terms often results in a very large number of results. The search engine will then rank the results based upon some algorithm that looks at the frequency and location of the words in the Web page. The Web search company Google (www.google.com) has quickly become the leader in this field by using a very different, yet effective strategy based a system called *PageRank™* (Google, 2001):

PageRank relies on the uniquely democratic nature of the web by using its vast link structure as an indicator of an individual page's value. In essence, Google interprets a link from page A to page B as a vote, by page A, for page B. But, Google looks at more than the sheer volume of votes, or links a page receives; it also analyzes the page that casts the vote. Votes cast by pages that are themselves "important" weigh more heavily and help to make other pages "important." (p. 1)

An interesting comparison can be made between the PageRank™ system and the identification of important works in educational research. The Social Sciences Citation Index (SSCI) is a highly valued resource that provides (albeit indirect) some measure of the importance and quality of an article by listing the number of times an article is referenced by other articles in important journals.

The purpose of this poster session will be to present a Web-based tool that can be used to perform a similar function for online publications relevant to educational technology research.

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Designing, Implementing and Maintaining a Web Site: Issues and Technique Tips

Leping Liu
Assistant Professor of Instructional Technology
Towson University, U.S.A.
Email: lliu@towson.edu

Abstract: This paper will address a series of issues, problems and solutions, and useful technique tips in designing, implementing, and maintaining a college Web site. The author of this paper is the Web manager and has worked on every single task through the entire development processes of this college Web site. Generally, developing a Web site is all about information and technology—using technology to organize and display information in an appropriate way to meet the purposes of the Web site. This paper will also present some useful strategies dealing with Web design, such as the structure of the site, function of navigation and orientation, the control of page loading speed, use of graphics, screen structures, file management, information collection/selection and administrative problems that a Web manager may be confronted with. These experiences and technique issues/solutions could be useful for those who design or maintain an educational institution Web site, and those who are teaching web design courses.

Introduction

When a student is to decide which university he/she will apply for to continue his education toward an advanced degree, he needs to search for the information of programs, course settings, or application requirements and procedures from different universities. When a new graduate is about to accept a job offer from a school or company, she would like to find out more details about his/her future working environment. When faculty members develop a new course or program, they might need to review what has been done in this field. To obtain the information, obviously, the Web is the first information resource they would choose. In this digital age, people depend more and more on the Web for information related to almost any aspects in their life. The question is to what extent the Web sites could provide valid information people need, which is one of the most important issues addressed to the Web developers. This paper will, from a Web manager and developer's view, introduce the processes of redesigning an informative college Web site, and discuss a series of issues, problems and solutions, and useful technique tips in designing, implementing, and maintaining the site.

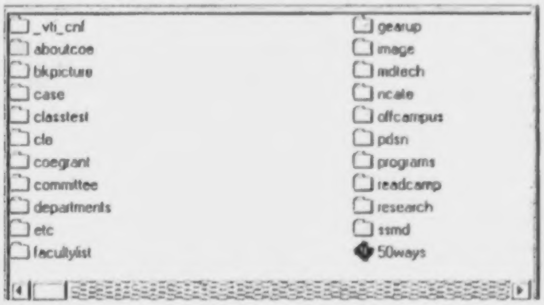
Purposes of the Site

The Web site introduced in this paper is the site of our College of Education. It had an old version that was developed years ago. The purposes of redesigning it were: First, we intended to use it to provide more information for students who want to apply for our programs, and for people who want to know more about our faculty, resources, technology facilities and so on. Second, we considered it an efficient way to show the mission/vision and the conceptual framework of the college, to show the strength of our programs, advantages of our resources. And the third purpose of redesigning the Web site was to establish a new and fresh image of the college for the NCATE evaluation, and to provide NCATE evaluators an easy path to find the information about the college (The Web site did play a useful and important role for our high scores in the NCATE evaluation).

According to these purposes, the development of the Web site, from the site structure to page/screen details, emphasized on two major principles: (1) valid and adequate information, and (2) clear and easy navigation, which are the basics to ensure an effective information resource.

Structure of the Site

After reviewed the purposes of the Web site, the next issue was to determine the structure of the information, and the structure of the Web. The structure of the information indicated the way to organize original information such as text files, data files, html files, graphic files, and other Web resources; this was an issue of file management. The information should be organized by category so that any future Web manager or current co-manager can easily find the files to edit or update. Therefore, the structure the information was redesigned in three fashions: (1) by administrative structure, that is, administrative divisions, departments, and centers; (2) by program, including all undergraduate, certificate, masters, the doctor programs; and (3) by faculty, including faculty contact information, courses taught, research areas, and publications. Figure 1 is an example of the file structure:



_vti_cnf
aboutcoe
bkpicture
case
classtest
cle
coegrant
committee
departments
etc
facultylist
gearup
image
mdtech
ncate
offcampus
pdsn
programs
readcamp
research
ssmd
50ways

Figure 1. File Structure of the Web Site

The structure of the Web was the way to navigate the information. The navigation should provide all possible paths to all information. One technique issue was how to merge the three structures smoothly into one site so that people could find information easily by departments, divisions, programs, courses, faculty, or other categories. Figure 2 shows an example of the Web structure, which is different from the file structure. Another technique issue was that during the redesign and restructuring process, we need to maintain certain consistence of the paths, file names, links from the old site, because they had been used for many external Web sites and quoted as references by instructors.

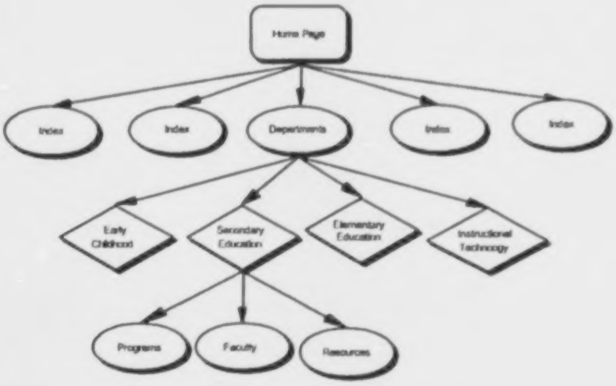


Figure 2. Example of Web Structure

During the redesign of the Web site, the author found out some useful and practical Web design tips, some which as introduced in the next section could be used as the solutions to these two structure design issues.

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Web Design Tips

Navigation and Orientation

In the design of site navigation and orientation, index page, navigation table, and site map were used. In the home page, buttons with links to different information categories were created – to administrative departments, programs, faculty and other categories. However, the links do not directly link to the specific page; they link to the second level pages – index pages. Index pages are the place where we put the links to specific pages that contain the information of the same category. For example, the "Departments" index page includes the links to the four departments in the college; from there, people can go to each department. The index pages should have the same style of screen designs. As in Figure 3, they have the same style of title design; people will easily see where they are.

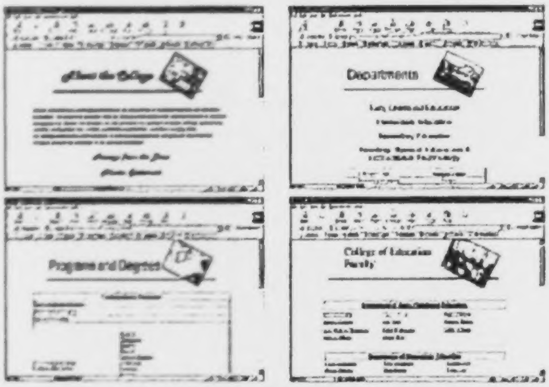
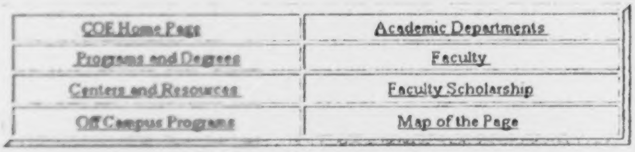


Figure 3. Examples of Index Pages

Then a navigation table (Figure 4) containing links to all the index pages were included in all the major pages within this Web site, which makes the easy paths to anywhere within the site. Also, a site map that navigates through the entire site is necessary and always helpful; it provides not only the links to all the major pages, but also the structure of the site. Index pages, navigation table and site map are three useful methods to merge information of different categories into the site and make the navigation clear and easy.



COE Home Page	Academic Departments
Programs and Degrees	Faculty
Centers and Resources	Faculty Scholarship
Off Campus Programs	Map of the Page

Figure 4. Navigation Table

When redesigning the Web site based on certain information from an old site, to certain extent, the old structure still needed to keep. Some folder names, even file names were used as they were. In this way, the URLs to certain important pages did not change, and meanwhile, we added a lot of new information. The index pages were used to organize the site structure, but the file structure kept as less changes as possible from the old site.

Page Screen Design

In the page screen design, to arrange the texts, graphics, buttons, or any other objects to certain position, traditionally, people use frames to separate the page into several areas and hold different objects. For example, title frame at the top of the page, side menu frame on the left or right side of the page, and the main frame to hold the major text or graphic – the three frames are three files when you create the page. One disadvantage of

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using frames is that, if the visitor wants to print out the page, he/she might just be able to print out the single frame (the single file) where the mouse pointer is on. One method that could produce the same or even better effects is to use table. We may create a table and set the boarder to zero, then set different colors as the background of the major cells. In this way, the table cells separate the screen into several areas, and all areas are still within one file. This will also make the file management work simple—one file for one page versus three or more files for one page.

Currently, pages on the WWW contain the information of the institution name and address, contact person, date of last updating and some other general information related to the site. Besides, one important thing is the URL for the current page, especially when the page provides information for visitors to download or print out. They need the URL as the reference resource for future use. Whether the page URL can be printed out automatically at the bottom or top of the page depends on the default set up of the browser software (Netscape or Explorer) on that particular computer. It may or may not automatically print out the URL. Therefore, when we complete one page, the last thing is to put the URL of that page at the end.

Every page should also include contact information, which can be E-mail link or contact firm. If using contact form, a clear path is needed to where the input information would be collected. The form input information could be sent to either the email address of the Web manager or the relevant administrator, or a server database.

Use of Images

Almost all the Web sites have images, pictures, or graphic designs. One issue of using images is the file size. One useful tip of using images and reducing image file size is that use one single image file instead of multiple files. For example, when you need to use a set of pictures, you group them all into one file. The file size of this grouped picture is much less than the sum of all single image file sizes. In Figure 5, the top picture is a grouped picture file with five pictures, and its file size is 20.1KB; the picture below is a single picture, and its file size is 12.8KB. Obviously, if we use five separate single pictures, the sum of the five files' sizes would be around 60KB. And, as we know, the smaller the file size, the faster it is loaded to the page.

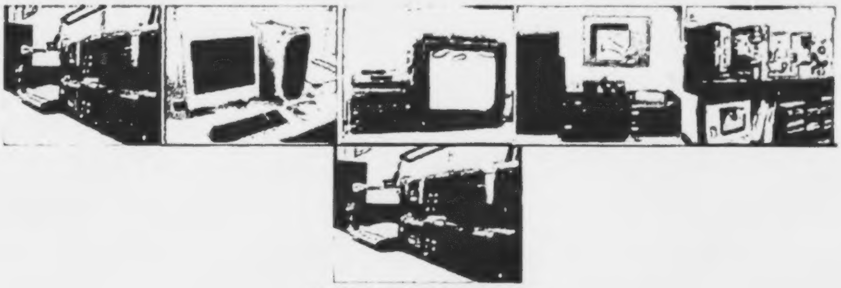

Figure 5. Image File Sizes

Using image is a major factor that influences the speed of the site. Especially, when using JavaScripting to load random images, display rotating images, or produce animations, the loading speed is very much slowed down. Sometimes, people use these new skills to create fancy effect, which does not always fit the purpose of the Web site. Therefore, images or special effects should be used only when necessary.

Another issue of putting images on the Web is the copyright issue; do we have the permission to use it? Especially, when we use real person's picture, or use the pictures found from the Web. Generally, we do not use pictures copied from other Web site into our pages. And we need to obtain written permission from the person to use his/her picture.

Download Option

If we have a document site, text based page, we may use hypertext to organize the sections, subtopics, or even paragraphs. But, remember that people may want to have the entire document (e.g., the course notes, or application requirements). Therefore, in a document site, we always provide a download option, or an option to print out the entire document in an easy and direct way, so that people do not have to print out them section by section, and if the site is non-linear hypertext, people may get lost in certain places.

To do this, first we create a link to the word file, and then upload the word file onto the Web. When people click on the link, the browser either launches the word processor for people to open and print the file, or provides an option to save the word file into the disk.

Tricks of File Name and Folder Name

There are some other technique tips that the author found useful and effective to enhance the quality of the site. When we work on the pages, one very basic step we may perform hundreds of times is to save the page file into certain folder, and FTP them to the Web. Sometimes, everything works perfectly on the local, but the links are dead after they are uploaded on the Web. One cause of this might be, very often, that when you create the files and folders, if you type the names in a upper-lower keys format, when they are FTPed to the Web, all the file names or folder names become all upper keys – that is, all capital. Sometime, if the file name or folder name consists of more than one word with space between, after they are FTPed to the Web, the space usually is interpreted as 20%. For example, if we use a file name "project one", it would be interpreted as "project20%one" after transferring to the Web. Therefore, the hyperlinks can never find the right folder and right file to link with. A simple way to avoid this is that we always use all-lower keys and one word for file names and folder names, with NO spaces in the names.

Strategies of Duplicating a File or a Site

There are several ways to duplicate a file such as "Save As", or copy. Our experiences suggest two best ways to do this: (1) use Windows Explorer to copy the file, and (2) use FTP to download it directly from the Web. The worst way is to use "Save As" (open a file and then save it as a new file in another folder) – this is very likely to change all original link paths on that page to local paths such as C:\foldername\..., when the link paths are uploaded to the Web, again, the hyperlinks can never find the right folders or right files to link with. Because there is NO such a path C:\ foldername\... on the Web.

Information Collection and Administrative Roles

The above sections introduced some very practical technique skills to create a Web site as an effective information resource. However, developing a Web site is about "information + technology" and the hard part is the information collection. A Web manager may not have the power to obtain any information effectively from the departments or faculty members. According to the author's experience, one efficient strategy is to work with the Dean and department chairs, and get all faculty involved. For example, when the author was working on the faculty pages that reflect faculty members' accomplishments, most faculty were very supportive and provided information for their short vita page.

Maintaining and Updating Work

After the Web site was published, the work of maintaining and updating the pages was an every-day work. A plan of updating the pages was developed and implemented for the academic year 2000-2001. Basically, the updating work was cooperated with program directors, administrative managers, and individual faculty members. Program information was updated by semester, and individual faculty page by academic year. Also, individuals were responsible for maintaining and updating the information linked from their pages.

This Web site http://www.towson.edu also was used as an example to demonstrate certain basic Web development skills to a "Web Based Instruction" course taught by the author. It is the author's hope that these experiences and technique issues/solutions could be useful for those who design or maintain an educational institution Web site, and those who are teaching web design courses.

PhoneChannel: Bridging the Digital Divide with Ubiquitous Technologies

Tammy McGraw, Ed.D.
The Institute for the Advancement of Emerging Technologies in Education
United States
mcgrawt@iaete.org

John Ross, Ph.D.
The Institute for the Advancement of Emerging Technologies in Education
United States
rossj@iaete.org

Abstract: The Institute for the Advancement of Emerging Technologies in Education (IAETE), in cooperation with AT&T Labs, completed a pilot study in Calloway County, Kentucky, to explore the use of ubiquitous technologies (i.e., telephones and televisions) to increase teacher-parent communication. PhoneChannel enables teachers to push visual information from a computer to a family's home television. Concurrently, the teacher and parent talk by telephone about the items displayed on the screen. This allows the teacher to communicate with underserved families who do not have access to a computer. The pilot study confirmed an increase in communication between school and home, and this unique application has breathed life into two common technologies now poised to become more powerful tools in education.

Many teachers have access to computers that can be used to communicate with parents, but parents without home computers cannot benefit. The Institute for the Advancement of Emerging Technologies in Education (IAETE) and AT&T Labs are using PhoneChannel to explore the use of ubiquitous technologies (i.e., telephones and televisions) to increase teacher-parent communication.

PhoneChannel is a new communication service that allows a teacher with Internet access to display visuals on a family's television while talking by telephone. For example, a teacher could call a parent, ask him or her to tune to channel 77 on the household television, and display a student's schedule, projects, or homework. The telephone provides a way to convey socio-emotional information in real time, thereby allowing attunements to establish trust. The television enables the sharing of visual information to establish common ground and increases trust by reducing uncertainty related to task-oriented information.

Originally studied in e-commerce environments (i.e., real estate and catalog shopping), PhoneChannel was recently pilot studied in a school setting. Calloway County, Kentucky, is a large, rural county in the southwest part of the state that has identified increased parental communication as a goal for improvement. Student households are widely distributed across the county, and distance is a significant barrier to successfully engaging parents in school meetings and conferences. In addition, 43 percent of students (10 percent more than the national average) live in a single parent household where involvement is typically minimal.

The pilot study utilized a teacher at each of two elementary schools, one of which is designated Title I. Each teacher used the PhoneChannel application to augment school-to-home communication while maintaining more traditional means, such as written notes, phone calls, and face-to-face meetings. The teachers recorded their school-to-home communications by type and frequency and rated perceived quality and effect.

Several factors encouraged the successful deployment of the PhoneChannel application in Calloway County. Preliminary surveys of target classrooms indicated that all student households had at least one television and all but one had telephone access. All classrooms in the two schools had telephone access, and teachers used computers in their classrooms on a daily basis for instruction, lesson preparation, student management, or communication. The PhoneChannel application required minimal new technology competencies beyond teachers' existing skills. Also beneficial was Calloway County's use of student portfolios, easily shared via PhoneChannel.

The Calloway County pilot was a key step in the evolution of a large-scale study in an educational setting. Moving the application from the laboratory to the field, it was important to negotiate and adapt to the realities of delivering secure information over a cable television infrastructure. The realities of cost models and proprietary system protocols were compounded through the need to transmit the PhoneChannel signal over two different cable companies. Representatives from Charter Communications and MediaComm in Calloway County worked with the researchers and developers to establish a working solution to transmit information originating outside the cable network to subscriber homes. Future delivery of PhoneChannel will owe a great deal to this pilot study, regardless of whether it is transmitted via cable television, broadband cable modems, the Internet, or satellite.

The pilot also helped to establish some user perspectives on the types of communication that are effective when using the PhoneChannel application. School personnel reported that if the Internet connection was reliable, the system was very easy to use. In fact, one school technology coordinator who was going to offer technical support during a session discovered that the teacher and parent were already using the system when she arrived. School personnel generally agreed that teachers could run the system on their own and could even use it from home computers.

While the original intent of the educational application was to share artifacts from an electronic portfolio, school personnel involved in the pilot offered several common school-related activities (e.g., discussing assignments, demonstrating progress, delivering reports, sharing discipline referrals, etc.) that could benefit from delivery via PhoneChannel. The District Technology Coordinator named three student populations in which PhoneChannel could make the greatest impact: night class, alternative school, and homebound. In the case of homebound students, teachers work one-on-one and spend much of their time on the road between homes. PhoneChannel could eliminate much of this travel time, which could be spent on instruction.

The greatest difficulty in terms of implementing the system was finding time to accommodate the call. While the physical system worked well, parents simply are not home during the school day when teachers are working, and the existing structure of the school day does not compensate teachers for working outside school hours. Several solutions were provided, including trying to schedule PhoneChannel conferences during teacher planning times, installing the system on teacher home computers or school laptops, and investigating novel scheduling practices. Some schools schedule half-day or part-day parent conference days, which still occur while parents are not commonly at home. In order to contact parents not available during that time, schools could consider giving teachers release time and teachers could log comparable time on the system at night. All use would be logged by the server and would be very easy to corroborate actual time spent.

During the trial, one feature of the system was discovered that had not been discussed earlier. Documents that were pushed to a home were stored in an archive. Home users could view these documents from their television at any time, regardless of whether they were involved in a session. The archive was accessible using the remote control from the set top box. This archive generated further suggestions for solving the difficulty of scheduling. Teachers could push items to the student archive during their planning period and discuss the items at a later time when the parents were home. Another option, parents could view the archived documents at night and discuss the documents with the teachers during the day by telephone only during a prearranged call, such as during the teacher's planning period. Use of the archive feature holds great potential for increasing the effectiveness of the PhoneChannel system and merits further investigation.

While the pilot study relied on cable dissemination, a variety of delivery modes are possible in subsequent applications—including wireless transmission. PhoneChannel also has opened the door to a variety of education-related activities that are not limited solely to traditional classroom support. Based on this preliminary study, it appears that service providers could use PhoneChannel to support adult and family literacy programs, ESL programs, distance-based and distributed learning and training, and services for disabled and underserved users. This unique application has breathed life into two common technologies now poised to become more powerful tools in education.

The Place of Internet-based Architectures in Supporting the Professional Practice of Teaching

Bronwyn Stuckey
Faculty of Education
University of Wollongong, Australia
bronwyn_stuckey@uow.edu.au

John Hedberg
Faculty of Education
University of Wollongong, Australia
john_hedberg@uow.edu.au

Lori Lockyer
Faculty of Education
University of Wollongong, Australia
lori_lockyer@uow.edu.au

Abstract
This paper describes the varied technologies and on-line architectures that serve to meet the needs of practicing classroom teachers and the ways in which they can meet those needs. The focus of the research is on teacher professional development and online technologies. The symbiosis between education reform and the integration of technology into learning is profound: technology requires the rich learning environments envisioned by reformers; reform demands the power of technology to put people at the centre of their own learning. (Serim, 1996, p.1) Having established that there is value in community development and its potential for ongoing professional support, it is important to examine the circumstances under which the community of practice could effectively go on-line. It is equally necessary to review all the Internet-based architectures and the strength of each in supporting classroom practice. This review and analysis of architectures will help to refine the concept of 'on-line community' and to shape and place value on all the current Internet architectures.

Supporting Classroom Practice

In-service teacher needs in relation to ICT can be summarised into relation to three main issues:

- Hardware and connectivity - support and maintenance
- Professional development - recognition and accreditation
- Equity of access to quality resources

As hardware and high speed connectivity becomes more readily available in classrooms, educators need to focus on the issues of support, ongoing professional development, recognition of ICT skills and leadership, accreditation for high level skill development, access to high quality resources and equity delivery formats and languages.

The National Foundation for the Improvement of Education report *Teachers Take Charge of Their Learning* (NFIE, 1996, p.1) asserts that; "*to improve student achievement, public schools must weave continuous learning for teachers into the fabric of the teaching job. This work can and should be initiated by the teaching profession itself in partnership with other educators, communities, districts, and states*". There is an imperative for new professional development strategies and for teachers themselves to take control of their personal professional development. For the past ten years it has been recognised that a 'culture of collegiality' is required. This can be achieved through an environment where teachers teach teachers in a supportive network of practice. (Little, 1993; Lieberman & Miller, 1991; Warren & Roseberry, 1992). There are no simple remedies, but it does seem understood that communication and collaboration are two of the keys.

Current Internet Architectures

It is important to clearly determine what are on-line communities, as Brown (1999, p.1) cautions "*Community is quite possibly the most over-used word in the Net industry. True community – the ability to connect with people who have similar interests – may well be the key to the digital world, but the term has been diluted and debased to describe even the most tenuous connections, the most minimal activity*".

Terms like *portal*, *hub*, *network* and *interest group* are all used interchangeably with the term *community* to describe involvement with Web site These structures or architectures are arguably distinctly different in what value they offer for on-line users. Kanfer et al (1997, p.1) offer a useful distinction between the ways that humans access information and support. *Traditionally, there are two different sources from which human beings access information: broadcast or mass media, and interpersonal communications.* Building on Kanfer's distinctions we can map current Internet architectures (Stuckey et al, 2001) and the levels and directions of possible interactions within those architectures. Table 1 maps these architectures and possible interactions against Kanfer's high-level divisions. All implementations of web architectures can be described as primarily broadcast or interpersonal.

Broadcast *One to many – central source to large audience* *uni-directional*		**Interpersonal** *One to one/ among people/ many to many* *bi-directional*		
Web site	**Portal**	**Network**	**Interest Group**	**Community**
Resources & Services-based		Communications & Relations-based		Collaboration-based

Table 1: Mapping Internet Architectures against broadcast and interpersonal delivery models

In order to build a deeper picture of the information contained in the map presented in Table 1, we need to examine in some detail each of these web architectures to define and distinguish each, to explore examples of each and to propose how each can meet the needs of professional teaching practice.

Web Site

A Web site can be defined as a compilation of pages created in programming codes such as HTML, DHTML, XML and ASP produced for display on the World Wide Web. The purpose of a web site is largely informational, promotional and/or marketing. The content can be static or dynamically delivered from a database and offer search options. There is usually neither membership nor access to others interested in this topic. Users who visit the site are usually passive consumers. Data might be trapped about users through cookies and visitor's books but this is data known only to the site developers. For the owner's success of the web site might be judged by hits on the site or contacts made with the developers or the visitor's book. Examples are too numerous to outline but we offer a few popular educational exemplars, which deliver varied media and technologies within the site architecture and are working towards accessible design.

- NASA http://www.nasa.gov
- How Stuff Works http://www.howstuffworks.com
- Sydney Opera House http://www.sydneyoperahouse.com
- Discovery Channel http://dsc.discovery.com/

Portal

The Oxford Dictionary describes a portal to be a *doorway or gate*. An Internet portal is a gateway to an aggregation of approved, categorized and/or indexed content, resources and services. The purpose of a portal is to become the first port of call for broadcast of content for users within a topic or domain. The site is often database-driven with some level of automated updating and the design may allow for customisation of the interface or records. The most effective portals offer some level of review and approval of the sites and resources that access if given to. It is this filtration, distillation and annotation of the Internet resources that gives true value to the portal for teachers. The site may offer membership or registration but users will have little or no access to other members. The users are still consumers but may be able to contribute sites and resources for review. Success for the owners of the portal is measured in numbers of hits on the home page. Examples are resource libraries, link sites, media databases, search engines and intranets (HR). Consider these sites:

- PT3 Digital Equity Portal http://www.digital-equity.org/portal.cgi/
- Texas Public Education Portal http://ritter.tea.state.tx.us/
- Science Education Gateway http://cse.ssl.berkeley.edu/SEGway/
- Education Network of Ontario http://www.enoreo.on.ca/

Network

A network can be defined as people connected by exchange of information. It is useful to also note the television metaphor as a group of broadcasting stations connected for simultaneous broadcast of a programme. The network is largely still a broadcast mode of delivery of content and services delivered from one to many or in one direction. A network may involve database delivery of content through a portal and some leader to member communication. Members will be unable to establish communication with other individual members of the network. Content is administrator controlled and users may contribute through moderated technologies. Success may be measured in numbers of members and hits on areas of the site. Only weak ties may be established while members remain largely anonymous in many on-line networks. For the members the involvement is individualistic and will be a general interest or 'keeping up-to-date' focus. Examples of networks include web and portal sites with added and varied technologies such as listservs, newsletters, discussion boards, forms for limited data collection or member contribution to the site. Consider these sites:

- Learning Network Family Education http://www.familyeducation.com/home/
- Education Network Australia http://www.edna.edu.au
- Idealist.org http://www.idealist.org
- EnviroLink Network http://envirolink.netforchange.com/

Interest Group or Special Interest Group

This is a familiar organisation to most teachers and special interest groups or SIGs often form at face-to-face get-togethers and conferences in order to support specific areas of teaching practice or needs. There is on-line a two-way communication focus and this may one to many or one to one.
Focused discussions there may be moderation from leader not necessarily the owner or administrator of the group. Registration and membership is essential and usually under some scrutiny and approval process. Members are rarely anonymous, whether they use real names or nicknames and pseudonyms a real persona is developed over time. On-line the SIG ties will be stronger than on a network and members contribute not only with communication but also with resources, ideas and leadership, an interest group offers communication between members about those specific topics. The communication is more than sharing; it is support for each other's practice through facilitation, leadership and mentoring. Success might be measured in numbers and types of issues and responses/ratings. Interest groups use technologies such as listservs, discussion spaces and member upload and review of resources along with advanced communication and face-to-face opportunities. Special interest groups include user groups, associations, fan clubs (ezines) and tightly knit demographic groups. Consider these sites:

- iEarn Homepage http://www.iearn.org/
- OzTeacherNet http://www.rite.ed.qut.edu.au/oz-teachernet/
- American Educational Research Association Special Interest Groups http://www.aera.net/sigs/
- Special Education Technology SIG (SETSIG) http://www.iste.org/setsig/community.html

Community

A community of practice is different from a network in the sense that it is "about" something; it is not just a set of relationships. It has an identity as a community, and thus shapes the identities of its members. (Wenger, 1998, p.4) Putting people together in a place real or virtual does not make a community. Loosely bound collections of people in groups on the Web do not make communities and most certainly not communities of practice. People in true communities collaborate, teach and mentor each other, solve problems and build solutions together; they do so much more than just communicate with a site administrator, leader or each other. In a community members are producers, consumers and builders. The communication is multi-dimensional and there is strong reciprocity. Real names are more likely to be used and even insisted on. The members share team projects/activities and develop joint artifacts. Communities are not built they grow through personalisation, member participation, contribution and most importantly ownership (van der Kuyl, 2001). They can effectively be used to leverage tacit knowledge from and between members of the group. Designers can establish frameworks, architectures and spaces to promote or facilitate certain activities and interactivity but it is the members who build the sense and value of community. As Preece (1999, p.3) explains *"communities develop and continuously evolve. Only the software that supports them is designed"*.

Wellman & Gulia (1997) have used the terms 'social networks' and 'community' interchangeably and the Howard Rheingold has adopted 'on-line social networks' (Kimball & Rheingold, 2001) to describe organisational groups. These blended terms represent attempts to clarify and distinguish the Internet communications that have arisen and to give due separation to the quite rare true community. What distinguishes a true on-line community from an interest group is when the collaborative projects and activities arise from the sharing and support within the group. When members take up the varied roles offered to them and work with others in the community to develop new resources, projects, form consortia, apply for grants, then we can truly say that we have established community. Communities evaluate their performance through more qualitative measures than do most other interactive structures. While numbers of members and resources might still be important to a community, it is the quality of interactivity and collaboration and the rate of adoption of leadership, mentoring and facilitation roles that is its true measure of success. Consider these community sites some not fully fledged but burgeoning:

- Tapped In http://tappedin.org (community of communities)
- StageStruck http://www.stagestruck.uow.edu.au (interest group aiming to build community)
- SITE Community Forum – Learning Communities http://www.aace.org/site/forum/categories.cfm?catid=17 (International collaboration for SITE02)
- MirandaNet http://www.mirandanet.ac.uk/

The Value Of Internet Architectures to Classroom Practice

These architectures, while as suggested are not mutually exclusive, represent a shift in focus and in the dimensions of interpersonal communication and interactivity. This increased development is shown in Diagram 1 but it is worth noting that there is at present conversely a decrease in the proliferation and use of such architectures as we move towards interest groups and communities.

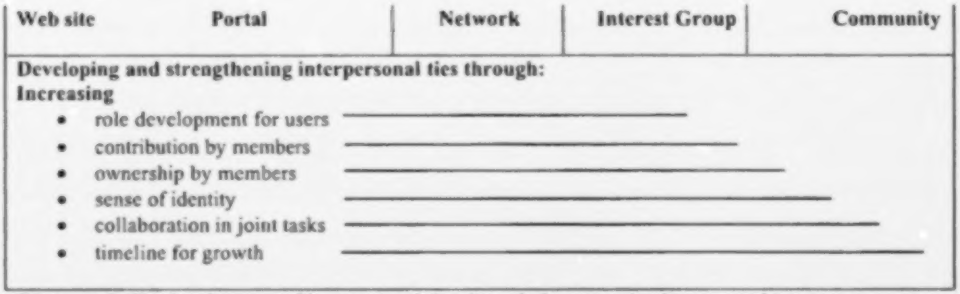

Diagram 1: The development of interpersonal ties through the respective Internet architectures.

A community has collaboration as its focus and offers experts and novices varying roles and ways to communicate, contribute, initiate ideas and devise joint projects. A community can develop from one of the Web-based communication architectures if greater levels of functionality, input, responsiveness and group task development are made available to the members and if this is what the members require. An intended community can become an interest group or a network if the members do not take up active involvement and leadership roles. Networks and Interest groups are interactive on-line structures in their own right, structures of merit and value to the membership. Each is also a possible developmental stage in the building of a community. You can design and build a network or an interest group but you can only enable the members to grow a community.

	Web site/ Internet	**Portal**	**Network**	**Interest Group**	**Community**
Focus	**Information**	**Access**	**Sharing**	**Support**	**Collaboration**
Use	Background study Research Email Media collection Building resources Publishing	Vetted information Quality resources Lesson plans Web sites Courses/ training Projects Competitions Product reviews	Updates & FYI Newsletters Contacts New ideas Organisational or system information	Connections Discourse Advice Support Knowledge exchange Sharing experiences Affirmations	Teamwork Initiating joint projects Peer review Innovation Mentoring Scaffolding Leadership Recognition

Table 2: Teacher use of the current Internet architectures

Groups and institutions planning to employ on-line architectures need to know what it is that teachers need, resources, communication, collaboration or a combination of all of these to decide which architecture will best meet their needs. The lower cost and more automated nature of a portal makes it an attractive option yet in another context the dynamic supportive nature of the interest group makes it most attractive. It is the needs of the teachers that must be understood before the technology is chosen. Educational Internet product and service developers need to ask themselves whether teacher needs will be meet by access to resources or to each other and at what level and intensity.

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The Transformation, Reform, and Prospect of Distance Education in Taiwan

Chih-Hsiung Tu, Ph.D.
Educational Technology Leadership
The George Washington University
Washington, DC USA
ctu@gwu.edu

Hui-Ling Twu
Chin-Yi Technology Institute
Taichung, Taiwan ROC

Abstract: Taiwanese government has emphasized education reform in the past few decades and has focused particularly on distance education. Several legislative initiatives involving distance education have recently implemented new policies governing distance education. These new policies are in opposition to the results of research accomplished in foreign countries regarding distance education and underscore an urgent need to examine the feelings and attitudes of students, instructors, administrators, policy makers, and related employees about the new policies for distance education in Taiwan. The purpose of this study is to determine the attitudes of students and teachers regarding the new policies controlling asynchronous distance education and distance education degree programs in Taiwan. The outcome of this study will improve the effectiveness of distance education teaching and learning, and will support appropriate academic standards for distance education in the Taiwanese learning community.

Introduction

Taiwan has experienced an economic miracle over the past two decades and her computer industry has been an integral piece of this economic success. The country's burgeoning gross national product has allowed the government to infuse large amounts of money into educational reforms, particularly into distance education. Several policies regulating distance education have been implemented under the aegis of the Asynchronous Distance Education Regulation (MOE, 1999).

Current Status

Distance education (DE) plays an important role in the history of educational technology in Taiwan. The purpose of DE in Taiwan is to promote societal education to fulfill lifelong learning goals. It is intended to achieve the goal of equal education. Confucius' philosophy, "to provide education for all people without discrimination," has greatly influenced DE. One of principles of DE in Taiwan is "school admission is open; evaluation is solid; and graduation is rigid." The intention is that "everyone has chances to get education; everywhere is a classroom."

School entrance examinations limit the opportunities to pursue a higher education. Each year more than 100,000 high school graduates take the examination. About 60% will pass and get admitted to colleges. The establishment of National Open University in Taiwan (NOU) provides a different venue for citizens to pursue higher education.

NOU students are typically married, middle class, and with incomes slightly below the national average (NOU, 1999). The specific reasons given for participating in NOU's programs include augmenting knowledge and skills, pursuing personal interests, raising personal educational levels, enjoying the social aspects associated with university, and increasing the chances for job promotion.

Three important periods of development of DE are identified (Chu, 1999): (a) Broadcast radio & television instruction, (b) Broadcast television instruction, and (c) Computer-based instruction.

The development of DE in Taiwan began in 1966 with the establishment of an educational radio station and began with a trial of the "School Over the Air." In 1971, the first open learning institution in Taiwan the "High School Over the Air" was established, and in 1973 teachers' college courses were offered over the radio to meet the vital need for elementary school teachers. In 1977, the "Junior College Over the Air" was established to provide alternative schooling and continuing education to adults and broadcast television became the main medium.

During the period between the 1960's and mid 1980's broadcast radio and broadcast television were the major media of instruction with the latter becoming dominant in the 1980's. Such televised instruction is supplemented with correspondence education and a limited number of face-to-face (FTF) instruction sessions as well as other technological and instructional support to provide feedback and interaction. The focus of this period was at first aimed at providing an alternative for the general public to receive education beyond the compulsory secondary education. As the education level of the general public moved beyond secondary education the focus switched to provide avenues of continuing education to adults with an emphasis on providing college and university level courses and to promote the idea of lifelong learning.

NOU in Taiwan was established in 1986, offering humanities, social sciences, business, public administration, living science, and management and information.

In the early 1990s, the third generation of DE, which utilized advanced CMC technology to provide interactive instruction evolved.

NII (National Information Infrastructure) Project, one of the major educational technology plans, identified/categorized DE into three different modes: (a) Real-time multicast systems (RTM); and (b) Virtual classroom system (VC); and (c) Curriculum-on-demand (COD) system utilizing technology. Under the NII Project, seven national universities are initiating interactive DE courses. The focus was the establishment of instructional systems on different communication carriers, computer-based virtual classroom systems, and developing multimedia course materials (Wei & Su, 1997).

This interactive DE project utilizes a multimedia teaching environment through the use of audio/video and computer technologies, such as A/V facilities, video processing, echo handling, CAI, room design, and related setups, to create an excellent educational activity. Educational activities focus on two main issues, teaching techniques and production of computer-based teaching material.

Although RTM has become a popular mode, MOE (1999) announced a regulation for planning asynchronous instruction that includes three requirements: instruction design, delivering methods, and production of course materials. Methods of delivery that are allowed are videotapes, video CD, the Internet, cable, or satellite broadcasting, and videodiscs. Interestingly, regardless of the type of medium "teachers' images and voices must be shown, suggesting that the favored mode of delivering instruction is through lectures. Additionally, instructors must post their office addresses and allow students meet with them either in FTF or through real-time online communication to increase course interaction. Clearly, the authority transfers traditional instruction design to DE.

Attitude toward to DE

Taiwanese education developed in a traditional Confucian way: rigorous examinations, creation of elite higher education institutions, and teacher-centered learning. This belief leads the development of DE in Taiwan to be more conservative while the Open University in Hong Kong demonstrates a more student-centered belief (Sherritt, 1999) although both schools share similar/same Chinese cultures. In fact, Huang (1997) argued that in Taiwan older learners are not attracted to and do not learn effectively in a traditional environment. Additionally, NOU has been categorized as a supplemental education system, which implies a somewhat marginal position in the whole education system. Data indicate that NOU graduates enjoy enhanced quality of life but seldom use their educational attainment for conational advantage.

Further, less than half (45%) of the graduates from the NOU feel that their academic achievements are fully appreciated by their families or their employers (Li, 1996). This suggests that although DE has made great inroads, the belief persists that qualifications from NOU are second class. Hsieh (1996) found that DE had positive influence on labor force skills development and economic growth.

Tu (2001) concluded that Taiwanese students have positive responses to CMC in distance learning environments. Hsiung and Tan (1999) found similar results and concluded that Taiwanese perceived computer Internet systems as interactive and effective communication media in the distance-learning environment.

Difficulties and Challenges

Challenges are identified in the DE system in Taiwan that must be resolved to advance the system, but the prospects for DE in Taiwan are promising (Tu & Twu, in press). Effective reforms require thorough cooperative efforts from students, faculty, staff, administrators, institutions, policy makers, governments, and all others.

Need driven rather technology driven

Current DE development has put more weight on the attributes of delivery technology than the needs of students. Certainly, obtaining hardware and technologies is necessary to the initiation of the reform process; however, it is necessary to examine what students need to learn, how they would like to learn, and how their learning experiences can be enhanced.

Course design

Effective course designs are the key to the successful enhancement of learning. Clearly course designs have been transferred from traditional instruction to the DE environment. Standard lecture transmission has become the major instruction design; but, it is doubtful that the lecture mode works well in computer based DE environments (Tu & Corry, 2001).

It is important that course design must be tailored to the cultural mores of local learners. Many institutions have failed to consider the cultures of the learners in instructional design (McIsaac, 1993). Foreign DE models should be referenced but the course design must reflect the Taiwanese culture and the learning styles of Taiwanese students.

Adult instruction design should be taken into account. Most adult learners perceive their learning process as more self-directive; experiential learning techniques have more meaning; learning should be able to apply to practice; and learning should lead to increased competencies (Knowles, 1976). It is a challenge to integrate adult instruction design into current DE instruction because of the educational foundations of school systems and the passive learning of the culture. DE may exert limitations on independence, critical thinking, and intellectual inquiry. Therefore, there is need for students to be trained to be independent and utilize critical thinking skills that will benefit them at their workplace and in their lifelong learning experiences.

Effective evaluations will provide students feedback and serve functions of directing their learning experiences. Current evaluations adopt traditional test styles, such as true and false, multiple choice, essay, etc. It is recommend that various assessment strategies be applied to monitor student learning progress and should mix systematic, summative, and formative methods.

The needs of theoretical foundation

DE in Taiwan has a short history; therefore, well-grounded and solid theoretical constructs are still evolving. Urgent need exists for more research to form a theoretical framework to project direction, to guide practice, and to serve as leadership.

Effective teacher training

Distance teaching differs significantly from traditional teaching. In fact, many DE teachers have been applying their traditional teaching styles to distance environments, which result in many frustrations, ineffective teaching, and retardation of student learning. Therefore, prior to becoming involved in distance teaching DE teachers should receive training in distance instruction. "Ongoing" training is more effective than one-time training.

Curriculum integration

Current DE graduates did not change their careers or use their degree to obtain a job. The purposes of DE are to provide various learning process to suit the needs of the students. Therefore, curriculum integration should be flexible to provide various programs, certificates, and trainings to assist students to achieve their individual lifelong learning goals.

Insufficient resources

The government and their institutions do not adequately support distance teachers. The teacher and student ratio is fairly high (1: 21). In fact, distance teaching normally demands more of the teachers time and a greater amount of effort for course preparation, course delivery, student support, and course management etc. (Tu, 2000) because of the diversity of the students' ages, cultural backgrounds, learning experiences, and technology experiences. Therefore, continuing support for DE teachers is imperative.

Role of DE and Perception

Although Taiwanese society has developed a room to face DE and the schools have developed rigorous adherence to high standards, most Taiwanese are still skeptical about the quality of this learning process, grumbling that it's not seemly to get a degree without going to school or by just watching TV. This misconception resulted from the fact that the government initiated DE as supplement to traditional education. Therefore, it has been seen as "alterative," "second best," and non-mainstream education. Particularly, it is wrongfully perceived that DE is for one who fails the college entrance examination to pursue his/her higher education and "Superior students go to traditional colleges." How society will perceive DE is a serious hurdle to cross in the process of development. It has been shown that DE students can learn as effectively as can students in traditional instruction (Hiltz, 1998). The authority should take the leadership to correct this misconception of DE.

Insufficient financial support

There were insufficient funds dedicated to DE. Each year the government assigns US$3,125 to $9,375 for a traditional university student, while the expenditure for a DE student is US$625. This differential in financial support limits distance students from obtaining a start-of-the-art quality instruction through distance learning technology when compared to students in traditional universities.

Conclusions

Moving Taiwan towards a learning community is an ideal and ultimate goal. The technology-based learning serves a vital tool to enhance learning. Learning and knowledge are the goals students need assistance to attain. Content, hardware, and software do not equal knowledge. The utilization of various learning technologies will allow Taiwanese to select their ideal learning methods to achieve their lifelong learning goals and to reach the definitive goal: "life is learning; learning is life."

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Infusing Wireless Technology into Teacher Education

David Zandvliet, Simon Fraser University, CA
Laura Buker, Simon Fraser University, CA

Abstract

The brightest promise of technology in education is as a support for new, innovative, and creative forms of teaching and learning. The Centre for Educational Technology at Simon Fraser University has established a wireless network throughout the instructional areas in the Faculty of Education. This network is used in conjunction with a 'portable lab' of laptop computers and allows us to infuse technology into our work with the Professional Program (Pre-Service Teacher Education) in a variety of classroom settings. This infrastructure currently satisfies many of our current and future instructional and technological needs while providing a rich venue for the project and further and continuing research and evaluation associated with it.

Introduction/Background

Educational reform initiatives aimed at integrating technology into the curriculum are well at work in institutions of higher education such as Simon Fraser University. As more and more K-12 teachers are required to change their teaching methods and teaching styles to include technology, educators within teacher education programs are being asked to alter their methods and styles of preparing teachers, specifically to include teaching with technology (Edwards, Ahn and Mooney, 1998). To facilitate this change and to structure computer-based activities, many teacher preparation programs in Canada and the U.S. tend to use the International Society for Technology in Education (ISTE) Foundation standards, (ISTE, 1997a; ISTE, 1997b; ISTE, 1997c). However, while teacher education programs may have a short-range need to impart basic computing skills to their students, the real challenge is to teach and to reinforce these skills to pre-service teachers while simultaneously showing them how to integrate the technology into the range of curriculum they will be teaching.

Generally, educational researchers would place schools, colleges, and departments of education (SCDE's) along a continuum in terms of this goal for the integration of technology (eg. Beck and Wynn, 1997). However, comprehensive reports on the subject indicate that the use of technology is not central to teacher preparation and that most technology instruction concerns "teaching about technology" rather than "teaching with technology" across the curriculum (eg. U.S. Congress, Office of Technology Assessment, 1995). A more progressive view of the needs of SCDE's in the U.S. was posed by a report by the National Commission on Teaching & America's Future (1996) which posed the challenge: "Schools of education need to model how to teach for understanding in a multicultural context, how to continually assess and respond to student learning, and how to use new technologies in doing so" (p.77).

In Canada, Faculties of Education need also to pay greater attention to the goal of integrating information and communications technologies (ICTs) into Pre-service teacher education programs. A recent report by the Angus Reid group (Globe and Mail , 2000, September) stated that Canada is near the top of the class globally when it comes to offering Internet access to its students. The report relates that 74 per cent of this country's students had Internet access at school, while 71 per cent had access to it at home (U.S. students were more likely to report Internet use available at home than at school). Further, the Industry Canada project, SchoolNet, claimed last year to have made Canada the first country in the world to connect all its public schools to the Internet. This public infrastructure then forms an important part of the teaching /learning context in public schools. At the very least, this argues the point that pre-service teachers need adequate preparation in its use.

The use of wireless networks and ICT has also the potential to transform learning and teaching. In this, the underlying principles of learning and cognition are the same as for all media and learning environments. Like other technologies, the Internet brings into being the ideas of its early innovators–in this case, ideas about hypertext and universal sharing of documents and texts. The Web can also be a vehicle for realizing the vision of educational thinkers like Dewey, Piaget, and Vygotsky who long ago advocated a constructivist or meaning-centered approach to learning and teaching (Wilson & Lowry, 2000, May). Constructivism, which stands in contrast to mechanical conceptions of thinking and action, emphasizes the learner's role in constructing meaning—as opposed to simple transmission from teacher to student (Duffy & Cunningham, 1996). Learners do more than process information--they build an understanding through interaction with their environments (and the technology infused into these environments).

Infusing ICT into Curriculum

In the context of pre-service teacher education, a number of early attempts have been made to describe the effective and pedagogically meaningful integration of ICT into the curriculum. Omoregie & Coleman (1998) designed a study which investigated the degree to which technology infusion played a significant role in the development of quality instructional materials by pre-service teachers and influenced their academic performance. Their study reported that their integration of ICT into the curriculum enhanced the interactions between students and preservice teachers while also increasing motivation, computing skills and academic performance in pre-service teachers. In addition, the researchers noted that the infusion of ICT encouraged rapid feedback between university faculty and pre-service teachers and that this increased student interaction using electronic mail enhanced their writing skills.

In another study (Persichitte, 1998), case studies were conducted to document and analyze factors (positive and negative) associated with the integrated use of educational technologies within SCDEs and further to develop rich descriptions of best practices use and integration to serve as models for preservice teacher program revision. Among its intentions, the study aimed to document (in a qualitative sense) what characteristics of pre-service teacher faculty, students, curricula, and programs would currently be considered examples of "best practice" in the use and integration of educational technologies for the preparation of teachers. Examples described in the report included the development of problem based learning (PBL) workshops, and a range of student designed 'electronic portfolios'. The study further inferred how the use and integration of educational technologies influences the planning for, and maintenance of existing technology infrastructures and of curriculum frameworks within pre-service teacher education.

Edwards, Ahn and Mooney, (1998) discuss one such problem-based approach which they term 'scenario-based computing'. They relate that these activities incorporate the day-to-day work situations encountered by in-service teachers with the possibilities of effective computer use and so provide pre-service teachers with an opportunity to focus on both the (professional) management and instructional duties faced by in-service teachers and technical integration issues within the classroom. The authors relate that scenario based activities also force students to think about each task in relation to tasks or situations that they might actually face sometime in the future. The use of scenarios in ICT instruction may facilitate students to think about and discuss computer use relative to (a) what needs to be done, (b) why the computer becomes the medium of choice for a specific scenario, and (c) exactly how the computer will be used.

Another approach to ICT infusion is related by Doty and Hillman (1998) who describe their Teacher Technology Portfolio program as one integrating instruction on technology with 'modeling of instruction' with technology throughout the course work in each of the teacher training program. Pre-service teachers begin their portfolio work in their introductory courses with opportunities in later methods courses to build competence; investigate curriculum and technology connections; and to develop and implement activities integrating technology. The portfolios are then finalized during the professional, student teaching semester. Portfolio requirements described included the development of a reflective statement regarding technology and education, the development and implementation of lesson and unit plans (with electronic artifacts), and a documentation of mastery of basic and advanced competencies with a variety of instructional technologies.

Jackson (1998) describes another portfolio approach taken. In this project, pre-service teachers developed computer portfolios as part of their professional program. Included in these portfolios were such items as text casts of philosophical beliefs, voice casts of effective teaching strategies, and digitized videos of actual teaching performance. The author states that portfolios allowed pre-service teachers an opportunity to both self reflect and assess their recent student teaching experiences while providing them with a greater understanding of how technology can be implemented into their future classrooms. Jackson states that the process of pre-service teachers developing their own computer portfolio had many positive outcomes. First, these pre-service teachers benefited by reflecting upon their student teaching experience as they compiled their own effective teaching characteristics. Second, the end product became a very valuable instrument in the student's job search. Third, the opportunity to author their own computer portfolio provided students with and increased technical capacity to infuse technology later in their own classrooms.

Finally, in an approach to teacher education that would be viewed as consistent with the student centred and constructivist models described, Topper (1998) relates a strategy which uses Technology coaches (or mentors) hired to support students learning to use technology and to assess their technological proficiency. The success of this work (and the mentoring model applied) was credited in helping future teachers develop the necessary expertise, dispositions, and attitudes to support their own generative learning around and with technology, and learn to use technology appropriately to serve some useful pedagogical end. With this project, the Centre for Educational Technology applys a similar model in infusing technology into pre-service education through the use of our wireless network and portable lab, the provision of a project facilitator and the development of workshops aimed at generating student designed (web based) instructional resources and the connection of these to their development as professionals through the progressive design of electronic or 'virtual' portfolios.

Project Methodology

The development of knowledge and skills related to the use of information and communications technologies (ICT) is an important goal for any teacher education program. In this, it is important to consider technology learning objectives as an integrated part of the development of teacher-professionals and not a separate requirement. In practice, this means subordinating technology-learning to the overarching professional nature of the pre-service curriculum, our intentions with this project are: to explore the possibilities for technology to enhance learning in the pre-service curriculum during on-campus experiences; to consider ways to utilize technology in our approach to subject-specific and integrated curriculum studies in the practicum settings; and to enable an understanding of technology as one of the many aspects of teaching and learning that collectively contribute to effective pedagogy. Further, social, gender and cultural issues that surround the use and possibilities of technology will be addressed and attended to within on-campus and school-based experiences.

This project is also sensitive to the reality that many pre-service teachers have little familiarity with technology. Our primary aim is to provide supportive learning situations that will facilitate both their comfort level and their expertise. There are two components to our current project: construction of 'virtual portfolios' throughout the program; and the design and implementation of a technology project during their practicum experiences. The requirements for the virtual portfolio accommodate the potential differences in competency, and on-campus experiences will include specific instruction in the use of technology which will support pre-service teachers' abilities to utilize technology __in effective and pedagogically meaningful ways. In addition, pre-service teachers will have opportunities to collaboratively participate in technology-supported inquiries through the self-initiated projects which will also support their technology learning and provide a meaningful context for technology-based inquiry within their practicum experiences.

Perhaps one of the greatest strengths of embedding technology within a pre-service module is that there is no presumption of expertise. In other words, learning about pedagogy, and learning about the possibilities of technology as a supportive pedagogical tool, are embedded within the broader goals of Professional programs. The intent with both is to nurture and encourage pre-service teachers to construct, reflect upon and practice their beliefs about teaching and learning, always attending foremost to the needs and abilities of the children who become their students. Beyond the specific requirements of technology-learning and learning about the unique aspects of middle school theory and practice, our ultimate goal is to create a meaningful, supportive and enabling learning environment for our pre-service teachers that will optimally be a model for their own practice.

Our specific goals related to the development of an ICT strand within pre-service teacher education programs are therfore threefold:

1) To infuse technology into the entire teacher education program. Throughout their teacher education experience, students should learn about, learn with, and learn to incorporate technology into their own teaching.

2) To introduce technology in context. Teaching pre-service students basic computer literacy is not enough. Pre-service students should learn about the many uses of technology because they are integrated into coursework and field experiences.

3) To allow students to experience innovative technology-supported learning environments in their pre-service program. Technology has the potential to transform learning.

The brightest promise of technology in education is as a support for new, innovative, and creative forms of teaching and learning. The Centre for Educational Technology at Simon Fraser University has established a wireless network throughout the instructional areas in the Faculty of Education. This network is used in conjunction with a 'portable lab' of laptop computers and allows us to infuse technology into our work with the Professional Program (Pre-Service Teacher Education) in a variety of classroom settings. This infrastructure currently satisfies many of our current and future instructional and technological needs while providing a rich venue for the project and further and continuing research and evaluation associated with it.

The Wireless LAN technology was introduced gradually over the fall semester (September-December 2000) by developing a mobile computing lab consisting of 16 IBook (Apple Macintosh) computers organized on a portable cart. In addition we began offering 'Wireless Workshops' to Pre-service teacher education modules and working extensively with the Middle School - Learning Community module in Jan.2001. These workshops demonstrate the utility of the wireless network technology (and mobile lab) while also introducing potential applications for its use in teacher education and classroom instruction. The workshops are followed up with consultation and collaboration with faculty-associates in the teacher education program to ensure their continued use and connection with the instructional goals of the program. These connections are part of an on-going research and evaluation project that began in January 2001.

Conclusion

Evaluation of our current work is continuing as we monitor the efficacy of our approach and the suitability of the learning environment we have provided for our students. Observation, interview and classroom learning environment surveys assist us to document and compile case studies on a variety of pre-service projects as they relate to teaching experiences designed by our developing teachers. Finally, in documenting the development and implementation of the wireless network in Teacher education we will continue to look for a number of different types of information related to its efficacy. For example, What technical and pedagogical limitations are imposed or removed by the use of ICT in teacher education? How do these differ from those experienced in other other ICT settings? Further, what are students' perceptions of their learning environment when using ICT in this way? Finally, are there qualitative differences in the nature of their technology-learning in the wireless setting? (i.e. Can enhanced connections between ICT and professional practice be described?)

In order to implement and evaluate this process, we have facilitate opportunities for students to critically examine their teaching practices and the assumptions they make about the nature of learning, teaching, and the role of technology - These are the learning goals of the electronic portfolios they create. Further, in building collaborative relationships, and in respecting the students' knowledge and expertise that they bring to these interactions, project staff support student efforts to construct their own practices of teaching with and document this through the design and implementation of web-based pre-service projects implemented during their practica. We believe that these approaches are consistent with the socio-constructivist views of learning we hold in the Middle School Module of Professional Programs and in the Centre for Educational Technology at Simon Fraser University.

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COLEGA: A Collaborative Learning Environment based on Individual and Group Memory Building

Jésika Carvajal[1], Natalia Foronda[1], Paola Gómez[1], Rodrigo Carvajal[1,2], Diego Zapata[3]

[1]Conexiones Project
EAFIT University
Medellín, Colombia
colega@conexiones.eafit.edu.co

[2]Institute for Human and
Machine Cognition
University of West Florida
Florida, USA
rcarvajal@ai.uwf.edu

[3]Aries Lab
University of Saskatchewan
Saskatoon, Canada
Diego.Zapata@usask.ca

Abstract: Collaborative learning systems offer common virtual spaces where different users (i.e. teachers, students, school directors, parents, researchers, and experts) can interact. Participants can share their pedagogical, technical and administrative knowledge. CONEXIONES project, a research group that has been enhancing the learning process in Colombian schools through the use of new technologies, has developed COLEGA, a collaborative and learning tool to support knowledge evolution processes within learning communities.

This paper presents COLEGA, a collaborative and learning tool that integrates retrieval document algorithms based on keyphrases, synchronous and asynchronous communication tools, and support for evolving individual and group memory. Results of a usability study are also presented in this paper.

Introduction

CONEXIONES project is part of the R+D Group in Computers in Education at EAFIT University - Colombia. CONEXIONES aims to improve Colombian education by developing and implementing new learning environments in real schools and community centers (Zea et al. 2000). More than one hundred schools (urban and rural, private and public) from five provinces of Colombia form part of CONEXIONES. There are strong cultural differences and social-economical levels among schools. Every month approximately 12.000 users interact in a virtual space. Users are students, teachers, parents, researchers, educational agents, and family members of the community centers.

COLEGA facilitates communication among users. Researchers and technical staff need to be in constant communication with teachers, students and family members within CONEXIONES. COLEGA provides users with synchronous and asynchronous communication tools where they will be able to solve their problems, share ideas, and express their pedagogical and technical doubts about CONEXIONES. COLEGA has been proposed as a new alternative to support communities within CONEXIONES.

Different groups can create their own learning spaces. For example, teachers in COLEGA use a learning space to discuss about topics related to collaborative projects. A teacher can create a learning space to interact with their students and an invited expert. Family members can be also involved on different groups in order to share their ideas with students and teachers. Students and teachers from several schools working on similar collaborative projects are able to share ideas and knowledge. Students from low-income and rural areas have the opportunity to interact with students, teachers, researchers, and experts from different regions and countries. Thus, COLEGA is instrumental in integrating educational communities.

Related Work

Learning communities have been supported using a variety of technologies. From simple electronic mail, multi-user environments (MUDs and MOOs) to collaborative virtual spaces. CSILE - Computer Supported Intentional Learning (Scardamalia and Bereiter 1991 1996 1999), for example, uses new technologies to support decentralized forms of discourse, and knowledge building within a discipline. CSILE is an asynchronous discourse tool that supports knowledge building providing thinking-type labels, scaffolding of notes, and different views of notes. CSILE has demonstrated how such technology produces positive effects in learning. CaMILE (Guzdial et al. 1995) offers a collaborative environment in which participants can share their ideas through the use of notes. Students in CaMILE can classify their interactions and change accessibility privileges to their notes. The IHMC Concept Mapping Software - CMaps (Cañas et al. 2001) empowers users to construct, navigate, share, and criticize knowledge models represented as Concept Maps. The toolkit allows the users to build, and collaborate during the construction of concept maps, as well as, share and navigate through others' models distributed on servers throughout Internet. COLEGA distinguishes from existing software by its particular use of keyphrases-based technology and participants' annotations to categorize and organize documents and interactions, that makes it possible to manipulate individual and group memories in benefit of the participants.

COLEGA

> "In classrooms that adopt the collaborative knowledge building approach, the basic job to be done shifts from learning to the construction of collective knowledge. The nature of the work is essentially the same as that of a professional research group, with the students being the principal doers of the work. Thus, in the ideal case, there is a complete shift from students as clients to students as participants in a learning organization." (Scardamalia and Bereiter 1999).

COLEGA supports users working in a learning activity by offering collaborative learning spaces in which they can learn from each other, solve their problems, learn about collaboration, and learn the appropriate use of this technology in their own context.

Fig. 1 presents a general view of COLEGA. Users can interact with synchronous and asynchronous communication tools to create documents and/or interact with other users based on previous documents. Users classify each interaction as a document, an idea, an alert, an attention, a question, an agreement, or a disagreement. Automatic key-phrase techniques are used classify each document with in a list of domain categories. This facilitates organization of documents with in individual and group memories.

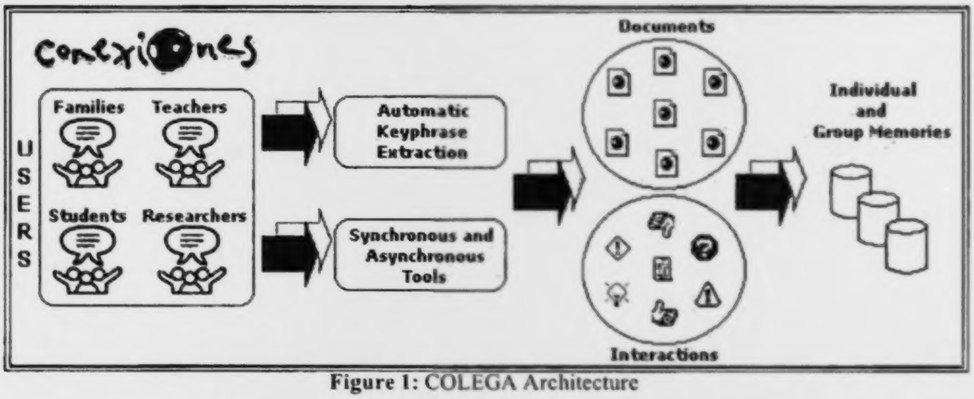
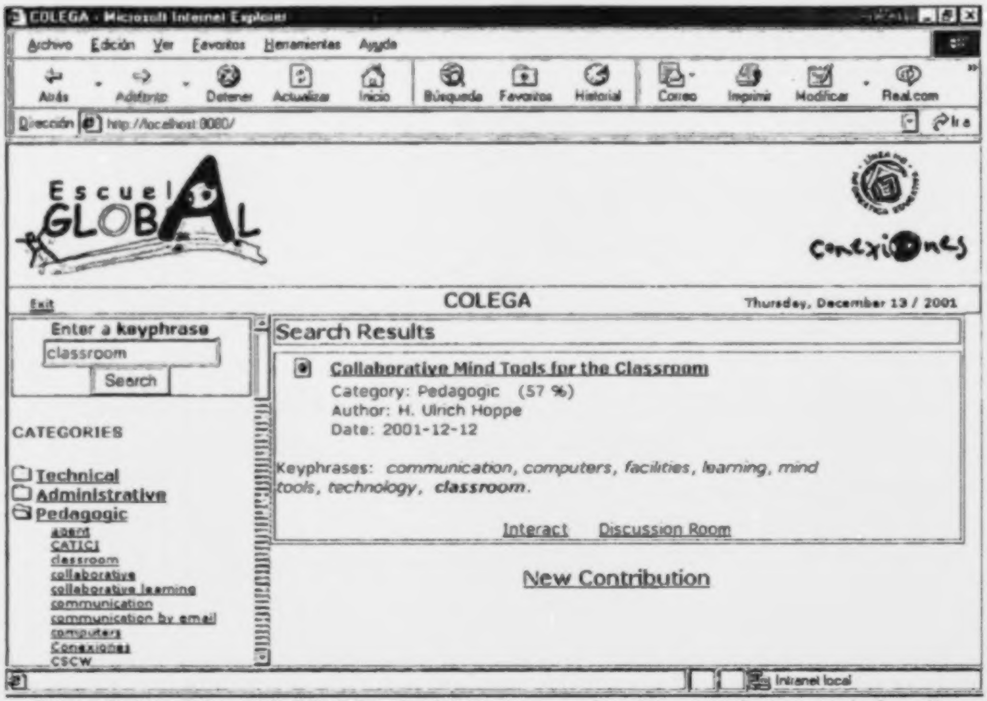

Conexiones
USERS
Families
Teachers
Students
Researchers
Automatic Keyphrase Extraction
Synchronous and Asynchronous Tools
Documents
Interactions
Individual and Group Memories

Figure 1: COLEGA Architecture

Participants can maintain their own knowledge space (individual memory) and share it later with their group. Students can decide with whom they want to share their questions and new ideas. Teachers can monitor individual and group memories to be able to guide students with their learning processes. Teachers can generate a list of topics of interest and use this information in their class. In that sense, COLEGA becomes an assessment tool for teachers. Furthermore, students and teachers in COLEGA can make the group memory available for other users to start a discussion based on an existing document or interaction. These users will create their own individual and group memories by including their own questions, ideas, or answers. As individual and group memories evolve, CONEXIONES' project memory evolves.

Participants have three different ways to interact within COLEGA: by participating based on an existing document, by participating based on a previous interaction, or by adding a completely new document or interaction. In the first two cases, participants can use synchronous or asynchronous communication tools to add their interaction or document. When participants are not satisfied with the search results or there are not documents or interactions related to a particular keyphrase, users can start their own discussion.

COLEGA will automatically extract keyphrases from the new document and will make it available for others to participate. See Fig 2.



COLEGA

Thursday, December 13 / 2001

Enter a keyphrase: classroom

CATEGORIES

- Technical
- Administrative
- Pedagogic
  - agent
  - CATICI
  - classroom
  - collaborative
  - collaborative learning
  - communication
  - communication by email
  - computers
  - Conexiones
  - CSCW

Search Results

Collaborative Mind Tools for the Classroom
Category: Pedagogic (57 %)
Author: H. Ulrich Hoppe
Date: 2001-12-12

Keyphrases: *communication, computers, facilities, learning, mind tools, technology,* ***classroom***.

Interact Discussion Room

New Contribution

Figure 2: Interacting with COLEGA. Participants can use keyphrases or choose a topic from list of categories to retrieve information from available group and individual memories. Once the participant has found an interesting topic, he/she can use it to start a new discussion.

Asynchronous and synchronous communication tools allow users to interact with others in a variety of settings. Participants can use an initial document to work with and generate a final document with the contributions of the group. This process can be done on-line during a face to face meeting (synchronous tools) or it can be based on messages posted by the participants in a group memory (asynchronous tools). Fig 3. shows a screenshot of the asynchronous communication tool in COLEGA. the user can select the user(s) to which the interaction is for, specify to whom a copy should be sent, classify the interaction according to one of the types COLEGA offer, type or import the document/interaction content, and send it. If the user desires to get help about how to classify the interaction, there is a help option available.

A group of participants can witness how their 'group memory' evolves through their interactions. New users can inspect group memories to learn about different topics. In fact, new participants can select an existing document to start a conversation with his/her own group. COLEGA provides methods to create and maintain knowledge spaces.

Moreover, several search facilities have been implemented using *automatic keyphrase extraction techniques* (Turney, 2000) to automatically extract keyphrases and classify information into categories previously generated based on existing documents. Using automatic extraction of keyphrases, documents can be classified into meaningful categories that will make simple searching processes. This in conjunction with participants' classification of their interactions within COLEGA makes individual and group memories easy to be accessed. COLEGA supports keyphrase based queries, which opens up existing documents to participants interested in a particular topic.

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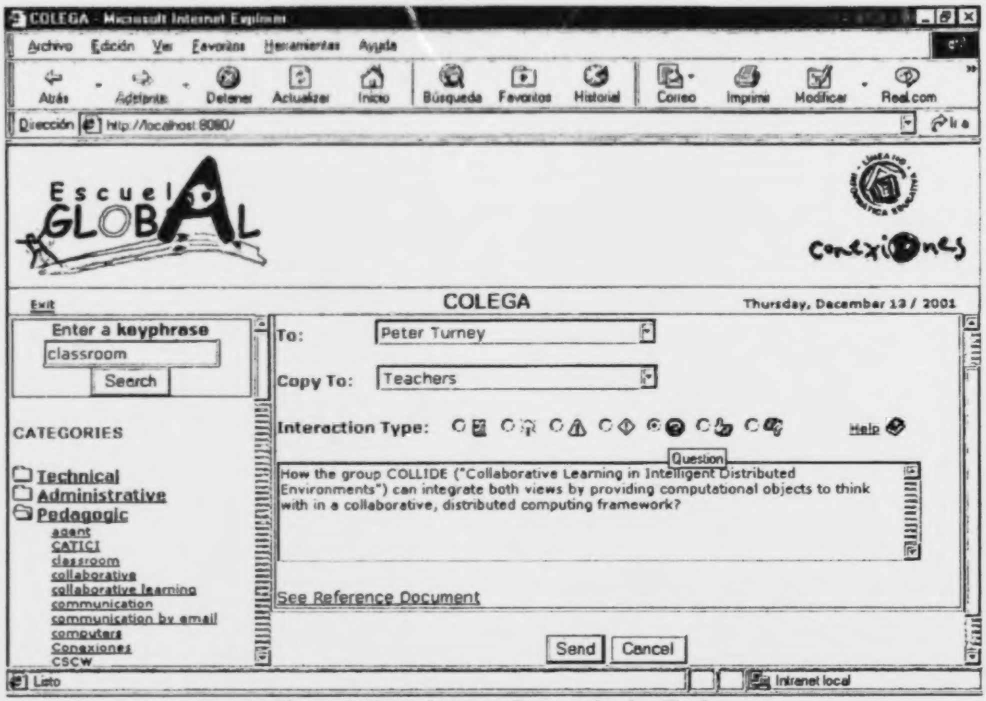
COLEGA - Microsoft Internet Explorer
Archivo Edición Ver Favoritos Herramientas Ayuda
Atrás Adelante Detener Actualizar Inicio Búsqueda Favoritos Historial Correo Imprimir Modificar Real.com
Dirección http://localhost:8080/
Ir a
Escuela GLOBAL
Conexiones
Exit
Search
CATEGORIES
Technical
Administrative
Pedagogic
agent
CATICI
classroom
collaborative
collaborative learning
communication
communication by email
computers
Conexiones
CSCW
Interaction Type:
Question
Help
See Reference Document
Send
Cancel
Listo
Intranet local

COLEGA

Thursday, December 13 / 2001

Enter a **keyphrase**: classroom

To: Peter Turney

Copy To: Teachers

How the group COLLIDE ("Collaborative Learning in Intelligent Distributed Environments") can integrate both views by providing computational objects to think with in a collaborative, distributed computing framework?

Figure 3: Asynchronous Communication Tool.

Usability Study

In this study, teachers, students and researchers had the opportunity to use COLEGA to solve some common tasks, such as: searching individual and group memories using keyphrases, searching by using categories from a proposed tree of initial categories, reading existing documents and generating new interactions using asynchronous communication tools mainly. Initial documents were consistent with real CONEXIONES messages (i.e. emails, teachers' and students' reports, and papers and technical documents). Participants solved a final questionnaire and observers were taking note of their reactions towards COLEGA. Each task was carefully designed taking into consideration the participant's language and probable topics according to the type of participants (i.e. student, teacher, researcher, etc.). Some of the initial results are as follows:

- ✓ Teachers considered COLEGA to be a helpful tool in their teaching both as a learning and as an assessment tool. Teachers were able to use keyphrase based searching facilities to monitor students' work and to find information about their topics of interest. Teachers liked the idea of been able to keep in touch with researchers, teachers, and students from different places.

  "COLEGA is an interesting pedagogical tool because I can keep in touch with other users of CONEXIONES. Besides, it is possible to give your opinions and engage in the construction of knowledge. it provides a great opportunity to generate knowledge and increase the one we already have" Teacher comment.

  "COLEGA provides a searching and interactive method to helps us to solve doubts with students, partners and experts." School director opinion.

  "I think COLEGA is easy to use. I can find answers to the questions I have. I can also ask people who know about my questions." Student comment.

- ✓ The Discussion Room – synchronous tool- generated a lot of interest. Participants considered that it will give them another way of interacting and building knowledge collaboratively.

  "I think is a great tool that will give a lot of support to the CONEXIONES Project. It will allow us to have more contact with teachers." Researcher comment.

BEST COPY AVAILABLE

✓ Teachers and students considered COLEGA as an innovative tool, that will increase their confidence in new technologies. COLEGA reduces their fear to computers and encourages interaction among participants.

✓ Participants felt that the instructions were clear and enough to understand the way they were supposed to interact with COLEGA.

"This system (COLEGA) seems to be useful for CONEXIONES' schools. It is a way to share experiences and to search for information related to different topics. It presents an attractive and an easy way to handle information. It motivates the members of CONEXOINES and increases their ability to share experiences." Teacher comment.

According to the initial results and the comments by participants, COLEGA was accepted and considered as a useful tool that supports their learning activities. COLEGA combines collaborative learning tools, group and individual memory, human-computer interaction and document retrieval techniques.

COLEGA uses of keyphrase based technology and participants' annotations to facilitate access to individual and group memories. Learning communities can benefit by inspecting and interacting with information maintained by COLEGA.

Conclusions

COLEGA is instrumental in providing a collaborative solution for managing group and individual memories. It promotes the generation of learning communities and learning spaces according to current participants' interests. This collaborative and learning tool aims to support participants of CONEXIONES with learning about a particular topic. In addition, participants can learn about group interaction, leadership, and collaboration while using the system.

COLEGA breaks geographic barriers in order to support modern learning communities. COLEGA was accepted by members of CONEXIONES who understood their potential and advantages to support learning in different settings. Future work includes a formal evaluation of the synchronous discussion room and integration of new tools to handle conceptual maps and learner models such as CMaps (Cañas et al. 2001) and ViSMod (Zapata-Rivera & Greer 2000).

Acknowledgments

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SECTION EDITOR:

Paula Christensen, Northwestern State University of Louisiana

The integration of technology into the classroom is a dynamic process that emphasizes the theoretical constructs related to how learners learn. Primarily, the focus of change in pedagogy, curriculum, and learning experiences is the challenge of the technological classroom. The articles in this section illustrate how theory and research can provide a different conceptualization of the processes of teaching and learning using technology.

Fetherston's article, "Educating teachers for the knowledge economy" proposes the knowledge and methods needed to prepare teachers to incorporate Information and Communication Technology (ICT) into the classroom. The dominance of constructivist pedagogy when using new technologies seems to be most important in training teachers. The knowledge economy, as explained in the article, demands that teachers must be able to assist students in learning how to access and work with information. Teachers can help students learn using technology by understanding and implementing the approaches of guided participation, conceptual change strategies, metacognition, and reflection.

In Bull's article, "Pedagogical Ethnotechnography: A bifocal lens to understand technology in education," readers learn about a research method for gaining insight into how individuals use and experience technology as a pedagogical tool. The author provides definitions, procedures, and benefits regarding Ethnotechnography. This type of research should increase understanding of the changing nature of pedagogy with the advent of technology. In a related manner, Kurubacak and Wiburg's article, "Designing a technology, society and education course" moves from the individual's experience to the impact of technology on society as a whole. Relying on project-based learning and creative activities, students enrolled in the course described in this article, develop an understanding of the relationships between technology and societal and educational change. Seemann's article, "Technology as a developmental influence" also delineates the impact of technology on society. The experience of technology is developmental, requires more abstract thinking skills, and has changed learning related to individual and societal occupational, social, and educational development.

Kayashima's article, "A model of self-regulation skills: penetrable process and not-penetrable process" describes a model of cognitive processing as part of a technological instructional method. The skills of metacognition and self-regulation are developed into a model based on production systems that aid in understanding how individuals construct knowledge.

Mishra and Wallace's article, "Teaching as design: Implications for learning to teach with technology" relies on the metaphor of design in technology as a process of learning to teach with technology. By comparing the complex, creative, and dynamic processes between design and teaching, students learn about the strong parallels between the two, thus developing an understanding of teacher knowledge for teaching with technology.

Gilesiz and Ferdig's article, "The design of electronic learning environments in teacher education: Understanding the importance of representation as a choice in technology production" explains how representation affects cognition and facilitates learning. However, the key point is that representation is of paramount importance in online environments and should be given special consideration in the development of online courses.

Kurubacak and Gonzales' article, "The use of the Internet to teach critical thinking" indicates how the Internet can facilitate learning critical thinking skills. The authors feel that teaching critical thinking should be one of the most important educational goals for students and that technology, especially the Internet, can be used as an educational tool in enhancing critical thinking.

Chih-Hsiung Tu's article, "Research and online social interaction" is concerned with the online learning community. Research has not adequately differentiated computer-mediated communication from face-to-face communication; therefore, relying on sociology, social learning, and self-presentation constructs would enhance research to better understand online social interaction. Additionally, Chih-

Hsiung Tu and Michael Corry's article, "Building eLearning communities" expands on the online social process by providing a conceptual framework for developing an eLearning environment. The impact of eLearning communities on human learning is considered as well as recommendations for future research.

Laferriere, Bracewell, and Breuleux's article, "The emerging ecological contribution of online resources and tools to K-12 classrooms" explains the ecological contribution of online network technologies on student learning. Research based on observation has indicated that a distributed change across all educational activity should provide a new pedagogy in order to take full advantage of information and communication technologies.

In summary, the integration of technology and education has provided change in pedagogy, learning, and social interaction. Future research and refinement of theory should expand the understanding of the dynamic processes regarding teaching and learning using technology.

The Emerging Ecological Contribution of Online Resources and Tools to K-12 Classrooms

Thérèse Laferrière, Laval University, Canada, tlaf@fse.ulaval.ca
Robert Bracewell, McGill University, Canada, robert.bracewell@mcgill.ca
Alain Breuleux, McGill University, Canada, Breuleux@Education.McGill.ca

Abstract : This paper presents the emerging ecological contribution of online network technologies on student learning. Significant effects of the use of ICTs were gathered from documentary reviews. An organizing framework was developed in order to make sense of preliminary observations, in combination with raising scientific discourse on the teaching-learning process. The framework was further validated through the research team's extensive participant observation in networked classrooms. Twelve observations are formulated out of the research literature. They regard process over product. Both the organizing framework and the observations form the basis of an ecological perspective on the contribution of online resources and tools to K-12 classrooms.

Introduction

Learning with online tools and resources is emerging in the brick-and-mortar primary and secondary school of North America. Meanwhile, an increasing number of researchers, including cognitive scientists and teacher educators, recognize that the teaching-learning process must evolve. It is advocated that teacher-talk and rote knowledge (addition and retention of facts, principles, and procedures) on the part of the learner must give way to higher-thinking skills acquisition for all (Resnick, 1998), and teaching for understanding (Bereiter, in press).

The contribution of new technologies to K-12 classroom learning and teaching will not obviously be well known for many years to come. As its title suggests, this paper focuses on the physical classroom, not the virtual one. The network capacity of classrooms and schools is emphasized, and not only the simple fact that resources and tools are online. A theoretical approach to the ecology of the networked classroom is presented, one grounded in three documentary reviews on the contribution of new technologies to teaching and learning (1996, 1998, 2001), and in our ongoing participant observation of networked classroom processes and products (1995-2002). A comprehensive framework emphasizing extreme circumstances of use is brought forward, followed by propositions that organize results found in scholarly works and other highly relevant studies, pointing to emerging observations in the process.

The method

The online search dealt with the contribution of new information technologies to learning and teaching in elementary and secondary schools for the 1998-2000 period. The search was exhaustive and emphasized articles, reports, papers and book chapters meeting the criteria for scholarly publications. Proceedings were judged to be of an exploratory nature which usually do not present final conclusions and findings, but some papers presented at conferences were included to support specific trends. Finally, a search using Internet search engines such as Alta Vista or Excite was also excluded since the volume of information retrieved would have been too large, many of the articles would not meet scholarly criteria and it would have be difficult to evaluate and authenticate the studies. However, online articles, reports, and papers meeting scholarly criteria were included.

The organization framework

The past five years have seen a radical change in what researchers sees as being important when considering the contribution of online resources and tools to teaching and learning in the classroom. Prior to this period, much of the research in this area can be described as implementing a rather simplistic horse-race model, in that the studies were designed to compare whether or by what amount the use of a particular technology was more successful in promoting learning than another technology or a traditional instructional practice (Zhao, Byers, Pugh & Sheldon, 2001). In contrast, more recent perspectives are grappling with the complexities of integrating online resources and tools with learners, teachers, administrators, and instruction. In a heartfelt and accessible call for a more encompassing treatment of online technologies in education, Nardi and O'Day (1999) apply the metaphor of *ecology* to the use of these technologies in the classroom, thereby highlighting the systematic relationships among participants and resources, the diversity found in educational settings, and the potential for evolution of instructional practices.

This ecological (as opposed to horse-race perspective) can be seen in the theoretical tools now being deployed in studies and analyses. Researchers are developing and applying both existing and new theoretical constructs to understand conditions for the effective use of online technologies. These include learner characteristics such as *metacognitive abilities* and *epistemological belief* (Hartley & Bedixen, 2001) and contextual variables such as the *distance* of new practices using online technologies from existing instructional practices and the degree of *dependence* of teachers using online technologies on non-traditional resources and personnel (Zhao et al, 2001). Researchers are also turning to and applying more comprehensive theoretical frameworks in investigating online technologies and resources in the classroom. These frameworks *include communities of practice* (Barab & Duffy, 2000), *problem solving* (Jonassen, 2000b), *cultural psychology* (Brown & Cole, 2000), and *activity systems theory* (Jonassen, 2000a) Application of these frameworks both provides a more adequate description of what is required for effective integration of online resources (and ICTs generally) and also brings this research and its application into the mainstream of educational research and professional practice.

Our ecological perspective relies on a number of constructs to organize the findings of the documentary reviews. The first of these has to do with the nature of change in educational practices involving online technology. Change can be characterized as being either incremental or transformative: *Incremental change* refers to the use of technology to carry out already existing instructional tasks in more effective and efficient ways; *transformative change* refers to the use of technology to instruct in new ways (Maddux, Johnson, & Willis, 1997). In addition, the implementation of change can be characterized as either isolated or distributed—it is clear from the research findings that effective use of online technologies in education requires *distributed change* involving all the constituents of educational activity. The second set of constructs has to do with the educational constituents, which are characterized in terms of Schwab's (1973), four commonplaces (or dimensions) of the educational situation: The *teacher*, the *content*, the *learner*, and the *context* (see Figure 1). With respect to the use and effect of online resources, the four constructs vary in the following ways:

- The *teacher*, who, at one extreme, may be primarily concerned with delivering content information to the learner using online technology while, at the other extreme, may be concerned primarily with facilitating network activities of the learner that result in learning;
- The *content*, which, at one extreme, may be a fact or already existing body of knowledge and, at the other extreme, may be a theme or project that is being built up by the learner(s);
- The *learner*, who at one extreme, may have only limited access to online technology and network capabilities through a school-based lab and, at the other extreme, may have full access via laptop and modem;
- The *context*, which, at one extreme, would provide minimal support with respect to leadership and knowledge for the use of online resources and, at the other extreme, would involve participation and support from all stakeholders (teachers, administration, and parents).

Figure 1: The four constituents of the educational situation in networked classrooms and their variations.

Most current classrooms would lie toward the left end of each continuum: 1) the teacher is a transmitter of knowledge rather than a facilitator of learning, 2) the content is pre-organized by the teacher or 'canned' on a CD-ROM or a web site, rather than constructed by the learner; 3) the learners have low rather than high access to online resources and tools; and 4) the context offers the teacher and his or her classroom a limited rather than a high level of support for new initiatives and resources. This model of use, called (TCLC -), which stands for each of the first letters of the four basic constituents, is being given here the notation minus (-) in order to point to low levels of interaction between the teacher and the learners, pre-organized content if any, low access to online resources and tools, and limited support from the external context.

The TCLC - model of use or any of the three other variations in which one of the four constituents is at a low level is still by far the most frequent situation at this point in time. However, we believe that the educational situation is evolving in that learners' access is less limited, and that the context has offered some technical support and opportunities for professional development to teachers. In contrast, the overwhelming thrust of research initiatives within the socio-cognitive psychological perspective would seem to be directed towards the opposite ends of each continuum: teacher/facilitator, content/constructed, learners/high access, context/extensive support (TCLC + Model of use). Here, the teacher primarily facilitates student learning, the curriculum content is largely constructed by the learners, the learners have free access to online resources, and the context supports the use and expansion of the resources.

Emerging observations in the networked classroom

First, with respect to the learner:

Observation 1: *Higher levels of control by learners are called for as classrooms are getting more online.* The student is found to play a more active role in the networked classroom.

Observation 2: *Online resources boost student interest and motivation in the classroom through a greater diversity of learning goals, projects, and outcomes.* Student motivation is increased, and this is consistently found across diverse groups of learners.

Observation 3: *Learners' thinking becomes more visible.* Computer applications facilitate the construction of knowledge representations that can be seen by the teacher and classmates.

Second, with respect to the content:

Observation 4: *Internet and learning projects are broadening the curriculum.* An increasing number of educational services are being offered online, and these include drill-and-practice learning activities as well as more open-ended activities such as telecommunication exchange.

Observation 5: *There is a greater range of construction of content by school learners.* In the networked classroom where the teacher has a powerful repertoire of pedagogical strategies, the content is more diverse and there is more student input. More advanced topics are studied.

Third, with respect to the teacher:

Observation 6: *Learning situations become more realistic and authentic as classrooms are getting* online. Both access to online resources and learners' increasing engagement in the construction of content is conducive to better and more authentic learning situations in the classroom.

Observation 7: The successful online classroom combines information technology with appropriate pedagogy. The more engaged teachers have students do more collaboration and communication, carry out more and longer work on projects and have students tackle more open-ended problems.

Observation 8: New online practices by educators are adopted through adaptation. The dissemination and implementation of effective uses of online technologies in classrooms take account of local contexts of instruction.

Fourth, with respect to the context:

Observation 9: *Cooperative and collaborative classroom processes are increased online.* Small group learning with computer technology has positive effects on group task performance, individual achievement, and attitudes toward collaborative learning.

Observation 10: *The education of educators is broadened to include just-in-time or collaborative learning.* Teachers have had the opportunity to join virtual interest groups and learning communities for nearly a decade, but teachers are far from taking full advantage of such opportunities.

Observation 11: *The online classroom challenges the locally-established curriculum.* Transmission of the curriculum by the teacher gives way to more approaches where the learner interacts more directly with online content.

Observation 12: *Educators use online learning as a key enabler of educational reform.* Evidence has been building on the mutual dependency between the use of online tools for learning and school renewal efforts.

Discussion

Information and communication technologies (ICTs) present us with a unique opportunity and challenge, to reach for a more human approach to teaching and learning with the purpose of preparing knowledgeable, democratic and socially responsible citizens. Therefore, to downplay the role of the teacher in the education of the knowledge worker of tomorrow – the formation and cultivation of understanding (*episteme*, knowing-that) and practical judgment (*phronesis*, knowing-why) – and to overplay that of the skillful production of artifacts as well as that of the expert mastery of objectified tasks (*techne*, knowing-how), would be here ill-advised. The new pedagogy put forward by the above observations constitutes not only a model of improved human relations but of sociocognitive processes in the classroom.

Teachers' creative integration of ICTs in the curriculum is likely to bring significant changes in the way schools carry out their educational mission. The school culture is bound to open up and to become more collaborative for the teachers and learners to face the inherent changes called for by the wide acceptance of the networked computer. On-line discussions conducted on a small group, on a school basis or on a broader scale, may greatly contribute to the development of such an expectation.

Network-enabled learning communities appear to provide most benefits: on-time access to resources, including best available practice on various subjects being studied, joint exploration of topics and issues, reflective analysis of educational situations, etc. Teacher learning communities that contribute to the intellectual life of the teacher outside the classroom (face-to-face and on-line discussions), and support his or her professional practice are key.

Conclusion

It is important to remember that the classroom is a place where order prevails. The infusion of information and communication technologies (ICTs) creates a zone of uncertainty for both teachers and learners, one that will engage them in a process of risk and exploration for some time to come. This uncertainty may be reduced by a better understanding of the sociotechnical framework needed to take full advantage of available ICTs. Research on one or the other of the four basic constituents (learner, content, teacher, context), while neglecting the others, is bound to lead to partial and confusing results that tend to raise superficial questions and unproductive debates. The interdependence of the four constituents that this review takes into account (and highly recommends for consideration in all further inquiry) should be progressively documented with respect to the impact of online technologies on teaching and learning in the classroom. More recent conceptual developments occurring in other fields such as the learning organization framework and the new domain of knowledge management, seem to point in the same direction.

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Pedagogical Ethnotechnography: A bifocal lens to understand technology in Education.

Prince Hycy Bull, North Carolina State University, US

Pedagogical Ethnotechnography

In an attempt to understand curriculum as a technological text, I developed the concept of pedagogical ethnotechnography as a research method. Ethnotechnography has its root words in Greek origins; *ethnos* from the nouns nation, tribe or people, "*techne*" is translated as art, craft or skill and "*graphy*" from the verb to write. Aristotle defines "techne" as the systematic knowledge for intelligent human action. Ely (1983) defines technology as " any systematized practical knowledge, based on experimentation and/or scientific theory, which enhances the capacity of society to produce goods and services, and which is embodied in productive skills, organization, or machinery." The term ethnotechnography simply means writing about technology as experience by people within a defined boundary.

Understanding Curriculum as an Ethnotechnography Text

Ethnotechnography as envisaged has several branches from which lived technological experiences can be study. Ethnotechnography can be viewed as "cultural ethnotechnography", "business ethnotechnography," "medical ethnotechnography," and "Pedagogical ethnotechnography."

Cultural ethnotechnography can be viewed on how members of a given group or community use or perceive technology within their culture. One major area that this may cover is the study of the "digital divide" from a cultural diversity perspective. One can also study cultural ethnotechnography from an ethnic perspective within society. Business ethnotechnography would focus on how technology is used in the business world. Medical ethnotechnography would focus on the use of technology in the medical field. Pedagogical ethnotechnography is a study of technology as a pedagogical tool as experienced by stakeholders - students, teachers, or school administrators - within an educational realm with an empirical analytic paradigm within a defined boundary set by the empirical analytic paradigm. The educational realm of pedagogical ethnotechnography spans the spectrum of educational delivery from preschool to higher education to educational policy makers. The emphasis in pedagogical ethnotechnography is the rich description of the lived experience as experienced by the participants- teachers, students, parents, administrators and policy makers.

Boundaries within pedagogical Ethnotechnography

The boundary that is set in pedagogical ethnotechnography is not a physical or geographical one, rather it is a scientific boundary to determine entry points in terms of skill level, perception or attitude, or usage before the lived experience and the exit point in terms of skill level, attitudes and usage after the lived experience.

Procedures to conduct a pedagogical ethnotechnography

1. Identify a pedagogical ethnotechnographical issue as it is lived by participants.
2. Prior to investigation, design an empirical- analytic paradigm to determine the boundary of the lived experience. By boundary I mean, entry and exit points or pre and posttests of the experiences as lived within defined parameters.
3. Investigate the pedagogical ethnotechnographical issue as it is lived by participants
4. Reflect upon the issues, essential themes or structures that occurred within the defined boundary physically or virtually.
5. Describe the lived pedagogical ethnotechnographical issue using the art of writing supported by empirical analytic paradigm.

Pedagogical Ethnotechnography and Collaborative Autobiography

Ethnotechnography can be studied using collaborative autobiography of participants lived experiences with technology. Richard Butt and Danielle Raymond advocate the use of shared autobiographical works to help teachers understand their 'lived experiences'. The concept of "collective biography" is formulated to point to the appropriateness of reporting and analyzing teachers shared or common experiences. Butt and Richard gives credence to the ethnotechnographical research methodology when they state that in the process of interpreting individual and collective biographies, one might blend qualitative and quantitative aspects of educational experiences.

Pedagogical Ethnotechnography and Phenomenology

Phenomenology is that form of inquiry, which focuses on human perception and experience. As one can see from the definitions, phenomenology and pedagogical ethnotechnography share similarities but there are stark differences between the two.

- Both theories study the world as it is lived. Phenomenology seeks to produce knowledge of what it means to be human. Ethnotechnography seeks to understand what it means to be human in using technology as a pedagogical tool. Also, with ethnotechnography, lived experience means both physical and virtual. Virtual in the sense of what is observed via e-mail, listserv, forums, teleconferencing and e-chat databases.
- Phenomenology theory seeks to ask the "what" instead of "how" questions. Pedagogical ethnotechnography asks both the "what" and the "how" questions.
- Van Manen states that phenomenology is a conscious practice of thoughtfulness and always embodies a poetic quality. I also envisage ethnotechnography as a conscious practice of thoughtfulness but not limited to poetic quality. I envisage a blissful harmony between empirical- analytic paradigm and poetic quality. One in which poetic articulation becomes the lead singer and empirical-analysis the backup singer.
- Phenomenology theory begins with a single case, moves to the universal, and returns to the single instance. Once ethnotechnographical theory takes off with a single case, it simultaneously develops universal and single tentacles to support both single and universal instances.

Some Benefits of Pedagogical Ethnotechnography

1. The qualitative and quantitative aspects compliment and validate each other in terms of the data collected and analyzed.
2. The disparities between qualitative and quantitative issues, if apparent are easily identified within the same study rather than in future studies.
3. The findings of pedagogical ethnotechnography are easily generalized to the target population.

The Design of Electronic Learning Environments in Teacher Education: Understanding the Importance of Representation as a Choice in Technology Production

Sebnem Cilesiz
Ph.D. Student
Educational Technology Program
University of Florida
USA
cilesiz@grove.ufl.edu

Richard E. Ferdig
Assistant Professor
Educational Technology Program
University of Florida
USA
rferdig@coe.ufl.edu

Abstract: We use representations and abstractions in every aspect of our lives. Designing and choosing the right representation is very important as Norman (1993) states "because [representations] allow us to work with events and things absent in space and time, or for that matter, events and things that never existed – imaginary objects and concepts" (p.49). In distance education environments, teachers and learners face representations rather than real entities. Thus, correct representation becomes essential in designing electronic learning environments. The authors draw on the importance of representation in cognition in, specifically when designing electronic learning environments. The authors also reflect on related topics and suggest that further studies be done.

Don Norman (1993), in his famous book "Things That Make Us Smart", makes the argument that representations are important "because they allow us to work with events and things absent in space and time, or for that matter, events and things that never existed – imaginary objects and concepts" (p.49). He also says that the "trick is to get the abstractions right, to represent the important aspect and not the unimportant" (p.49). In other words, the user of the representation is expected to understand the idea or concept—without the existence of the original—by looking at and making inferences about the representation.

His statements about representation are *important* because of the ubiquity of representations in our life. The Oxford English Dictionary (2001) defines representation as:

1. A material image or figure; a reproduction in some material or tangible form
2. The fact of expressing or denoting by means of a figure or symbol; symbolic action or exhibition
3. The action of presenting to the mind or imagination; an image thus presented; a clearly conceived idea or concept.

These definitions point to the fact that representations are things we use in our everyday lives. They include such things as numbers, alphabet, attire, graphs, imagery, tables, and even language. Norman (1993) even argues that the powers of cognition *come from* abstraction and representation: "the ability to represent perceptions, experiences, and thoughts in some medium other than in which they have occurred, abstracted away from irrelevant details" (p.47).

His statements about representation are also *timely*, though, as we begin to work with and through technology. As we begin to teach and learn with technology, we create cognitive artifacts that are, in and of themselves, representations. (for that matter, Donald (1991) would argue that human cognitive evolution itself has been greatly affected by our representational abilities.) Norman (1993) had foreshadowed this aspect in his writing, arguing that the future of human evolution would be through technology. Shaffer & Kaput (1999) follow Norman and state that "computational media make it possible to externalize not only information, but also the *processing* of information" (p.102, italics in the original). Thus, one of the most important affordances of computational media is their ability to allow for conversion of multiple representations, which eases many cognitive tasks. In some sense, we now continue to create representations as we have always done. However, we are also beginning to create meta-representations to better serve our cognitive needs because of the tools we have available.

Since representation affects cognition, it has a vital role in education and learning technologies. Distance education in specific requires focused attention on representations, because these environments lack many supplementary features of human communication, namely interaction. In other words, these electronic environs use representations as major substitutes for missing elements in non-face-to-face interactions (Muirhead, 2000). In traditional learning environments we can back up false or missing representations by additional features to convey the intended message, however we do not have the same luxury in online environments.

Representation is further important in education because it affects not only the way teachers perceive the designer's intentions but also the way they design their teaching, thus affecting their students' perception. Norman (1993) implies that teaching is a *skill* of understanding "how a topic has to be presented" so that the learner can "acquire it most readily and successfully" (p.121). For example, Suzanne Nyrop (2001) utilizes representation very well in the online environment TappedIn. (TappedIn is an online teacher professional development environment enabling teachers to discuss and share ideas. It is available at http://www.tappedin.org/) She says that she likes to combine play and work in her virtual office "Susanne's Virtual Playground". She continues "Here, I keep my notes and records for later retrieval. I also enjoy my virtual pets. Virtual food and beverages are available to offer to my virtual guests" (http://www.tappedin.org/info/perspectives/sn.html). As all other users and designers, Nyrop has made a decision to represent herself. Embedded in all representation is decisions and assumptions – decisions on how we want others to perceive us and assumptions on how they see us. [This reflects the theory of Symbolic Interactionism]. Nyrop chose to represent her office as a playground. This increases the likelihood that people interested in combining work and play will visit her office and meet her. Thus, in some sense, her representation has succeeded.

As representations are important, they should be considered as such for designing electronic learning environments for teacher education. The discussions have many implications for designing online teacher education environments. We suggest that further studies that (i) provides a more complete history of representation and cognition drawing on the works of Donald and Shaffer & Kaput, (ii) describes how to become cognizant of representations (iii) using Mead's Theory of Symbolic Interactionism, presents information about the self and ways to design representations. (iv) concludes with implications for design and future study needs be conducted.

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Techno-Humanism: Teaching and learning for an Information Age

Charles Dickens, Tennessee State University, US

Several decades ago there was a movement in curriculum for a humanistic education. In part it represented a reaction of educators against the behavioral theories that of learning that were then dominating curriculum and educational policy making. This paper explores the apparent failure of the humanistic education movement and the part that contemporary information technologies play in its revitalization.

EDUCATING TEACHERS FOR THE KNOWLEDGE ECONOMY

Tony Fetherston
Center for Curriculum and Learning Technologies
Edith Cowan University
Western Australia
t.fetherston@cowan.edu.au

Abstract: Driven by common international trends and the acceptance of such constructs as the knowledge economy, pre service teacher education institutions are forced to conceptualise how to integrate ICT into their curriculum. In this paper the author proposes that Habermas's three domains of human interest are an excellent beginning in organizing the curriculum to include ICT. Using these domains he proposes possible curriculum content under headings of What should they be able to do, What should they actually do (in the classroom) and What knowledge empowers them.

Education systems in Australia at all levels increasingly have to respond to the challenge of incorporating Information and Communications Technology (ICT) into curricula. Like many other countries, Government policies mostly drive this movement. Recent Australian National reports such as: Teachers for the 21st Century: Making the Difference (DETYA 2000a); Learning for the Knowledge Society (EdNA 2000); and Models of Teacher Professional Development for the Integration of ICT into Classroom Practice (DETYA 2000b) all highlight the importance of teachers being able to integrate ICT into normal classroom practice. As pre service teacher educators, need to revisit what and how we teach this group of students.

Another factor, which forces us to examine practice at all levels in regard to ICT in Australia, is that Australian State governments are rapidly equipping schools with computers and Internet access. This access is occuring concurrently with a national initiative designed to develop a wide array of on - line learning resources.

All these elements focus attention on the preparation of our pre service teacher education students for the rapidly changing context in which they will eventually work. We, as pre service teacher educators, need to revisit what and how we teach these students.

Deciding on what we should teach our pre service teachers is essentially a curriculum design task. This is a task as Grundy (1987) describes, of "constructing" or "designing" a curriculum (p27). Approaches that are dynamic and interactive appear to hold the most promise. These approaches usually start from the premises that planning involves making decisions about the learning experiences of students (content and process), that it will involve many groups, that it will take place at many levels and that it is a continuous process (Beane, Toepfer & Alessi 1991).

It appears that a useful beginning point might be to accept that planning curriculum involves making decisions about the learning experiences of students (content and process). So what follows then is just one personal conceptualisation of what we should be teaching our preservice teachers. It is accepted that other processes would need to follow this beginning. What is proposed below would have to be subjected to some kind of systematic process before it was adopted and these processes

In my thinking about learning experiences of pre service students, it occurred to me that Habermas's views about the three domains of human interest in learning might be useful. These areas define cognitive interests and are grounded in different aspects of social existence that include work, interaction and power. In regard to pre service teachers, this grouping can be put very simply. At the end of their course What should they be able to do, What should they actually do (in the classroom) and What knowledge empowers them? In the remainder of this paper I would like to use this scheme to propose some answers to the main question of what we should teach.

What should they be able to do?

It is difficult to define exactly what teacher's technical skills should be, as we all know that the history of the ICT industry shows us that technical advances are inexorable and rapid. Nonetheless it is possible to define some generic areas in which they should have enabling skills. Enabling skills are those that I define as those that enable a graduating teacher to use ICT for learning purposes. In other words they are generic skills that become transferable and ubiquitous but allow the user to accomplish much more in learning terms than if they didn't have the skill.

A good example of an enabling skill is word processing. Teachers should be able to use a word processor to enter text, format text, check spelling and print and this skill should be at mastery level. These skills should be transferable to word processing programs other than the program on which they were learnt. These skills would also be able to be used to advantage in other programs. Teachers should have similar kinds of basic skills in the use of a spreadsheet, database and presentation software. They should be able to use a web browser and search engine to locate information efficiently on the Internet. Every teacher should be able to receive and send an email, know how to subscribe to a list server and conduct an on-line chat session

I think it is also reasonable to expect teachers to be adept at transferring digital information to, from and around a computer. Teachers need to be skilled in these transfer procedures in regard to still pictures and in regard to video and sound files. I believe also that all teachers should be able to construct a simple Web page and mount it on a server.

Should all teachers be required to know how to configure a computer so that it can act as a server or know how to maintain a network? Should they all have a passing familiarity with IP addresses? I don't think so but they should have a conceptual overview of what a network is. Such an overview would enable teachers to make good judgments about the use of emerging technologies like Wireless Application Protocol (WAP) devices.

Should they have knowledge of programming? Programming I would regard as a specialist curriculum subject not applicable to all preservice teachers but with a place in a preservice course for some specialist teachers. Similarly I believe that not all teachers need to know how to upgrade a computer or install a card or memory even though these skills are reasonably straightforward. Anyone aspiring towards a coordinating position in a school should be able to perform these tasks and so courses like this should be available as part of teacher training for those aspiring to specialist coordination positions.

What should they actually do?

How teachers should act in a classroom is essentially a pedagogical question. The answer depends on the individual teacher who takes into account many, often conflicting factors such as the learners' characteristics, their own curriculum knowledge, management issues, outcomes desired and the general social setting in which the learning occurs. The additional factor, which now has to be taken into account in many settings, is ICT. The key pedagogical question facing the teacher is how to best use these technologies to assist the learning process.

The dominant learning theory today is constructivism. Constructivist pedagogy acknowledges that students construct meanings that are individual, that students interpret classroom events in individual ways and that social processes are important in learning. This means that for example, when using new technologies like the Internet in the classroom, teachers should regard the Internet as not just a delivery medium but a potentially rich teaching and learning tool (Fetherston 2000). They would then use the Web to address student's own ideas, to allow students to become active participants in their learning and to attend to conceptual change.

Authentic approaches like situated cognition (Brown, Collins & Duguid 1989) are essentially constructivist approaches and the Web has enormous potential to assist with these approaches as they allow explicit links to be drawn between knowledge encountered and its conditions of use. For example, through communications technology students are well able to contact practitioners within their field of interest, to work collaboratively on real world problems and to compare their growing concepts with the expert's and other's conceptions.

Guided participation (Rogoff 1990) offers a sound theoretical framework to guide learning in this way. The Web can potentially allow a "…formal, instruction-oriented apprenticeship model in which novices are systematically coached, guided and supported by expert practitioners" (Hodson and Hodson 1998, p17) to be established. Participation in joint activities with more knowledgeable others is congruent with a social constructivist approach to learning and establishes an environment in which scaffolding can take place. Scaffolding in most settings is mostly a language-based activity that allows cognitive processes that occur first in this social plane to become shared processes and eventually to be internalised by a student. This Vygotskian (1978) process is deserving of much research in the on-line environment (and indeed in all classrooms).

Any pedagogy that embraces the use of ICT would recognise that when students use the Web they can potentially join a community. This community can be like-minded "surfers" or the community could be founded around a common topic and utilise communication technologies. By constructing and posting a web page students immediately have an audience for their work even if they do not know who and how many constitute this audience. For this to be meaningful in learning terms, students need good models to enable them to participate successfully in this environment and to be able to evaluate the quality of information available. Pre service teachers need to develop these models as part of their training. They need to also to be able to eventually implement them in their classes.

The knowledge economy has rapidly become a well-worn phrase. It refers to an economy that recognises that the generation and exploitation of knowledge play a dominant part in the creation of wealth. The rise of the knowledge economy is closely coupled to the globalisation of capital where capital continually circulates economies in search of maximum investment opportunities. Information technology has not just accelerated this process and made it more successful but is the key factor that underpins the existence of the knowledge economy. The key attribute of knowledge workers in the knowledge economy is that they are symbol handlers and that they know how to access and work with information, using ICT.

Romer sees knowledge as the third factor of production in leading economies (Romer 1990). Romer views knowledge as the basic form of capital, and economic growth as being driven by the accumulation of knowledge. Innovation, intelligence, concepts, symbol manipulators, information massagers would seem the essential "right stuff" for a successful knowledge worker. In the same way as machines were the stuff of the industrial revolution and people became wealthy by inventing new machines or new applications for existing machines, concepts are the stuff of the knowledge economy. People will become wealthy by coming up with new ideas or by applying new ideas in creative ways

This means that in terms of pedagogy our graduating teachers must have ways of assisting students so that they can turn information available on the world's biggest library into meaningful concepts. Of course before this can occur students need to know how to locate such information in the Internet environment and this ability is now I believe a critical literacy. Once having found the information, it is not the information itself but the effect of that information on students' own ideas that is important and teachers must know how to develop each student's individual understandings. Much research accords with the view of Becker (2000):

> "that teachers were three times more likely to have their students use the Internet if they held more constructivist beliefs about teaching in general—that is, they believed in devoting attention to student interest rather than curriculum coverage, focusing on critical thinking and real-world applications, and using complex problem solving in small groups to help students learn, compared with teachers with more traditional beliefs and practices" (p54).

For students entering the competitive knowledge economy it is their own ideas that they bring that are important as well as their ability to apply these concepts in new and interesting ways.

Metacognition and reflection are regarded almost universally as important elements that affect learning. As part of a pedagogy that embraces the use of ICT in schools, these elements need to be encouraged and developed. In addition students in schools increasingly need access to tools which enable them to track the progress of their own knowledge: not just by using tools like concept maps nor by working with data bases, but by using personal tools that track their own ideas and the influences upon them. They need tools which answer the metacognitive question "what was I thinking", tools that enable them to reify their ideas, to link these ideas to other ideas, to link them to what they know already, and allow them to also present these ideas in various forms to others. Allowing students to draw upon existing textual material, graphic images, video or web pages in order to present their ideas should facilitate this and accords with a constructivist framework. Unfortunately such cognitive tools that can do all this do not exist at present. However even presentation software like PowerPoint can assist with the process and pre service teachers need to know how to use these tools to accomplish as muchof the above as possible.

So what does the existence of the knowledge economy mean for pre -service teachers? Firstly it means that these teachers must know how to develop conceptual understanding in students. Teachers need understanding of broad based, conceptual change strategies generic through a range of units of study and across many learning areas. Teachers would probably need at least to become familiar with Posner, Strike, Hewson and Hewson's (1981) four conditions for conceptual change or Hewson, Beeth, & Thorley's later views that conceptual change can be seen through a change of status attributed to a particular conception (1998).

If we wished preservice teachers to adopt particular approaches to teaching in their classrooms, then teacher training organisations should model these approaches These organisations also need to re-examine some of the assumptions about what constitutes core content and what it means to be a teacher.

Deakin University (Victoria, Aust.) and Microsoft have entered into an agreement to implement a degree built around the philosophy of "learn while you work". Students complete 12 months study in traditional manner at university they will then complete the rest of their qualification while working and learning within the IT industry with a guaranteed job. They emerge with a bachelors degree, an industry qualification and two years of work experience.

We must construct similar innovative training for our pre service teachers as the people who teach the future knowledge workers need direct experience in the knowledge economy and this should be a national priority. Benefits would flow onto the students they teach. Perhaps it could be argued that pre service teachers are the group more than any other that need good knowledge of this industry.

What knowledge empowers?

What are students' values and perceptions of technology and how are they affected through interaction with ICT? Our pre service teachers need heightened awareness of the possible effects the use of these technologies have on the acceptance or not of individualistic values. Our teachers need to be able to critique the use of ICT in schools and to assist students to develop values that enable them to use these technologies in socially useful ways that enhance the human condition. They need an understanding of the social impacts of such technologies.

ICT technologies have the potential to alter our understanding of what is important, "which is another way of saying that embedded in every tool is an ideological bias, a predisposition to construct the world as one thing rather than another" (Postman 1990). Does the use of ICT in schools help construct a Technopoly where "the primary, if not the only, goal of human labor and thought is efficiency, that technical calculation is in all respects superior to human judgment ... and that the affairs of citizens are best guided and conducted by experts" (Postman 1993). Implicit in this statement is the realisation of such a society is based on the assumption that science is supreme and that ICT technologies support and make possible such a society. The knowledge society seems already disturbingly like this.

Conclusion

This paper started with the recognition of the importance of newly graduating teachers being able to develop learning environments that utilise ICT and which contribute to the realisation of a wide variety of learning outcomes. We need to examine what we teach our pre service teachers in regard to ICT and such an examination I regard as essentially a curriculum design task. After examining traditional approaches to design, I decided that a Habermasian view of knowledge centered on what this group should be able to do, what should they actually and what empowers was useful. I then suggested content that could be addressed under these headings in a pre service course. In conclusion I recognize that all the above attends mostly to scope and content: what has to follow are more systematic curriculum design processes in volving sequence, articulation and continuity.

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An Model of Self-Regulation Skills
-penetrable process and not-penetrable process -

Michiko KAYASHIMA
Faculty of Art
Tamagawa University
Japan
kayasima@lit.tamagawa.ac.jp

Abstract: ITS (Intelligent Tutoring Systems) researchers consider how ITS assists a user in the construction of knowledge. The formulation of an answer to this question examines a new instructional methodology. Additionally, it is observed that metacognition is involved with a new instructional methodology. In further exploration of these relationships, a metacognitive architecture, based on a production system as a cognitive architecture, is proposed.

Introduction

While learning theory maintains that learning is the successful transmission of knowledge, the central issue for traditional ITS (Intelligent Tutoring Systems) is finding efficient ways of transferring this knowledge. However learning theory has shifted to social constructivism or situated cognition. This has further shifted the view of learning from instruction to construction [Koschmann, 1996]. The new learning theory forces ITS researchers to explore new ways to help learners in their acquisition of knowledge such as coaching self-explanation [Conati and Vanlehn, 2000].

We deem the successful acquisition of self-regulation skills as a new and helpful way to help learners to acquire knowledge. Self-regulation skills, that are parts of metacognition, allow one to monitor and control one's cognition by oneself [Brown, 1987]. Supporting to acquire self-regulation skills allows learners to apply their knowledge to wider variety problems.

The new learning theory takes a nonabsolutist, fallibilist view of knowledge as constructed, and views this construction to be essentially a social process [Ernest, 1995]. According to this theory, knowledge is closely connected with a social situation on which knowledge is constructed. Despite of this view of knowledge, human experts can use their knowledge in multiple ways according to context. Their flexibility depends on not their general knowledge but their strategy to use cognitive resource efficiently. We believe that a learner's self-regulation skills could cause the learner to apply their knowledge to the problem solving in different situations. The purpose of this study is to help learners acquire self-regulation skills.

The acquisition of self-regulation skills helps learners to make their knowledge plastic. Discovery learning requires learners to reflect upon procedures used in solving tasks and to explore which procedures must be improved [Collins and Brown, 1988]. However, solely utilizing a discovery learning system such as LOGO does not require the learner to directly monitor and control cognitive activities by himself. Adding them to a function to help learners to monitor and control their cognitive activities by themselves augments the weak point of these systems. In this study, we utilize production systems to represent a model of self-regulation skills. Production systems are adequate for this study, because they represent human cognitive architecture, and they are constructed by a set of condition-act pairs called productions. The separation between acts and conditions have the possibility to apply actions to different conditions.

In this paper, we propose a model for self-regulation skills, which are based on production systems. We will first describe production systems. Next, we will categorize cognitive process into "penetrable processes" and "not-penetrable processes". This distinction can be viewed as the difference of inferential mechanism at production systems. Continuing, we will propose a model of self-regulation skill.

Production systems

Here we wish to describe production systems, which are known as cognitive computational architectures.

There are a number of candidates for general computational architectures for achieving a mental system, including general problem solvers [Newell and Simon, 1972], general schema systems [Minsky, 1975, Shank and Abelson, 1977], ACT* (Adaptive Control of Thought Star) [Anderson, 1982], SOAR(State Operator and Result). ACT* and SOAR have been predicated on the hypothesis that production systems provide the right kind of general computational architecture.

A production system consists of two memories: working memory, and long-term memory. Working memory contains the information that system can currently access, consisting of facts retrieved from long-term memory as well as temporary structures deposited by encoding processes and the action of productions. Long-term memory contains facts and productions. The basic claim of production systems is that underlying human cognition is a set of condition-action pairs called productions. The condition specifies some data patterns, and if elements matching these patterns are in working memory, then the production can apply. The basic action is to add new data elements to working memory.

According to ACT*, all knowledge initially acquired declaratively through instruction must be interpreted and reorganized into general procedures through experience. However, by performing a task, proceduralization gradually replaces interpretive application with productions that perform the behavior directly. This mechanism is a learning mechanism. It is referred to as knowledge compilation on ACT*· and called chunking by SOAR, creating task-specific productions through practice. Knowledge compilation is the means by which new productions enter the system.

The knowledge compilation processes in ACT*can be divided into two sub processes. One, which is called composition, takes a sequence of productions that follow each other in solving a particular problem and collapses them into a single production that has the effect of the sequence. A composed production still requires that the information be retrieved from long-term memory, held in working memory, and matched to second and subsequent clauses. The second process, proceduralization, builds new productions. These productions no longer require the domain-specific information to be retrieved into working memory. Rather, the essential products of these retrieval operations are built into the new productions [Anderson, 1982].

Penetrable processes and not penetrable processes

Here, we will categorize productions into penetrable processes and not penetrable processes. This distinction implies the difference of inferential mechanism within production systems.

Penetrable processes and not penetrable processes

According to one of cognitive psychology's recurrent hypotheses, there are two modes of cognitive processing. One is automatic, less capacity-limited, possibly parallel, invoked directly by stimulus input. The second requires conscious control, has severe capacity limitations, is possibly serial, and is invoked in response to internal goals [Anderson, 1996]. Also, a process can be considered as semantically penetrable or not. A penetrable process is a process that can be affected by specific instructions or by giving some explicit information [Pylyshym, 1998].

Here, we wish to distinguish the above-mentioned productions between penetrable processes and not penetrable processes. Proceduralized productions and composed productions are not-penetrable, a sequence of general productions is penetrable.

First, we consider that the process of a sequence of general productions is penetrable. The process of combining one general production with other general productions can be affected by data in working memory retrieved from long term memory, data encoded from the outside world, data deposited by executing production, or conflict resolution. Here, we describe the process to decide a general production which should be executed. These data in working memory and conflict resolution decide the production to be combined as a sequence of productions to solve a problem as in the following. In the match process, data in working memory are put into correspondence with the conditions of productions, and then a conflict set of productions is selected. Then only one production that will be executed is chosen by a conflict resolution principle (Fig. 1). Therefore, the execution of a sequence of general productions is penetrable. From this process, a sequence of general productions for solving a problem can be shown in Fig. 2.

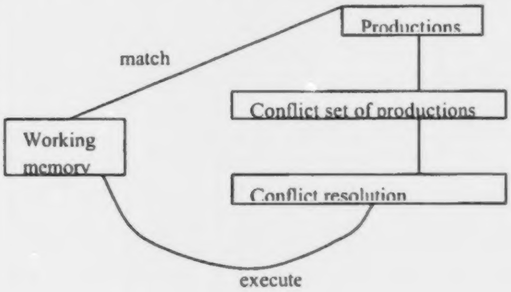

Figure 1

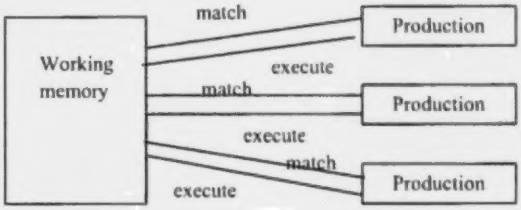

Figure 2 A sequence of general productions

However, although the execution of composed production involves the match process, data in working memory are put into correspondence with the conditions of productions, the match process cannot affect the choice of a production. The process of composed production is a non-penetrable process(Fig.3). Also, the process of proceduralized productions no longer invokes the match process and then is a non-penetrable process (Fig.4). Therefore, both processes of composed productions and proceduralized productions are not-penetrable processes.

The distinction between penetrable process and not-penetrable process indicates the difference of inferential rule in production systems. Although penetrable process is affected by data in the working memory that production appended immediately, not-penetrable process is not. Furthermore, the distinction between composed productions and proceduralized productions can be viewed as the difference of the extent of knowledge compilation.

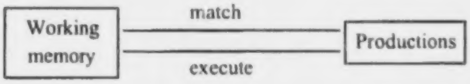

Figure3 Composed Productions

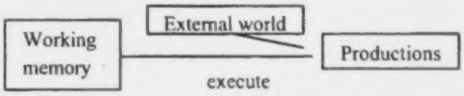

Figure 4 Procedualized Productions

A model of self-regulation skills

Here, we propose a model of self-regulation skills.

The architecture for both cognitive and metacognitive process is same

The same architecture must be responsible for both cognitive and metacognitive processes simultaneously [Lories, Darsenne and Yzerbyt, 1998]. This idea leads to the following cognitive process and metacognitive process. Cognitive process is the processing of the information, which is retrieved from long-term memory or the outside world and held in working memory by standard cognitive architecture. Metacognitive process is considered as processing the information that is held in working memory as a product of cognitive process by the same cognitive architecture.

A model of self-regulation skills

As self-regulation skills rely on cognitive process, self-regulation skills on penetrable processes may be different from those of not-penetrable processes. Self-regulation skills which rely on penetrable process result in the monitoring and control of the inferential process. But self-regulation skills which rely on not-penetrable process result in monitoring and control of the composed process. Although the process of self-regulation skills is different, both of them process information in working memory. The contents of working memory included actions of production that were executed immediately.

Penetrable process

As Self-regulation skills are employed to monitor and control inferential processes which were executed for achieving a goal, they can be viewed as exploring a set of productions that have been executed. The trace chaining is shown in the following .

step1. A production in which actions correspond with data that is set as a goal, is chosen.

step2. If conditions of the productions correspond with data in working memory, go to step 3.

step3. A production in which actions correspond with conditions of the chosen production is selected. If there are no productions to which actions correspond with conditions of the chosen production, the process will stop. If a suitable option may be chosen, go to the step 2.

The trace chaining will separate composed production into a sequence of productions. Next, this separation must be evaluated as to whether it is justified.

The relationship between the actions of the productions that were chosen at the last and the conditions of the productions that were chosen next to last in the sequence is evaluated as to whether it is cause and effect. If it is cause and effect, the sequence is justifiable. If not, the sequence must be improved. This process indicates self-regulation skills.

Not-penetrable process

Here, we propose to divide composed productions and proceduralized productions into a sequence of general productions as self-regulation skills. As not-penetrable process doesn't involve the choice of appropriate production, we must evaluate and regulate the process of knowledge compilation as self-regulation skills. This idea is seen in NEOMYCINE's decompilation. Decompilation is the separation of strategic knowledge from domain facts and rules. This was an attempt to recognize the performance of human experts who can access their knowledge in multiple attempts according to context [Wenger, 1987].

To divide composed productions and proceduralized productions into a sequence of general productions make the composition and proceduralization explicit, providing them warrants. The process of unpacking the complexity of these productions is to articulate knowledge, including justifications in both causal and teleological terms. From this, we propose to isolate composed productions and proceduralized productions by a sequence of original productions as self-regulation skills.

Additionally, proceduralized productions can be viewed as a part of composed productions. In other words, proceduralized productions are a specific form of composed productions. Thus, we describe a model of self-regulation skills of only composed productions.

The process of separating into a sequence of general productions is trace chaining without memory access. Consider the following productions which were demonstrated by Siegler [Siegler and Klahr, 1982].

P1: IF weight is the same THEN say "balance".

P2 : IF side X has more weight THEN say "X down".

P3 : IF weight is the same AND side X has more distance THEN say "X down".

P4 : IF side X has more weight AND side X has less distance THEN compute torques: t1=w1xd1; t2=w2xd2.

P5 : IF side X has more weight AND side X has more distance THEN say "X down".

P6: IF the torques are equal THEN say "balance".

P7: IF side X has more torques THEN say "balance".

Applied to the sequence of production P4 above followed by P6, composition create P4&P6.

P4&P6: IF side X has more weight AND side X has less distance AND compute torques: t1=w1xd1; t2=w2xd2. AND the torques are equal THEN say "balance".

After composed production P4&P6 is executed, data "balance" might be appended into working memory. Self-regulation skills on P4&P6 are described as the following.

The candidates of general production; P1, P6, and P7; the actions of which correspond with data "balance", are chosen. From these candidates, a sequence of general productions will be combined. We describe two cases; the candidates of general production P1 and P6.

The case of P1:

There are no productions, the actions of which correspond with conditions of production P1, "weight is the same". Then, a candidate sequence of general productions is P1.

The case of P6:

There is no production, the actions of which correspond with conditions of production P6 "the torques are equal". But the relation between the actions of the production P4 "compute torques" and the conditions of the productions P6 "the torques are equal" is of cause and effect, and consequently this connection may be evaluated as being justifiable. Next, the production, the actions of which correspond with conditions of production P4 "side X has more weight" and "side X has less distance" was chosen. But, there are no productions, the actions of which correspond with conditions of production P4; "side X has more weight". Then, a candidate sequence of general productions is P4 and P6.

There are two candidates of separation as a conflict set. As the condition of P1 "weight is the same" doesn't satisfy the criteria, a sequence of P4 and P6 is a candidate of separation.

Summary

We propose a model of self-regulation skills based on penetrable processes and one on not-penetrable processes.

Reflecting on the not-penetrable process, compiled knowledge has become so specialized toward a specific use as to have lost transparency and generality. The state of being compiled is independent from the process by which the state was reached [Wenger, 1987]. Therefore it is necessary to warrant compiled knowledge through the process by which the state was reached. Kitcher (1983) defines intellectual knowledge as warranted belief, where the "warrant" for a belief is a set of specific experimental episodes that have given rise to the belief and that justify it to a particular person. In other words, the actual warrant is a process.

The process of separating compiled knowledge into a sequence of general productions is also to justify it to oneself. Therefore the process of separating compiled knowledge into a sequence of general productions is one of self-regulation skills.

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Designing a Technology, Society and Education Course

Gulsun Kurubacak, Ed.D.
College of Education, New Mexico State University
College of Education, Anadolu University (On Leave of Absence)
kurubagu@nmsu.edu

Karin Wiburg, Ed.D.
College of Education
New Mexico State University
kwiburg@nmsu.edu

Abstract: A distance education professor from Turkey and a professor of Learning Technologies in the United States have collaborated on the design of a graduate course for studying the dynamics of change in an era of electronic technologies. They will describe the perspectives used to examine the impact of technology on society and thus on the pedagogical tools developed to enhance eventual online delivery. The course provides an opportunity for students of learning technologies to look at the field from broader perspectives through historical, sociological, political/economic, cultural and personal perspective on how technology has changed human activity. Through short writings, reaction papers to the books and research syntheses in an area of interest, students develop a personal change model and revisit that model. Students, also, wrote a science-fiction story that shows what they think education might be like in the future. Readings are from fields other than education.

Introduction

This graduate course titled "Society, Education & Technology" in the College of Education at New Mexico State University covered a lot of different aspects of how technology affects society and education. It began with the larger historical perspective offered by Toffler of how technology has changed world history during three distinct phases or waves of technological change moving from the agricultural to the industrial to the current information/communication age. We looked briefly at how technology and specifically computers have changed in the last 50 years and what that means for education. Our model of the changing functions of computers involved moving from computers as number crunchers to data processing machines to communication devices and finally to seeing computers and the networks they are connected to as a knowledge creation environment. Then we considered briefly how technological innovations have influenced education or not influenced it and finally we looked at some of the stages of technology use in education.

To explore the dynamic relationship between changes in technology, society, and education and their influence on human interactions and learning, students in this class collected information from a variety of perspectives, historical and philosophical, sociological and cultural, political and economic, and psychological and personal, and create their own knowledge environments related to technology, society, and education. They tried to find a answer to how technology affects society and thus education and technology and its relationship to societal change. They found these answers not only through reading widely in books outside of education but also by interviewing young students who were involved in using the web.

During the second week students received an invitation from the instructors to participate in a research symposium to be held toward the end of the class on the subject of technology, society and change. The students refined their questions and formed question research groups. The intention was for the class to formulate a number of powerful essential questions that can drive the investigations into the relationships between technology, society and education. An essential question must be meaningful and deep enough to lead to fruitful research and consideration of big ideas. The research groups developed questions about technology, society, and education, which are answered through interactive multimedia presentations, which will be presented at the (Society for Information Technology and Teacher Education (SITE) conference 2002.

The main objectives for the students were:

- To discover technology and its relationships tosocietal and educational change.
- To work in a project-based team to investigate a technology, society and education question deeply.
- To make assumptions based on their coursework and write a narrative on the future.

Background of the Class

In the words of Buffalo Springfield, *Something's happening here... what it is ain't exactly clear...* or as Dylan suggested *The times they are a-changing.* The world is not the same place in which we grew up or in which our parents and grandparents lived. We live in what Margaret Mead called *a post-figurative culture*, in other words a culture in which our children experience a whole different reality from what was experienced by older generations. The effect is that much of the knowledge we gained growing up may not be especially relevant or useful in today's world.

Yet, there are historical parallels to this period and common to these parallels are how society often reacts to fundamentally new technology. The course begins with a story from Socrates about the fears educators had about student learning when the alphabet was introduced. When the printing press was first invented no one envisioned the profound effect it would have on human activity. Books were still seen as something only for the elite. Language and literacy are crucial technologies influencing human events. History has many examples of how writing and reading was forbidden in different cultures including the slaves in early U.S. History. From 1066 to the late 1300's in England all official transactions were done in Latin or French. At one time English was only an oral language spoken by the peasants. By 1400 the people's English began to blend with French and Latin into Chaucer's Middle English and eventually modern English.

Now we have the personal computer. Where once only computer gurus in data processing departments could control the information to which people had access, an elementary student today can quickly access the Web and soon know more than his or her teacher about a specific subject. Scary. And then there is the more recent history of technological innovations in schools, so well articulated by Larry Cuban in *Teachers and Machines* (1986). In each era from films to radio to instructional television great claims have been made by researchers and technologists about how this new innovation will change education. In fact, very little has changed. Is there something fundamentally different this time? Is the web more like the printing press than just a faster engine? This class is about all of these issues. It asks the essential question: "How is technology changing the world and what does that mean for education?"

The historical perspective in this class was investigated by studying Toffler's three distinct waves of technological change from the agricultural to the industrial to the current information/communication age. Students also read *The Victorian Internet* (Standage, 1999) and compared this innovation to current web development. They were amazed at the similarities between the development of the telegraph and the web today. We looked at the long view of history using writers like Alvin Toffler and his book *The Third Wave*. We also began scanning current media to detect the hottest issues in society today in relationship to technology following the lead of Naisbitt's *Megatrends* (1991) a book he wrote based on column inches dedicated to current news. As part of the historical perspective students developed their own interactive timeline in relationship to the Question/Research group they join.

A sociological perspective included reading *Growing Up Digital* (Tapscott, 1999) and doing student interviews with *Netgeneration* students. Technology has always had a profound effect on human activity. Small communities were formed when the technology of firming was invented. The invention of the wheel made it possible to move goods and people easily from place to place and contributed to the creation of commerce. The class investigated models of the change process, examined speculations related to the directions and dynamics of change in an era of electronic technologies, explored shifts in the cultural and personal activities and relations of humans, and speculated on concomitant educational implications. Each student developed a personal model of change and shared it in class.

We also discussed the importance of tools. Technology is not neutral, but affords different kinds of activities (Norman, 1994). As computer capacity has grown and network resources increased exponentially the power of computers have changed from what were at first glorified typing and teaching machines to systems in which it is now possible to create as well as distribute education. High levels of access allow teachers and students to participate with others in the community and to generate new community knowledge environments. One of the important potentials for today's interactive multimedia technology is to help students who are English Language Learners. Technology can also afford community building or individualistic types of learning.

In the year in which the Berlin Wall fell (November 9, 1989), Francis Fukuyama (1993) believed that the end of the cold war signaled the end of a long ideological evolution from feudal times through republics, communistic approaches, to the final form of government - a universalization of liberal democracy. In contrast, Samuel Huntington (2001) highlighted that the world was entering a new period in which there would be a Clash of Civilizations. He issued a much more ominous forecast and suggested that the passing of the cold war had brought an end to competition among nation-states, but it had also launched an era of growing competition among the world's major civilizations. These questions were pressing after the September 11th terrorist activity and the class turned to books like Jihad vs. McWorld (Barber & Schulz, 1996) to help understand the current crisis and its relationship to society and technology. Political and economic explorations were also grounded in the economic history of Hegel and Marx and expanded to include cultural perspectives through reading C.A. Bower's *Let them Eat Data* (2000). We abandoned the regular syllabus after September 11 and spent three weeks on questions related to this event including time spent exploring alternative world media. Especially interesting was how different countries used media to explain their point of view on this event. We returned frequently to a very professional web site developed underground by professional women in Afghanistan (http://rawa.fancymarketing.net).

Project-Based Learning

If teachers are going to change the way they teach they need to be in classes that model constructivist, project-based learning. This class was designed to involve students in researching, organizing, evaluating, and presenting information that they felt illustrated relationships between technology, society and education. *We are to thinking as the Victorians were to sex,* writes Papert (1980), *everyone does it, but no one knows how to talk about it.* As we create new dectronic learning milieus, we have the potential to create environments that scaffold and enhance higher-level thinking. Anchored Instruction is one way to think about a constructivist design for learning. The term was introduced by the Cognition and Technology Group at Vanderbilt (1990) to describe situated learning. Norton and Wiburg (1998) describe this type of instruction, *Anchored instruction creates environments that permit sustained exploration by students and teachers and enables them to understand the kinds of problems and opportunities that experts in various areas encounter and the knowledge that these experts use as tools. (p.103)* It is this type of constructivist learning that we aimed to model in our course on Technology, Society and Education.

Students built their research presentations around problems and questions that were both meaningful for them and rich in opportunities to understand how technology affects society. The culmination of the course was the research symposium presentations. During the class, findings from the readings were explicitly tied by the students to their larger research questions. The topics were extremely diverse and quite interesting. The groups in this class choose the following topics:

- Environmental Racism - What impact have computers had on the quality of life from an economic, health, and consumer perspective?
- Virtual Learning & Real Benefits - As the need for education increases and time for pursing and education decreases, can the combination of high-quality instruction and current technology assist specialized groups of learners to obtain their objectives and does gender play a significant part in this learning progress?
- Influence of Technology on Human Health - How has the growth of technology has an effect on individual's quality of life and health across socioeconomic boundaries?
- Technology & Multicultural Diversity - How does an individual's socioeconomic, gender and racial background affect their learning with technology?
- The Influence of Technology on Educational Delivery - How have new technological media influenced distance education opportunities for woman?

Each presentation took almost an hour in spite of the assignment, which was to do a 30-minute presentation. However, students had created extensive time lines, web connections, and interactive multimedia components to their presentations and we did not want to limit their time. The student presentations will be available via the web on the New Mexico State University Learning Technologies web site (http://mathstar.nmsu.edu/EDL610.htm).

Creative Activities

Piaget once wrote, *To understand is to create*. To provide students with a truly constructivist environment we asked them to build creative products as part of this class. The first product was their personal theory of change in which they developed both a visual metaphor and a narrative related to their theory of how things changed. We did not limit their product to education but allowed them to think about change in the world. This reflected the class in general, for which we had decided that graduate students need to think outside of the paradigm of education. Metaphors included different types of swimmers in a race, a peeling onion, a train going downhill, types of eaters, and spirals without beginning or end.

The final project in the class and the one the instructors felt best evaluated the ability of students to think about the future was an assignment to create a science fiction story about education and life in the future. Graduate students who were now well trained in writing research papers protested loudly against having to write fiction. However, the instructions understood the value of transforming information from one form to another (expository to narrative) as well as the value of showing via narrative what things mean (Brunner, 1966). The resulting stories were uniformly very, very good and showed, often in a very moving way, the potential relationships between technology and society. The stories reflected the two-sided sword of technology. Some were very scary and portrayed an Orwellian future in which technology controlled all human interactions to make them efficient and non-messy. All babies had to perfect in order to enter society and all jobs were designed for each individual's skills and interests. A character who was curious about the what other people did or the possibility of changing jobs had to be eliminated. Other stories reflected the liberatory potential of technology to serve rather than destroy diversity. In one educational system a student and his grandmother used the web as well as electronic time travel to study an area of historical interest.

Conclusion

This course covered many different aspects of how technology affects society and education. It began with the historical perspective offered by Toffler of how technology has changed world history and then explored parallels between an earlier revolution caused by the telegraph and the impact of the web today on society and education.

As with any new technology computers were first used to do more efficiently things that teachers have always done. During the 1960's and the 1970's the computer was used for "drill-and-practice" or "tutorial" programs with students. This was known as computer-assisted instruction (CAI) or computer assisted learning (CAL). Students would type in answers and the machine would indicate whether the answer was right or wrong. If it were wrong then the computer would indicate that the answer was wrong and then present a new question at the same level of difficulty. If the answer were correct then the computer would present a progressively more difficult question. It was believed that students could learn more in a shorter period of time using this type of technology. In many cases CAI has been useful in improving student achievement. However, Cuban notes a study by Levin, Glass and Meister (1984) that noted that peer tutoring was actually more cost effective in terms of learning gains that the use of computers. Hativa, N. (1988) did an extensive meta-analysis of the use of computer-based drill and practice in arithmetic and suggested it was widening the gap between high-achieving and low-achieving students. CAI is often least effective with English Language Learners since their problem may not come from not understanding language rather than content (Wetzel, K & Chisholm, I., 1998; Butler-Pascoe & Wiburg, in press). In a 2000 study, A recent large-scale study by Wenlingsky (2001) found that those children whose teachers used computers in constructivist ways to teach mathematics (simulations, spreadsheets) scored significantly higher in mathematics achievement than those who used the computers as tutorial and drill and practice machines

Most current leaders in the field of learning and technology suggest that it is only by tying the use of computers to new forms of instruction such as constructivism and socioconstructivism that the power of the computer for learning can be tapped (Bereiter, 1994; Dede, 1998; Norton and Wiburg, 1998; Rodriguez & Berryman, 2000). There is emerging a powerful synthesis between new theories of how students learn by constructing and sharing knowledge and the capacity of new computer-based technologies to support these types of learning strategies. However, access to these best uses will not occur until teacher educators embrace and model these deeper uses of technology.

It was important in this class to think critically about the notion of change. Each new innovation is introduced with strong words from the developers as to how this new device will fundamentally change education.

In reality, many of these innovations have had very little impact on teacher practice. The final book we read in the class, Leadership and the New Sciences, reinforced for the students the nature of systems and the potential impact of the larger system on efforts to make change. As a result of studying changes in society and education in relationship to technology, students became more reflective and critical about what kind of change is possible in the world of education today. Is the computer such a fundamentally different machine that its integration into school practice is likely to alter practice in fundamental ways as suggested by Norman (1994) or Dede (1998)? Or is the institution and culture of K-12 education fundamentally in conflict with the potential of computers to create changes in educational practice? What are the limitations of the current educational structure in the United States and how does this limit what is possible in terms technology and learning? Taking a variety of perspectives and a global view of change helped students to think about how to answer these questions and to become the leaders we need in the field of information, communication, and learning technology.

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The Use of the Internet to Teach Critical Thinking

Gulsun Kurubacak, Ed.D
College of Education
New Mexico State University, U.S.
kurubagu@nmsu.edu

Carmen Gonzales, Ph.D.
College of Education
New Mexico State University, U.S.
carmen@nmsu.edu

Abstract: The world is rapidly becoming more technologically complex. As a result, students need to be taught differently than they have been in the past. Schools must prepare students to become active members of this changing society, and to adapt to these transformations as they occur. The Internet can be a strong partner in enhancing a student's ability to think and solve problems critically. However, without teachers who understand how to integrate technology meaningfully into their teaching, the desired student outcomes may not occur. This paper discusses ways that the Internet can be used to teach critical thinking in a classroom.

Introduction

Critical thinking and problem solving have become increasingly important in the educational development of students. Critical thinking helps students to better read, listen to, understand, and remember information (Smith, Knudsvig, & Walter, 1998). Moreover, engaging in critical thinking requires students to be active participants in the construction of knowledge, rather than passive receptacles for information delivered by a teacher or instructional medium (Jonassen, 2000).

Critical thinking can be easily incorporated into a constructivist classroom that supports students in being producers of their own knowledge. In a constructivist environment, students work on complex projects, synthesize information to build their own understandings, learn skills and concepts, and use them to solve real-world problems. These projects, often done in groups, follow from a theory of learning that suggests subject matter becomes meaningful, and therefore understandable, when it is used in context-rich activities (Fosnot, 1996; Norton & Wiburg, 1998).

The availability of technology and access to the Internet has allowed educators to bring real-world problems into the classroom for students to explore and solve. In addition, students are often more engaged in problem solving when using such external vehicles as the Internet, because they encourage comparing ones ideas with others, an important component of the critical thinking process. Students in today's world have other possibilities than learning face-to-face from a teacher. They can also learn by discussing problems, ideas, and beliefs with peers and experts throughout the world by using the Internet. According to Bransford, Brown, and Cocking (1999), "Technology can help to create an active environment in which students not only solve problems, but also find their own problems" (p. 195).

The Internet as an Enhanced Critical Thinking Tool

The Internet is the world's largest computer-based communication network. It contains many resources that educators can access to create enriched learning environments, and it has the potential to offer up-to-date information for teachers, and learning activities for students. It also can expand the boundaries of a school far outside its walls, and change the roles of teachers and students in the educational process.

Learning on the Internet can help make education more meaningful for some students than learning by traditional methods, because they can acquire knowledge using a variety of modalities, including visual, audio, and text. They can also gain a great deal of information about any topic in a very short period of time, and have access to original sources and experts throughout the world. Numerous databases found on the Internet can help teachers guide students to access, analyze, and evaluate information. With appropriate instructional strategies that teach critical thinking, students can then learn to construct their own meanings from this information.

According to Harris (1994), the use of the Internet as an enhanced critical thinking tool in the classroom can include independent learning, one-on-one coaching, and large group projects, with both independent and assisted practice. For example, retrieving research information can be done alone or as a member of a group. Email is a useful medium for collaborative writing activities, and can also be used for communication among groups of students from various cultural and socio-economic backgrounds. Bulletin boards and Usenet newsgroups provide individuals the opportunity to read, reply and reflect on messages focusing on specific areas of interest. Web sites also allow users to store documents and multimedia resources. In addition, the Internet allows for computer conferencing and virtual classrooms. Internet Relay Chat (IRC) lets users see what is typed on other users' screens; and, video conferencing permits users to send and receive video images from people throughout the world. One of the newest learning environments is virtual reality, which gives users the impression of three-dimensional interaction.

Although there are many advantages to using the Internet in the classroom to enhance critical thinking, learners may become overloaded with information. Harris (1994) found that students are more successful when they consciously apply specific strategies to learning tasks. The learning tasks then direct their thinking, and encourage them to monitor and evaluate their progress. Thus, it is crucial for teachers to assist learners in developing strategies for best accessing and evaluating online information. In addition, educational activities should include offline resources, such as video, books, and other available resources.

If educators hope to use the Internet effectively to enhance the teaching of critical thinking, all schools and teachers must have access to technology and the Internet. However, they also need to have professional development opportunities that teach them to meaningfully integrate the Internet into their curricula. Without such staff development programs, delivering web-based courses to teach critical thinking may be a time-consuming and frustrating educational activity for both teachers and learners.

Conclusion

Teaching critical thinking should be one of the most important educational goals in today's society. When thinking critically, we become active, productive, hopeful, and psychologically healthier people. However, teaching students to become critical thinkers is often difficult. With today's emphasis on test scores, a teacher must make an extra effort to integrate problem solving and critical thinking into her daily routine. When done correctly, this may have the additional benefit of higher test performance.

We need educational environments with high levels of communication, interaction, and collaboration. The Internet can be a valuable tool in an instructional strategy, because it enhances active, cooperative learning through communication with people, both nearby and around the world (Smith, 1996). Today's educators are beginning to use technology to support students in critical thinking activities, because they provide learning environments that are more interactive and engaging. Teachers will continue to have a very important role in the development of Internet applications for their classrooms.

It has become quite clear that the Internet is breaking down the walls of the traditional classroom, and allowing students to gain worldwide communication and information online. Moreover, instead of teaching and learning only in the conventional educational environment, we can now do so at a distance with our own computers. We are just beginning to understand the potential of the Internet as an educational tool that can be integrated into the classroom in a meaningful way.

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Teaching as Design: Implications for Learning to Teach With Technology

Punyashloke Mishra
Learning Technology & Culture
College of Education
Michigan State University
punya@msu.edu

Raven Wallace
Learning Technology & Culture
College of Education
Michigan State University
ravenmw@msu.edu

Abstract: Teachers, particularly those working with technology, have to deal with the issue of design. However, it is often hard to describe what design means. This paper offers an analytic framework for better understanding the process of design and comparing it to the kinds of activities that are involved in teaching. We do this by looking at case studies of design as instantiated in a Master's seminar in Educational Technology. Participants in this class were expected not only to learn interactive web-based technology but also to generate abstract knowledge (about designing educational technology) through working on authentic design projects. In this paper we look closely at the design process and compare it to the process of teaching. Our analysis is guided by prior work on the analysis of design conducted by Mishra et. al. (1999). We believe that a better understanding of design can enrich our understanding of both teaching and technology taken individually, as well as offer us new ways of teaching with and about technology.

Introduction

This paper grew out of a conversation about teaching with technology, a conversation between two researchers who focus on educational technology, teaching, and teacher education—though with slightly different backgrounds and interests. The first author is a designer, researcher and educational technologist with a keen interest in the nature and process of design while the second is a former school-teacher and researcher in teacher education. Clearly we approached these topics (of designing technology, teaching with technology, and teaching about teaching with technology) from different perspectives but with fundamentally similar concerns, (a) to better understand the manner in which teachers use technology in their classrooms; and (b) to use this understanding to develop better strategies for assisting this complex process. As we continued to talk it seemed that certain themes began to emerge, themes that tied together teaching and design in interesting and insightful ways.

Underlying our conversations was a concern with teacher's attitudes towards technology or more appropriately people's perceptions of teacher's attitudes towards technology. Too often it seemed to us teachers were being represented as Ludditics or people resistant to the incorporation of technology into their classrooms. Moreover teachers also report feeling ill prepared to teach with technology, and research suggests that for the most part, teachers are not making the kinds of transformative uses of technology that seem likely to have a positive impact on education (Becker, 1999). However, this is where we faced a paradox. Through our conversations we came to realize that at some level, teachers should be the ones most comfortable with technology. They are accustomed to complexity; they design complex environments and solve ill-defined problems day in and day out (Leinhardt, 1994; Lampert, 2001). On the face of it, they have some of the most important characteristics needed to be effective technology users.

This seeming contradiction between perceptions of teachers towards technology and our belief that teachers should be the most comfortable with it is the basis this paper. To understand the problem, we use the metaphors of teaching as design, and design as teaching. Through these lenses, we explore ways that teachers can understand the work of learning to teach with technology as an extension of what they already know and can do. We begin by talking about design, what it is, and what it is not. At each and every point we contrast it with teaching. What we find is that both design and teaching share many important characteristics. Specifically we shall focus on a series of themes about design and look at each theme as it plays out in the case of design and of teaching.

Why these particular metaphors?

Recent research projects on learning environments have been described as design experiments, and the metaphor of designing for teaching has been extended by some to teaching as design. Educational technology researchers work at the interface between design and teaching. We help teachers learn to design technologies, and to design their teaching to take advantage of the affordances of those technologies. We help them learn to teach with designed artifacts. The link seems natural because our work is focused on both design and teaching.

From time to time, both teaching and design have been conceived as being formulaic—a series of predetermined steps that must be accomplished in order to achieve a particular goal. Both programmed learning and standard design methodology courses suffer from this misconception. At the heart of misconception is what Donald Schon calls the "model of technical rationality" (Schon, 1983, p. 21). This model assumes that both design and teaching consist of "instrumental problem solving made rigorous by the application of scientific theory and technique" (Schon, 1983, p. 21). Just as too often technology is seen to be "merely the application of the relevant basic sciences to the making of artifacts" (Dasgupta, 1996, p. 4), teaching has been seen as the application of psychological principles to the process of student learning.

For instance, looking more specifically at design, it has been argued that design is more than the application of scientific knowledge to a given real world problem (Dasgupta, 1996; Gelernter, 1999; Mishra, Zhao & Tan, 1999; Schon, 1983; Winograd, Bennett, De Young & Hartfield, 1996).

As Mishra, Zhao, & Tan (1999) say:

> Design is a creative activity that cannot be fully reduced to standard steps, and should not be thought of as mere problem solving. A designer lacks the comforting restraints of a well-organized discipline because designing is inherently a messy endeavor. It includes, but goes beyond, the ability to be creative in solving problems. A host of techniques and skills come into play during design. Many of the techniques and skills are explicit and publicly available, while others may be tacit and unspoken. According to Smith and Tabor (1996), design is as much an art as it is a science-spontaneous, unpredictable, and hard to define. (p. 221)

It is enlightening to read the above quotation once again, though this time replacing the words "design", and "designer" with the words "teaching", and "teacher". The new quote would echo a perspective that is valued by many teachers and teacher educators.

Similarly, both teaching and design require a balancing act among a variety of factors that often work against each other. It requires the application of a wide array of knowledge, from algorithms to rules of thumb. This inherent "messiness" of both these professions is further complicated when we consider the very abstract nature of their respective goals—be it learning for understanding or the design of an after-school program (Vyas & Mishra, in press) or an online course.

Both design and teaching are inherently teleological. Both are concerned with the invention of artifactual forms–an activity that aims to satisfy human goals and aspirations. Often , particularly in the case of design These goals can be quite concrete as in the case of building a bridge or or writing a poem. In the case of teaching, however, these goals can be more abstract: developing student understanding, learning content and so on.

In addition, both design and teaching are dependent on dialogue or interplay. As the individual acts on the environment, the environment also acts upon the individual. Design and learning are not simply about understanding and assembling materials. It is fundamentally about ideas and transforming oneself and the world through the process of working with those ideas. This process of "acting on" an idea happens in two ways: intellectually and physically. Intellectually, the designer or the learner engages with the ideas and concepts and attempts to learn more. Physically the designer works with the artifact, modifying, manipulating objects to fit the desired ends. This is essentially a dialogue between ideas and world, between theory and its application, a concept and its realization, tools and goals. We see this dialogue as being at the heart of true inquiry, involving as it does the construction of meaning and the evolution of understanding through a dialogic, transactional process.

We begin with a framework for thinking about design developed by the first author (Mishra, Zhao & Tan, 1999). In this paper we attempt to "unpack the black box of design" by closely studying the theoretical, technical, social and cognitive issues surrounding the design of two different computer programs. This analysis (1999) builds on previous empirical and theoretical work by other scholars (Dasgupta, 1996; Schon, 1983; Winograd and Flores 1986; Winograd *et al*, 1996), and led to the outlining of twelve general themes that underlie the design process.

We extend this discussion about the similarities and differences between design and teaching through a deeper analysis of the 12 themes of design as offered by Mishra *et al* (1999). These are:

1. Design/Teaching is purposeful, intentional, and conscious
2. Design/Teaching keeps human concerns at the center
3. Design/Teaching is knowledge intensive
4. Design/Teaching is historical and path-dependent
5. Design/Teaching is selective
6. Design/Teaching is aesthetic
7. Design/Teaching is communication
8. Design/Teaching is a social activity
9. Design/Teaching is creative
10. Design/Teaching is emotional
11. Design/Teaching is an ongoing conversation
12. Design/Teaching requires closure

Limitations of space prohibit us from delving into each of these themes in greater detail. Clearly some of these themes will not be new to teachers and educators. However there are others that may not be as obvious. The fact that design is aesthetic brings to the forefront the fact that teaching is also an intensely aesthetic activity. However, this is not an issue that is raised often during discussions on teaching. Similarly both design and teaching require immense emotional commitment, once again not something discussed often. Finally the fact that design requires closure allows us to think about the ebb and flow of teaching (be it a single class or a school year) very differently. Thus what this metaphor does is allow us to think about teaching with a new perspective.

Applying our ideas

The similarities between teaching and design can also be seen in discussions about how both are to be taught. Schon (1987) lists a range of reasons arguing that design cannot be "taught" in conventional ways. Once again it is instructive to see how appropriate these reasons for why teaching cannot be taught in conventional ways. Schon argues that: (a) Designing is a holistic skill. It must be grasped as a whole, by experiencing it in action; (b) Design depends a great deal on recognition of design qualities. This recognition is not something that can be described but rather must be learned by doing; (c) Designing is a creative process in which a designer comes to see and do things in new ways. Therefore, no prior description of it can take the place of learning by doing; (d) Descriptions of designing are likely to be perceived initially as confusing, vague, ambiguous, or incomplete; their clarification depends on a dialogue in which understandings and misunderstandings are revealed through action; and finally (e) The gap between a description of designing and the knowing-in-action that corresponds to it must be filled by reflection-in-action.

Over the years we have been applying our ideas about design and teaching in a series of master's courses taught by the first author. The emphasis in these courses has been on learning about design by "doing" design. Most participants in these courses are practicing k-12 teachers who bring their rich professional knowledge of teaching and learning to the classroom. Participants in this class were expected not only to learn interactive web-based technology but also to generate abstract knowledge (about designing educational technology) through working on authentic design projects. In the learning process, each member of the communities is engaged in activities that compel them to seriously study technology, education, the interface between the two, and the social dynamics of working with others. They participate various learning activities such as group projects, whole class discussion, group collaboration, project presentation and critique, asynchronous on-line discussion, journals and final group reflection on design process. Through learning about and through authentic design focused on genuine problems of practice, participants use technology creatively in various educational contexts.

One of the key arguments developed over the duration of the semester is that of the similarities between design and teaching. This is not something that is explicitly pointed out at the beginning of the course. Rather in the beginning they are told this course is just about learning technology through design. As the semester progresses, these similarities between teaching and design are allowed to emerge. This culminates in a formal presentation by the instructor towards the end of the semester that describes the similarities between design and teaching. Finally the students are asked to write a paper on the design and teaching process connecting them to the 12 themes of design/teaching.

Design and teaching are not things that can be taught by lectures and demonstrations. They are best learned through the active process of creating and doing. That said, both are hard to learn. Both can be extremely motivating and enjoyable though frustrating as well. The fact that there are no magic solutions, and even the solutions that emerge are compromises at best is often a difficult message to swallow. By involving teachers in these design projects we offered them an opportunity to explore and play within the relatively "consequence-free" zone of a classroom. In some sense the classroom became a laboratory for teachers to experiment and try out different concepts, to experiment with technologies and ideas.

Bringing ideas of design into the realm of teaching allows teachers to think about what they do on an everyday basis in a new light. As one of the students in the class wrote in a journal posted to the class listserv: "I buy into the strong parallels between teaching and design. We design lesson plans. We design strategies to hopefully interest children in learning, discovering, and developing an interest to learn more. Early on I tried to design lessons to get them to learn the correct information they needed. Correct information is important, but now I try so much harder to just get them interested in learning and develop learning as a lifestyle. I work at designing an environment that is appealing not only for the information, but for the aesthetics. Over the years that I have taught (~20) I agree … that teaching is spontaneous, unpredictable, MESSY, and creative. So much more is involved than just me. How much the students know already and what the students are like just from one class to the next." He continued "The problem is design cannot be taught. It is a holistic skill - it must be experienced.... I was so unprepared for what I found in the classroom, because there was so much more going on than what my college classes covered. I needed college for the knowledge of my field, but I needed more input from teachers than I had when I started... If I had not been under contract the first 2-3 months I think I would have quit."

The course became a site where students thought about the complexities inherent in both design and teaching. As one of the students in the class said: "Ultimately, I think one of the things I've learned from this is how complex and dynamic the process of design can be. We have brainstormed, gotten ideas from and been influenced by other people, our audience, our surroundings, and by the object of our design itself. By listening to opinions, taking the advice of others, and considering our own vision we are creating something unique and exciting."

Conclusion

We believe that bringing these two worlds (that of design and that of teaching) together adds to our understanding of teacher knowledge for teaching with technology. It allows us to explore aspects of what teachers already know, albeit tacitly, and how that knowledge can be called on in support of new skills and competencies. Finally we believe that the metaphor of "teaching as design" allows us to think of both teaching and design in interesting ways. As we know, metaphors serve as filters for our perceptions, providing a kind of framework within which we interpret our experiences and assign meaning to them. Metaphor is deeply embedded in our language, culture, and the way we think, and hence affects how we experience and interact with the world and other people. We believe that bringing the metaphor of design into teaching with technology allows teachers to step out of the "paradigm of technical rationality" and to become better and more flexible users of technology.

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Technology as a Developmental Influence

Eric A. Seemann
Department of Psychology
Louisiana Tech University
United States
zainka@msn.com

Lamar V. Wilkinson
Department of Psychology
Louisiana Tech University
United States

Anita S. Flye
Department of Psychology
Louisiana Tech University
United States

Gina Gibson
Department of Psychology
Louisiana Tech University
United States

Abstract: As a prominent environmental feature, the availability of advanced technology likely has a pronounced developmental influence on those who encounter it. As technology becomes more integrated into society, and as society becomes more technology dependent, an individual without even basic technology skills may face the same challenges as one who lacked basic literacy twenty years ago. Exposure to technology likely has other benefits, such as facilitating the development of advanced cognitive and conceptual skills. A problem exists, however; not all individual have adequate exposure to technology or adequate opportunity to develop technology -related skills.

Human development is largely dependent on the environment. A compromise accepted by many in the seminal nature-nurture debate is that the environment determines how heredity expresses itself. Society has changed much in the last eighty years, and the degree of change within the last thirty years has been more rapid than in any other period of human history. Basic skills sets have always changed based on the availability of technology and the dynamics of social convention. The advent of the computer age has changed human occupational, social, and educational development significantly in a very short period of time. The computer is likely responsible for the single largest developmental shift across many areas of learning and performance; this is especially true of not only what children, adolescents, and young adults are expected to be able to do, but how they conceptualize problem solving and the degree to which abstract reasoning is important in concept formation.

The workplace has changed significantly due to the automatization of many formerly manual jobs. Education has changed on several fronts as well; not only do computers (and other sophisticated electronic devices) require special skills to use, they are also now part of standardized education in many areas and will only become further ingrained in education service delivery at all levels. Occupations fomerly considered to be non- or low skill vocations now require at least some degree of technological sophistication. This level of knowledge is considered minimal compared with other, more technology dependent occupations, but for the unskilled person trying to learn a new job, these basic skills can pose a significant obstacle.

Because the changes in available technology have occurred so rapidly over the last three decades, the more glacial pace of social change is having difficulty keeping up. Standard developmental influences, such as modeling work behavior from a parent or a role model, acquiring training in a traditional vocational or elementary classroom, and hands-on exploration of one's immediate surroundings will likely not be sufficient to teach fundamental skills necessary to later acquire more advanced abstract concepts and hands-on technology skills. There is a significant impetus to put computers in elementary and college classrooms, but not all classrooms have them and many do not have a sufficient number of machines for the number of students served; many learners on all levels have insufficient exposure to technology in the learning environment and hands-on time is severely restricted. Computers are present in most learning environments, but in many cases the number of machines is simply insufficient.

Many students of all ages do not have computers at home and do not have access to them in their community. Government initiatives, such as Head Start, do not have the funding to provide significant numbers of computers in all areas along with instructors trained in how to maximize their utility as teaching tools. This lack of access sets the stage for learners, child and adult, who do not have access to computer and electronic technology outside of the classroom to be at a competitive disadvantage compared to those who contact advanced technology in a number of different settings.

The importance of learning technology skills from the job performance/occupational requirement perspective requires some examination of the evolution of most common occupations with respect to the availability, reliability, and capacity of computer and electronic technology. Computers and computer-controlled technologies are readily available to business and industry, companies, service providers, and manufacturers. Those who integrated these advances early on found themselves at an initial competitive advantage over the competition. With the widespread integration of technology into the workplace, this advantaged seemed to normalize across employers, leaving those who either failed to integrate advanced technology or failed to fully incorporate and update technology on hand at a competitive disadvantage. Advanced technology is no longer an advantage, it is requirement. Simple paper and pencil functions, such as signing for a parcel or filling out a room reservation in a hotel have been almost entirely replaced by computers and portable data units. Many organizations keep few paper copies (unless required by law) and store most of their data and documents electronically. Any business or service provider that attempts to operate without at least a minimal level of technological integration is almost certain to fall short in their respective market. The integration of technology into our lives has come both as a massive rush of change and as subtle changes to everyday life. The computer revolution suddenly reinvented mass communication, giving us an entirely new medium in the Internet. Just as revolutionary but with greater subtlety came debit and credit card purchases in supermarkets, on-line shopping, computer controlled ignitions in vehicles of all sorts, cellular phones, and so many other changes. Skill in the use of advanced technology, even in its most basic form, is now a fundamental skill set as important as literacy. Twenty years ago an illiterate adult entering the workplace found his or her options decidedly limited. Lack of literacy skills is less common of a problem than twenty years ago, but the lack of basic technology skills is fast replacing illiteracy as a fundamental skills deficit.

The social and educational environments have changed as well due to the infusion of technology into every aspect of our lives. Technology has become a developmental experience and is no longer a set of supplemental skills. Children socialize by playing games. Many of the games children play involve computer technology, and the skill to use such game stations are relatively easy to acquire, especially if there is another child to act as a model. Internet use and skill with the more advanced functions of a personal computer are more difficult. Children who lack these skills may withdraw from the settings in which they are used. Such early skills development and the development of patterns of approach/avoidance behavior to technology will influence the learner for the rest of his/her life. Technology serves not only an occupational function, but is increasingly a social medium and catalyst as well. Potentially, the lack of education and availability of developmental experiences with technology could create an "out group" of people who not only have difficulty maintaining adequate employment, but who also find themselves at a distinct social disadvantage.

Not only have the tools of the trades changed, and not only have the media of the social environment followed the evolution of technology, but basic conceptualization and cognitive mediation have changed as well. People with exposure to technology as a key feature of their environment likely develop advanced thinking skills earlier than those without such experiences. Those for whom technology has been consistently available likely think in more abstract, representational terms, as opposed to a more concrete style involving more realistic references and less abstract interpretation. Advanced concept formation and problem solving are likely the benefits of exposure to technology across many settings over a sustained period of time.

Potential solutions must include increased exposure to appropriate technology and fundamental skills acquisition. The main problem is not inability to learn these skills, but the insufficiency of learning opportunities for many learners. Within the economic structure of the United States a series of broad solutions, based on collaboration, is possible. Because of the rapid nature of technology-driven change, and the correspondingly ponderous rate at which various social engines adapt to that change, these solutions must include a higher level of collaboration between private coronations, educational institutions, and government bodies than has been present to this point. Advanced technology likely has an impact on individual development second only to heredity. The children of today who are consistently exposed to a technology-rich environment will undoubtedly develop advanced conceptual and synthesis skills when they become the adults of tomorrow. Integrated cooperation from all sectors will be necessary to ensure such development.

Building eLarning Communities

Chih-Hsiung Tu, Ph.D.
Educational Technology Leadership
The George Washington University
Washington, DC USA
ctu@gwu.edu

Michael Corry, Ph.D.
Educational Technology Leadership
The George Washington University
Washington, DC USA
mcorry@gwu.edu

Abstract: Effective eLearning communities play an important role in the technology-based learning environment. An eLearning community has been misrepresented as a place where learners only learn together. This thesis is discussed, reviewed, and examined by considering effective eLearning communities, the impact of eLearning communities on human learning, different frameworks for eLearning communities, and proposes a refined theoretical framework for future research and development of eLearning communities. In this thesis, eLearning community is referred to a place where learners learn together and, in addition a community that learns. A refined theoretical framework for eLearning communities is proposed that encompasses three major constructs "Instruction," "Social Interaction," and "Knowledge Construction Technology." It is recommended that eLearning communities should be implemented with looser structure but with effective systemic strategies.

Introduction

Active approaches to effective learning present learning as a social process that takes place through communication with others (Hiltz, 1998) in communities (Hiltz, Turoff, & Benbunan-Fich, 2000). The importance of online learning communities has been emphasized by recent studies (Gordin, Gomez, Pea, & Fishman, 1996; Haythornthwaite, Kazmer, & Robins, 2000). In fact, students and faculty were yearning for a deeper sense of community. From a social learning aspect, learning community is defined as a common place where people learn using group activity to define problems affecting them, to decide upon a solution, and to act to achieve the solution. As they progress, they gain new knowledge and skills (MacNeil, 1997). It is a process much more profound than merely appreciating one another. Little conceptual framework has been developed regarding this new learning environment. ELearning community is the term widely applied in electronic education. Researchers (Schlager et al., 2000) are aiming and advancing toward a community that learns/evolves in addition to being a community for learning. How learners gather information and apply appropriate information to knowledge construction is more critical than simply obtaining information, making it necessary to examine knowledge construction in an eLearning community and advance to the level of a community that learns, rather than just information sharing and learning together.

Learning Impacts

Before exploring eLearning communities, it is necessary to understand what impact an eLearning community has on learning. Studies of virtual teams have shown that issues of interdependence, leadership, social communication, and project management are critical in forming successful teams (Jarvenpaa et al., 1998).

Collaboration

Research has demonstrated that electronic collaboration as an effective instruction design for an eLearning community. Ocker and Yaverbaum (1999) found that asynchronous electronic collaboration is as effective as face-to-face (FTF) collaboration in terms of learning, quality of solution, solution content, and satisfaction with the solution quality. Additionally, Hiltz (1998) argued that eLearning with a collaborative design is more effective than working individually.

Collaboration mechanisms directly affect cognitive processes by three functions (Dillenbourg & Schneider, 1995). First, conflict/disagreement. Second, Internalization. Third, Self-explanation. The more advanced members also benefit because providing an explanation improves the knowledge of the explainer (self-explanation effect).

Equal Access

An eLearning community has the potential to equalize economic and learning opportunity. OECD (1996) has identified eLearning as an effective means by which disadvantaged communities and individuals can acquire and improve their skills and knowledge. Although this argument is strong there is little evidence to define the impact that online technology exerts on equality and a particular digital divide may be created (Gladieux & Swail, 1999). Graham basically agreed with the value of an eLearning community; however, in the construction of the ideal eLearning community network model equality should be optimized and the impact of technologies should not be the main focus.

Social Presence

Learning in an eLearning community occurs as an active social process. Online Social presence, the degree of feeling, perception and reaction of being connected by online to another intellectual entity through a text-based encounter, is required to insure the interaction necessary to sustain community activity (Hiltz, 1998). Social presence is a critical factor that affects the eLearning community. Gunawardena and Zittle (1997) found that the degree of social presence is predictive of the satisfaction of online learners with their learning. Social presence, online learners' social relationships, tasks being engaged in, communication styles and personal characteristics impact online learning (Tu & McIsaac, 2001). Therefore, it is concluded that to foster an ideal eLearning community, one should increase and idealize the level of social presence.

Technology as Learning Tools

Technology has been seen as a tool to sustain and enrich an eLeaming community. Office of Learning Technologies (1998) argued that computerized commuting technology has been viewed as a revolutionary tool to build eLeaming communities, strengthen relationships, and mobilize joint planning and community action. In the past two decades, research has shown that "The No Significant Difference Phenomenon" exists between technology-based instruction and traditional instruction (Russell, 1999). However, technology can be applied as a tool to enhance learning and as a means where learners can approach the learning experiences of their choosing at their own pace.

Resources

Resources available through technology provide the greatest advantage to its use. Current technology is capable of delivering many resources, particularly resources that can trigger and reflect on knowledge. These resources are likely to enhance learning in an eLearning community. Technology brings participants together to generate online interaction. An ideal eLearning community should be able to provide its members with multiple perspectives in their learning experiences (Tu, 2000). These rich perspectives will be able to enhance the online interaction and to stimulate a higher level of thinking and learning. A cumulative sharing of learning, knowledge, and experience can result in the development of a community.

Blurred Boundaries

Electronic communication democratizes the eLearning environment (Rheingold, 1993). Computer-mediated communication (CMC) has been described as a venue where participants can contribute equally in communications (Rheingold, 1993). Democratic openness, the absence of nonverbal status cues, teacher-student role reversal, and learner-to-learner interaction within a CMC environment provide an opportunity for a more equal platform for communication and more stimulus for action than does a traditional classroom and more peer interactions were concluded. This phenomenon obscures the boundary between learners and teachers.

Learner Driven

Because of the blurred roles of students and teachers more weight is placed on the learning process/experience than upon roles and "teaching" processes. In other words, both students and teachers are learners and share their responsibilities in an eLearning community. Morrison (1995) argued that the learning process is unbounded by *time* (when one learns), *space* (where one learns), *mode* (how one learns), *pace* (the rate at which one learns), *level* (the depth of learning) and *role* (with whom one learns). Therefore, it is not merely learner-centered; in fact, an eLearning community is a learner-driven process.

Lifelong Learning

Since the learning paradigm is shifting to community-centered learning, lifelong learning is gaining in importance. Lifelong learning is what individuals learn over the course of their lifetimes and in a multitude of contexts. Galbraith (1995) defined it more precisely as: "those changes in consciousness that take place throughout the life span which result in an active and progressive process to comprehend the intellectual, societal, and personal changes that confront each individual human being." Clearly, this definition has given weight to community-centered learning.

Theoretical Framework

A new theoretical framework for eLearning communities is proposed in this thesis. It is a preliminary model that provides an appropriate direction for future research in eLearning community.
In this framework, "Instruction," "Social Interaction," and "Knowledge Construction Technology" are major three dimensions of eLearning communities. To develop an ideal eLearning community, these three dimensions should be consistently maximized. Somewhat lopsided development may result in different learning experiences in the process. However, the balanced development is not a static force. This framework represents a theoretical framework for eLearning communities that are dynamic, not static, flexible, not fixed, and negotiable, not pre-set.

Instruction

One should engage their community members in an authentic and an interactive design of activities. Community members that are more experienced, or experts, should function as mentors to stimulate members in processing knowledge internationalization. Material and information should be presented in a fashion that stimulates and indicates to members what is to be understood. Coaching processes allow novice members to receive appropriate feedback and to be aware of how they deviate from mastery and how can they modify their processes to be closer to the model.

Community learning is not only active but is also interactive. Community of Practice (CoP) serves as an appropriate concept for an eLearning community. Several factors identified in a recent study (Tu & McIsaac, 2001) should serve as a model for building a CoP for education reform: determine knowledge; build important topics/issues; gain members' background context; and design pull technology.

Collaboration enhances the active exchange of ideas within small groups and increases interest among the participants but also promotes critical thinking (Garrison, 1999). The community of collaborative learning, the grouping and pairing of learners for the purpose of achieving an academic goal, has been widely examined and is advocated throughout the professional literature.

Recent publications (Berge & Collins, 2000) have emphasized the importance of moderation in an eLearning community, a necessity that has often been ignored in online instruction. Knowledgeable use of strategic moderation can enrich and deepen the dialogue and foster learning in this emerging venue.

Social Interaction

Social context is constructed from the community members' characteristics and their perception of the eLearning environment. Less attention is being paid to other components, affective and social, as well as cognitive.

Bauman (1997) argues that social factors can be as powerfully motivating (Lowell & Persichitte, 2000) as intellectual ones in keeping learners on task. Research should focus on the relationships of community members and their perception of the eLearning community.

Ideal eLearning engages community members in deep thinking, provides multiple viewpoints, supports reflection, and offers frequent feedback and guidance toward higher standards. Kearsley (1998) contends that but the most important overall impact of the eLearning environment is the emphasis they place on critical thinking and discourse. The one thing that happens in eLearning, is that community members communicate a lot more with each other (novice and experts).

Knowledge Construction Technology

Knowledge construction technology contains attributes of electronic technology and technology that assist learners conduct knowledge construction. The latter is more important than the first.

Electronic computing and telecommunications technologies are converging into knowledge construction tools. Technology not only delivers content (information) and it has the capability to trigger and stimulate chances for knowledge construction. In fact, contents, bits, learning, and cognitive science are converging to "knowledge Media (Eisenstadt, 1995)."

Unlike a traditional FTF communication, knowledge construction technologies have the capability to deliver single or multiple channels either asynchronously or synchronously. When a new communication medium becomes available, one often applies a FTF communication style to this new communication environment, which often generates misunderstanding between the two communicators. Appropriate selection and use of communication media is very critical.

Conclusion

ELearning community is an important concept in technology-based learning. An effective eLearning community reaches beyond the point that community members learn together and should be perceived as a community that learns. The concept of an eLearning community implements the generation of social interaction and learning processes to generate dynamic and effective knowledge rather than "fixed" information. An eLearning community never dies after it is born. Instead, it grows and learns; and it may mature into a different character as a community. Therefore, community learning is endless and translates to knowledge construction and gaining information that is infinite.

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VIDEO CASES

SECTION EDITOR:

Sue Talley, Pepperdine University

As Barry Sponder and others who submitted papers for this section indicate, one of the more vexing issues in teacher education is the difficulty of bridging the gap between the theories of teaching and learning that credential candidates are exposed to while preparing to teach, and the complex realities these teachers encounter when they are employed and engaged in their teaching practice. Among the many techniques frequently used to address this issue is the use of text-based case studies. Shulman's research clearly indicates that these text-based cases, when used by instructors who are skilled in facilitating reflective dialogue, can improve teaching practice by helping credential candidates develop reflective skills. But Wasserman also points out that learning to teach is difficult when credential candidates have little time to *observe* teachers handling daily problems in their classrooms. Miriam Sherin points out in her paper in this section that learning to notice key components of a teaching situation and "connecting those components to broader concepts and principles of teaching and learning" is critical. The papers in this section indicate some ways that video, combined with newer CD-ROM technology and/or the World Wide Web, is helping to provide credential candidates not only with more opportunities to observe teaching practice but to observe practice in ways that may be more effective than classroom observations alone.

Benefits of Video

Several of the papers in this section point to similar benefits found in using video cases as part of preservice education. One of these benefits of the use of video is that it allows the credential candidates the ability to review a classroom teaching situation many times. This is substantially different than the normally limited ability of a candidate to do observations in the classroom itself. This is pointed to both by Sherin and myself in our papers. This is also implied by the nature of the video databases created by InTime at the University of Northern Iowa and the video database at Arizona State University. These databases can be accessed by different instructors for different purposes as needed.

Many researchers have pointed to the complexity of the classroom and the failure of schools of education to prepare candidates to deal with this complexity. The affordances of digital video, in particular, allow candidates to observe a single video through many different lenses. Haydek, from the InTime project, emphasizes that their video databases can be searched through the lenses of the Technology as Facilitator of Quality Education Model. This model includes the following elements: a) technology, b) students at the center of their own learning, c) content standards, d) teacher knowledge and behavior, e) information processing, f) principles of learning, and g) tenets of democracy. Thompson from the University of Houston indicates "much more can be learned from these video segments than how to teach a single skill."

Using video cases also gives candidates a common forum for discussion. As Lynda Ginsburg says about the Captured Wisdom videotapes, they are "useful for stimulating teachers to think about and question the approaches of other teachers and the ways that they might adapt what they see and hear for their own local education contexts.... " This observation, reflection, and dialogue process, just as with text-based cases, appears to be a key component of the video cases. Sherin, in particular, describes this dialogue and how continuation of this cycle over time changes the teacher's reflective practice.

Another benefit of digital video, especially when used in combination with the web or a CD technology, is the ability to add teacher and expert commentary. This enables the candidate to "see" the video through the eyes of other, more expert, viewers. Savenye at ASU includes these commentaries as do we at Pepperdine. Yusko describes the process of having the mentor teacher watch the tape and comment on his own teaching. As Yusko says, "We found that the 'stimulated recall' nature of this interview allowed [the mentor teacher] to speak in rich detail about his thinking... ."

PT3 Convergence

As a PT3 Project Director I was intrigued by the common elements being included by many of the PT3 projects that are creating video case studies. One of these elements is the Pre / Post Teacher Interview portion of the video case study. This is included in the InTime cases, the Pepperdine cases, the ASU cases, and in Yusko's work. As discussed above, this commentary appears to guide the candidate to focus on critical elements in the video.

Some of the projects have commentaries by others as well. Both ASU and Pepperdine include commentaries by content experts and by a technology expert. As Sherin and van Es point out, teachers "need to find ways to focus their attention on new aspects of classroom interactions." It appears that these commentaries, along with the commentaries of the teacher, might scaffold this "noticing" process.

Sponder points out that lesson planning and classroom management are classic conundrums for the new teacher. Many of the video cases include elements designed to address this. The ASU cases include a portfolio of the lesson plan, materials developed by the teacher, and links or resources for the technology used. The InTime cases include a lesson overview and information about the content standards covered. In the Pepperdine cases, a resources section includes links to related research, state frameworks or standards, additional reading, as well as samples of student work. Classroom Management is specifically addressed in the video cases developed by the University of Houston and as I point out, Pepperdine's experience is that viewing case studies from different perspectives leads to use in new areas: "For example, [video cases] can be used in an Instructional Strategies class where preservice educators may be discussing possible classroom management strategies. They might also be used in an Educational Psychology course where preservice teachers might develop their observation and reflection skills."

Analysis and Reflection

Sherin and van Es discuss in their paper how the use of video seems to change the course of discussion over time from a focus on the "how of teaching" to the "why of student learning". They raise a very important concept for all involved with the use of video cases about the need to scaffold to ability to "learn to notice" and then to link this noticing to key theories and prior knowledge.

Yusko points out that there is a great value in the process of editing the videos because that process itself is a key analytical tool. In fact, that realization is what led Jim Stigler to create the LessonLab software used by Pepperdine. Stigler came to this realization after his experiences with analyzing the videotape captured during the TIMSS project. The analysis gained through thinking about what is important in the video is key. Following this with reflection and dialogue leads to a much richer experience, according to the preliminary results of the work of many who submitted papers in this section.

This concept that editing a video leads to greater analysis has led some creating video cases to have teachers and students create their own digital videos that they then edit and on which they reflect and comment. This concept is highlighted in the TLC – Teachers as Students Project from the Department of Defense Dependents' Schools. David Georgi from Californai State University at Bakersfied has also been experimenting with this concept. We have begun work with this at Pepperdine as part of our work on electronic portfolios.

Video Production: Lights, Camera, Action

Yusko, while candidly sharing his journey into creating video cases, describes the experience of many of us as we entered this world. He says, "We quickly began to realize the complexity of capturing high quality classroom video footage. Even when we carried the camera around the classroom, we realized that we needed guidelines to accommodate different classroom formats, such as whole group discussions, small group work or individual work. We needed to know where to focus the camera, on who, and for how long. To make sure that we had high-quality sound, we experimented using two remote transmitters with different types of microphones." During our panel discussion, Redmond, Georgi, and I also propose to answer questions about what we have encountered in this area.

One of the key elements that no one specifically refers to in their papers but that I am sure will be quite obvious in the demonstrations is the fact that this newer technology makes it much easier to scan the video and to jump backwards or forwards to places where the analysis, reflection or discussion might be focused.

Unique Purposes

Several of the video projects included in this section had purposes very different than the typical case study used in preservice education. For example, Easterm Washington University and Cheney School District created a 17 minute video to "tell" teachers of the value of participating in the partnership between these two institutions as part of their PT3 grant. Stephen Ransom from Ball State University uses video cases to help teachers better understand how to evaluate software. After learning the limitations of checklist evaluations, he experimented with showing the software being used in a classroom, thus situating its use. His paper highlights the reactions of the teachers to this use of video and this new form of software evaluation. His ending note is particularly interesting because, as others here noted, the use of the video can frequently extend well beyond its original purpose. The University of Minnesota uses case studies to document how technology integration is successfully sustained. Finally, swinging full circle back to Sponder's comments about the difficulty of bridging theory and teaching experience, Sponder created a CD-ROM that includes not only video cases designed to help preservice teacher prepare for student teaching, but also includes answers to Frequently Asked Questions , and interviews with key personnel. This CD-ROM is designed to be given to every candidate prior to their student teaching experience.

Conclusion

Miriam Sherin and Elizabeth van Es summarize best much of what is written in the papers in the Video Cases section. Research indicates that video can help us to help teachers to learn what to *do* in the classroom. The newer video cases, using newer technology, extend this to helping teachers to *notice* what is happening in a classroom. With guidance, this ability to notice can lead to improved teaching practice and the ability to adopt new teaching interactions and processes as well as to integrate new content or materials.

Developing Digital Video Resources to Improve Teaching with Technology: The PT3 - "Best Practices" Project

Introduction

The Preparing Tomorrow's Teachers to use Technology (PT3) program is an initiative of the U.S. Department of Education designed to improve teacher preparation programs to allow educators to more effectively integrate technology into their teaching. The foundation of the PT3 program is that schools increasingly have access to network resources and the Internet; their goal now is to improve teachers' and students' use of technology to improve learning. For instance, Base and Meek (1998) report that 78% of K-12 schools have access to network resources. School district leaders believe their students must have access to and use technology (Brush, 1999; Brush & Bannon, 1998.) Although most institutions that prepare teachers offer some type of technology course, research continues to show that teachers do not feel prepared to effectively integrate technology into their instruction (Schrum, 1999; Strudler & Wetzel, 1999; Topp, Mortensen, & Grandgenett, 1995.)

In August, 2000, Arizona State University was awarded a 3-year, $1.15 million PT3 Implementation Grant. This award is being used to fund a project entitled "A Field-Based Model for Integrating Technology into Pre-Service Teacher Education." The technology skills and processes the preservice teachers are learning are based upon state recommendations and the ISTE (2000) standards.

This field-based project involves a collaboration among schools, three university campuses, and the Arizona K-12 Center. During the first year educational technology and methods faculty teamed with educational technology graduate students to develop and present hands-on workshops at five elementary schools where students take most of their methods courses. Mentor-teachers at the schools work with the preservice teachers and also participate in the technology workshops. During the summer of 2001, a Teacher Institute was held for the mentor-teachers at these schools and three more are participating during the second year.

The primary goals of the ASU PT3 project are that that the preservice teachers, along with their methods faculty and their field-based mentor-teachers will demonstrate a significant increase in both the quality and frequency of technology integrated into their teaching.

As part of the field-based PT3 project a set of prototypes of a www multimedia database of materials and best practices has been developed.

In the proposed SITE Video Festival demonstration we will focus on presenting samples of all components of the database, a software tool designed to aid preservice, but also inservice, teachers in integrating best practices of technology into their teaching. We will present an example of one full "lesson" from one of our participating teachers, along with sample video clips of several others of the teachers. In addition, in our discussions with SITE members, we may also discuss aspects of the development of the video-based "best practices" project.

The "Best Practices" Digital Video Database

Arizona State University, the Arizona K-12 Center, and Northern Arizona University are partnering to provide the preservice teachers with access to databases of instructional materials and methods for utilizing these materials. The K-12 Center is hosting the database, so that it is accessible not only to project teachers, but to teachers throughout the state. Preservice teachers will be expected to access these materials via the www, evaluate appropriate methods for using these materials, and integrate these materials into their instructional activities.

"Best Practices" Videos to be Demonstrated at SITE

Our prototype series includes several recognized "best practices" teachers. A sample of the materials, each set of which will include a pre-instruction interview with the teacher, a video of the teacher delivering the technology-based lesson, and a post-instruction reflective interview with the teacher, will be demonstrated. A portfolio consisting of the systematically-designed lesson plan (cf. Dick & Carey, 2000; Sullivan & Higgins, 1983) and materials developed by the teacher, links or resources for the technology used, and a sample of a commentary by an educational technology or methods expert will also be presented to SITE audience members.

The Video Lessons

Each lesson is built along a "model" or "timeline" of a lesson, which allows for all types of teaching styles and philosophies. Preservice teachers can access the lessons and lesson materials by clicking on components along a timeline that serves as a metaphor for the lessons. The lessons consist of:

Lesson Interviews and Commentaries. Each lesson includes extensive reflective interviews and commentaries. Teachers were interviewed prior to teaching the videotaped lesson and immediately after they taught their students. A follow-up commentary is also included; the teacher reviews his or her edited lesson and then comments upon his or her teaching practices.

For each lesson one subject-matter expert or peer-expert teacher, and one technology expert have also provided a reflective commentary while viewing the edited tape. Preservice teachers may then choose to view each lesson several times, reviewing the teacher or various other experts' perspectives each time.

Timeline Components. A flexible framework was developed for the lessons. For each lesson the videos include an Introduction, Presentation, Activities and Wrap-up. Preservice teachers can access any or all components of each lesson and can review any sections they wish.

Example Lessons to be Demonstrated

One lesson will be shown in full, followed by illustrative excerpts from several other lessons.

Fifth-sixth grade mathematics. It is planned that this lesson will be shown in full. A fifth-sixth grade teacher prepared a lesson on Archimedes Spiral for her class of higher-achieving middle school students. The students had previously learned about natural spirals. She began her lesson with an inquiry-based introduction, in which she questioned students extensively to help them recall what they learned in the prior lesson. In this introduction, as the students actively built upon this knowledge base, she wove new instruction into the inquiry. She used a Powerpoint presentation with many photographs and drawings, and an animated illustration of Archimedes Screw to show students historical and current uses of this spiral in technology. She then showed students a Quicktime movie she had prepared to show students in close-up views the tools and techniques they would be using to build their own Archimedes-type spirals. She gave students several challenges for their participation in the lesson, including to test what happens when they vary the size of the peg used to make their spirals. Also during the active participation part of the lesson students were challenged to search the web on one of their classroom computers to answer questions about the spiral and further uses. Students worked in cooperative groups to build the spirals and to answer the internet-based challenge questions.

In pre-and post-interviews the teacher described the purposes to which she put technology in this science and math lesson, what she hoped students would learn, state criteria being met in the lesson, how she will assess student learning and advice for new teachers who wish to use this lesson.

Examples of Excerpted Lessons to be Demonstrated:

- High-School Language Arts. A high-school teacher used technology to motivate lower-level students in an English class. She has found that building challenging lessons using the web has helped her increase these lower-achieving students' successful completion of this English class. This teacher used PowerPoint, Inspirations software and a Web-Quest, followed by student presentations, to allow students to "build their case" for who King Arthur might have been, and where Camelot might have been.
- High School Physical Science. Another teacher is using SimCalc to help his students learn to analyze and interpret data from their physical science experiments.

Implications

We anticipate that access to the "Best Practices" videos, lesson materials, reflective interviews and commentaries, both by PT3 teachers and all teachers in the state, will enhance teachers' success in integrating technology into their classrooms. Their use of technology will go beyond using computers as tools to allowing their students to learn in innovative ways using a full range of technologies.

For our Video Festival SITE participants we will provide a handout summarizing our video project, along with highlights from formative evaluations we have conducted using the videos. We will also provide a view of our future development plans and of research we are conducting on how best to support the learning value of our videos for preservice teachers.

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Portraits of Three Schools from the U.S.A. Exemplary Technology-Supported Schooling Case Studies Project

Sara Dexter,
sdexter@umn.edu
Center for Applied Research and Educational Improvement

Ronald E. Anderson,
rea@umn.edu
Department of Sociology

University of Minnesota
U.S.A.

Abstract: This presentation features video footage from three schools with innovative classroom teaching using technology. The results were obtained as part of 11 case studies in USA schools and were selected to be part of two international studies, one by OECD and the other by IEA. Innovative roles of both teachers and student were evident and improvements were sustained by professional communities and by emphasizing both technical and instructional support.

Background

New conceptual and methodological models are needed to cope with the changes that result from integration of information technology into education. Rapid changes in technology and the ways that schools adapt to them mean that qualitative methods are needed to identify key factors, uncover hidden meanings, and explore alternative conceptual models. The "Exemplary Technology-Supported-Schooling Case Studies" project (funded by OERI of the US Department of Education) was part of the United States participation in two international projects, one by OECD and the other by IEA.

The methodology was designed to study sites successful in dealing with rapid changes due to technology. In the USA, sites selected also had to be committed to meeting high content standards; have students drawn from diverse backgrounds with some low income students; implementing reform efforts that appeared to be sustainable and transferable; and have compelling evidence that the reform efforts were resulting in educationally significant student outcomes. An extensive procedure of solicitation of nominations from numerous experts and organizations was followed to obtain candidate school sites around the country.

Overview of the Schools

From the eleven case studies we completed, we selected three schools to feature in video portraits. One was a senior high with only 240 students. However, the other two schools, a middle school and an elementary school, were average in size with two-thirds of the students from low-income families. These three schools and their innovative programs are summarized briefly:

(1) The New Tech High School has an underlying philosophy of educating students in capabilities most essential to the 21st century, especially problem-solving, project construction, knowledge management, and teamwork. Most classes are interdisciplinary and team-taught, and students' work often requires they serve as a team member on a project. Students spend a major part of every day using computers, as most of their assignments are projects requiring educational technology applications. Nearly ninety-five percent of the students attend college within two years of graduation. New Tech High has established a reputation for innovation and high productivity with frequent visitors from all over the world.

(2) The Lemon Grove Middle School focuses upon academic performance emphasizing professional development and extensive technology support made more feasible by a relatively high density of "thin clients," network PCs lacking local diskette or CD-ROM storage devices. The district also provides these thin client computers free or at low cost to parents without home computers. Essential to the success of the program is a strong professional development program providing every teacher in the school with a minimum of 120 hours related to technology during the first year. Equally critical to the program is a very extensive technology support system. While the program encourages and supports all types of pedagogical approaches including inquiry and project learning, a major emphasis is on remedial activities and other technology applications that help to improve student achievement. Test score gains for the school are consistent with their program goals.

(3) At Newsome Park Elementary, laptop computers are linked wirelessly to hubs for shared activities and Internet access at a 5:1 student to computer ratio. The wireless laptops support flexible distributions to classrooms so small groups of students can use networked computers on a fairly regular basis. A central tenant of their reform effort is to utilize student interests and discussion to drive the direction and character of projects, which are usually long-term and interdisciplinary. An essential feature of their school-wide program is for every teacher to participate in a school-based, intensive, forty five hour, technology-focused professional development experience. This kind of instructional technology support has made it possible for some teachers to implement some advanced techniques such as concept maps with young children.

Overview of the Findings

New Teacher and Student Roles in the Technology-Supported Classroom

The use of educational technology is part of a shift toward new instructional approaches within a context of school improvement or reform. A range of technologies are supporting teacher and student practices and contributing to a transformation in their traditional roles. Students are more often serving as knowledge managers, team members, and self-regulated learners. Teachers are more often serving as instructional designers, collaborative team members and coordinators of teams, as advisors to students, and as assessment specialists.

Contributions Professional Community Makes to Exemplary Technology Use

The commitment to teachers' individual learning about technology as a support to instruction was very strong at these schools, as evidenced by the support staff and professional development programming dedicated towards this end. The technology leadership at the sites contributed further to the supportive conditions and need for teacher learning that was required to implement technology-enhanced pedagogy in exemplary ways. It appears that the presence of this need to learn and the supportive conditions to do so was reciprocal, or mutually supportive, of the development of professional community around technology use. The professional community deepened and refined the shared vision related to the purposes of instructional technology, and the technology support. Our tentative supposition is that effective use of technology and professional community are mutually supportive—that increases in one create conditions for increases in the other.

Implications for the Future

Regarding the sustainability and transferability of these innovations: the teachers who practice the innovations consistently report that they expect to continue the instructional practice in the future. The systemic factors such as school culture, district support, and state policies influence the sustainability and transferability of these innovations. Systemic factors that were most mentioned included: funding and shared vision; strong leadership that is shared with teachers; public and private sector partnerships; professional development that is institutionalized and extensive; high quality technical and instructional support; climate that is supportive of reform efforts; and commitment to exploiting technological resources.

Incorporating Technology into Early Childhood Pre-Service Field Experiences

Ruth Gannon-Cook, UH-Clear Lake, US
Michael Joseph Bell, West Chester University, US

Preparing early childhood pre-service teachers is very challenging due to the national and state mandates to diversify experiences among settings that range from infant and toddler rooms up through the primary grades of elementary school. Within these experiences pre-service teachers will have opportunities to work with experienced and qualified individuals who are dedicated to serving families and nurturing the development and education of young children. However, due to the lack of program continuity and well-integrated curriculum across program boundaries, pre-service teachers will encounter a wide range of classroom practices and program policies.

Within university and college-based teacher education programs, faculty and staff are striving to understand and incorporate technology into teaching practices and pre-service teacher learning activities. Incorporating technology into teacher preparation programs is driven by goals that include: (1) broadening young professionals understanding the electronic communication, professional development and professional research, (2) nurturing pre-service teachers' skills in using technology to promote young children's understandings and broaden the scope of classroom learning activities, and (3) developing pre-service teachers' understanding of the appropriate and effective applications of technology in early childhood curricula.

Preparing early childhood pre-service teachers through field-based courses and field-based internships presents challenges regarding the acceptance, development and implementation of technology as a fully integrated component of early childhood classrooms. Most early childhood programs promote the development of young children across several developmental domains. A growing number of programs are focusing on basic skills and pre-academic activities that may or may not be deemed appropriate for young children. The use of technologies as a viable means of promoting young children's development and learning has largely been attributed to those programs that focus on "academics," rather than developmental approaches.

This paper suggests that early childhood teacher educators could enhance the development of pre-service teachers and neighboring early childhood programs by identifying classroom strategies and curricular constructs that would promote the use of technology in early childhood settings. Further, teacher educators should broaden their view of technology to include materials and objects that promote children's abilities to understand (1) parts to whole relationships, (2) systems that function and "work," (3) computer and electronic hardware that promotes the use of touch and grasping as a means of input, and (4) multimedia as a means of individual creative expression. This paper suggests that developmental early childhood programs should view the use of technologies as an on-going process of learning and interactivity, rather than the widely held belief that technology is a simple input/output relationship. Field-based early childhood programs should model, promote and facilitate the integration of technologies into training sites within their surrounding communities. Due to the diverse needs and program differences found in childcare, federal preschool programs, public school early childhood programs and early childhood special education programs, the challenges are great, but not insurmountable.

Captured Wisdom

by Lynda Ginsburg, Ph.D.
National Center on Adult Literacy
University of Pennsylvania/Graduate School of Education
3910 Chestnut Street
Philadelphia, PA 19104-3111

The two videotape set of **Captured Wisdom** is a resource that is designed to help inform educators of successful practices of integrating technology into adult education instruction. Innovative, replicable activities are shown, described, and discussed by front-line classroom educators and learners so that other teachers feel that they have had an opportunity to actually visit the class and chat directly with the learners and teacher about their work together.

Captured Wisdom documents the ways educators and learners actually use technology in their classrooms as a tool to support instruction and learning in a variety of content areas. When used as a vehicle for professional development, **Captured Wisdom** is especially useful for stimulating teachers to think about and question the approaches of other teachers and the ways that they might adapt what they see and hear for their own local education contexts, learners, equipment, and curricular and instructional goals and plans.

The two videotapes contain seven 10-14 minute videos of authentic adult education classrooms. The classrooms were located at Brooklyn Public Library, Linn Benton Community College in Oregon, and Rend Lake College in Illinois among others places. The locations were chosen for the diversity of their student populations and programming. Teachers and adult learners comment on what they are doing and why. There is a short booklet that accompanies the videotapes and provides ideas for how they can be used for teacher education.

TLC - Students as Teachers

Scotty Govaars, Department of Defense Dependents Schools -Europe, US
Pat Ridge, Department of Defense Dependents Schools - Europe, US
David Reider, Learning Communities Research Group, US

This poster session will focus on case studies of students and teachers from several of the Department of Defense Dependents Schools throughout Europe who are currently offering a new course, entitled "Technology Leadership Community" or "TLC".

TLC Course Description

The course is about teaching, learning, and learning to teach. The domain of information is technology and technology skills.

Technology Leadership Community (TLC)

Grade Level: 7-12

Length Of Course: 18-36 Weeks

Recommendations:

Experience with PCs, strong working knowledge of applications used in school and capacity to learn newest technologies, interest in education and teaching. Students must be self-motivated and have a high level of personal responsibility.

Major Concepts/Content:

The TLC class merges learning the newest computer technologies with learning how to effectively teach others those technologies. Students collaboratively study and learn new software packages and computer skills while learning how to become effective trainers and educators. In addition to raising the technological knowledge of the school community, TLC students examine their own roles as teachers and learners, increasing their learning abilities in all other classes.

Major Instructional Activities:

This course is designed to train students to become effective teachers and learners by complementing the technology support in their school community.

Technology study includes Internet navigation and searching, web page creation, server management, desktop publishing and graphics applications, GIS, CAD, and other specialized software. Pedagogical study includes methodology of teaching, materials preparation, presentation strategies, evaluation techniques, and formalized self-reflection activities such as log-keeping and using videotape to observe, analyze, and improve their own teaching efforts.

Teaching activities include weekly one-on-one mentoring sessions with faculty, staff, students or community members; teaching in larger group situations (such as another classroom learning a single application); and preparing manuals and other instructional materials for their "clients." Other activities include regularly assessing the school's technology learning needs and developing strategies to effectively meet those needs.

Major Evaluative Techniques:

Students will create their own assessment rubrics and goals. Doing so enables them to set learning objectives and have a clear understanding of what is expected of them. They do this individually with the teacher. The students will also be graded on completion of tasks and participation and there will be several take-home essays that reflect what the student has learned at different points in the semester.

Assessment Will Be Based On:

How well they learned to identify, analyze, and improve their teaching abilities through their video and writing work. This will be based on survey and writing assignments, comparison of pre/post surveys, and essay writing.

How well their mentees learned the technology material. Teachers and other mentees are asked in survey form to assess their experiences with the TLC students. The TLC student assesses himself and a combination of this data describes how the student performed.

The degree in which a student's technological knowledge improved. The TLC teacher, along with the student, will examine the pre/post surveys and determine how much of the technological knowledge the student learned. Students are expected to attain a high level of competence in one or two applications, rather than learning only a little about as many applications as possible.

Essential Objectives:

Upon completion of the course, students should be able to

Demonstrate how teaching others enhance one's own learning abilities and styles, in any subject.

Demonstrate technological competency on at least one application. Competency is defined as thorough knowledge of the program, fluency with operation, and ability to explore with the tool.

Design a teaching unit or activity, including an assessment piece about a specific software or technological application.

Demonstrate growth in communicative, developmental and social areas. For example, students learn how to become articulate, develop confidence to communicate clearly with adults and youngsters, become methodical in their learning styles, attain a very high degree of responsibility.

Help the school use the complex technologies already in place, working with and complementing the training tasks of the Education Technologist, and also develop new training programs to meet changing demands.

Demonstrate that work of this nature is directly tied to real-world workplace skills.

This is a course that engages the student in the learning process. The content and activities serve to get students to think of themselves as learners, identify their own learning patterns and styles, and improve as learners. They do this by studying how to teach, by teaching others, and by reflecting upon themselves as teachers and learners.

The topic they teach is technology. This is not a technology learning class per se; it is not a computer education, application, or programming course. Those topics may be included, but it is primarily about learning how to teach technological information to others.

This is also not a "students-as-techies" course or program. While students in the TLC may learn how to service an LCD projector or a printer, their job is not to visit a classroom and change a printer cartridge, but rather demonstrate to the faculty in one-session maintenance procedures on a range of common technological equipment. TLC students are the leaders of the school, and presumably the leaders of tomorrow; therefore it wouldn't make sense to exploit their knowledge by having them tasked to fix problems everywhere.

The TLC course contains rigorous academic activities as well as demanding technological experiences.

InTime: A Video Archive for Integrating Best Practice Technology into Classroom Curriculum

Doreen Hayek, University of Northern Iowa, US

Purpose

This presentation will demonstrate the INTIME (Integrating New Technologies Into the Methods of Education) video materials that were developed as part of a $2.4 million PT3 Catalyst Grant at the University of Northern Iowa. (**http://www.uni.edu**)

The purpose of this session is to show how to utilize online video vignettes of Pre K-12 teachers using technology in a robust educational environment in preparing tomorrow's teachers to use technology.

Abstract:

The purpose of INTIME (A Video Archive for Integrating Technology into Classroom) is to provide the necessary resources for methods faculty to revise their courses, model technology integration, and require preservice teachers to integrate technology, along with components of quality education, in their lessons and units. INTIME features over 300 video scenarios of PreK-12 teachers effectively using technology in the classroom. The participants will view and critique online video vignettes of technology integration and quality education in a PreK-12 setting via video streaming technology.

Description of the presentation:

During the session the audience will experience an online video developed at the University of Northern Iowa as part of the INTIME project, applied to the educational environment. The purpose of the project is to provide the necessary resources for methods faculty to revise their courses, model technology integration, and require preservice teachers to integrate technology, along with components of quality education, in their lessons and units.

INTIME provides a wealth of learning resources by featuring video scenarios of PreK-12 teachers effectively using technology in the classroom. The INTIME server hosts over 300 web-based video vignettes of teachers integrating technology in the curriculum. Real Player software may need to be downloaded to view the video vignettes. Classroom activities are analyzed through the lenses of Technology as Facilitator of Quality Education Model. TFQE Model includes the following elements: Technology, Students at the Center of Their Own Learning, Content Standards, Teacher Knowledge and Behavior, Information Processing, Principles of Learning, and Tenets of Democracy.

TFQE Model

The video clips of about 5 minutes in length are searchable at the project website not only by elements of quality education but also by grade level, content area, teacher name, state, video title video code, software, and hardware.

During the session, the audience will have the chance to view one of the videos and its nine versions: an interview with the teacher, a lesson overview, content standards, technology, teacher knowledge, information processing, democracy, principles of learning, and teacher behavior. The video tracks appear on the left side of the screen with a scrolling text narration at the bottom of the screen. The scrolling text has terms that are hyper linked to the summaries of the model. On the right side of the screen the audience will see a complete lesson plan that includes the teacher's name, school, state, grade, curriculum area, full description of the classroom activities, content standards identified for each activity, tools and resources, assessment, timeline, and teacher's personal comments on the implementation of this particular activity.

Participant Involvement and Outcomes:

The participants will understand the structure and the purpose of the "Technology as Facilitator of Quality Education Model" as well as view and critique online video vignettes of curriculum technology integration and quality education in a Pre K-12 setting via video streaming technology.

This session will show how the project is intended to produce change in teacher training programs in three ways: 1) The project provides web-based learning resources to support new teaching and learning processes in teacher training courses; 2) Teacher trainers can model technology integration in their classes and use the video scenarios and online discussion forum to discuss the technology-based learning process; and 3) INTIME provides a Faculty Online Discussion Forum through which teacher trainers can share strategies for integrating technology with other trainers.

Viewing Successful Partnerships: Teachers and Teacher Candidates Working Together

Linda Kieffer, Eastern Washington University, US
Nancy Todd, Eastern Washington University, US

The Eastern Washington University and Cheney School District PT3 partnership provides opportunitites for EWU teacher candidates to jointly plan and carry out, with classroom teachers, a lesson incorporating technology. Such projects included WebQuests, classroom newspapers, daily school news "broadcasts," and story writing and illustrating.

A professional video (17 minutes) was produced that shows scenes of teacher candidates working with children to help them use computers in school district classsrooms for a variety of technology based projects. Also included are interviews with Cheney teachers and pupils. The video portrays successful projects that were facilitated by teachers and teacher candidates working together.

The video was used in October 2001 at faculty meetings in each of the district schools to sell PT3 partnerships with teachers who had not yet participated with EWU candidates helping with technology in their classrooms. Hearing testimonials of fellow teachers, who admitted on tape to being initial technophobes, many teachers responded, "If so and so can do that with an extra set of hands, I might be able, too." Seeing local success was inspirational to teachers and encouraged them to give technology a try. It was well worth the production cost of the video.

Using Video to Support Teachers' Ability to Interpret Classroom Interactions

Miriam Gamoran Sherin
School of Education and Social Policy
Northwestern University
United States
msherin@northwestern.edu

Elizabeth A. van Es
School of Education and Social Policy
Northwestern University
United States
van-es@northwestern.edu

Abstract: This paper examines how video can be used to help pre-service and in-service teachers learn to *notice* what is happening in their classrooms. Data from two related studies are presented. In the first study, middle-school mathematics teachers met monthly in a video club in which they shared and discussed excerpts of videos from their classrooms. In the second study, a group of pre-service high-school mathematics and science teachers used a new video analysis support tool called VAST to examine excerpts of video from their own and others' classrooms. In both cases, we found changes over time in *what* the teachers noticed and in *how* they interpreted these events. This research adds to our theoretical understanding of the role of video in teacher education and also provides direction for the development of new forms of video-based professional development activities.

Introduction

Video has become an important tool for working with both novice and veteran teachers. This is particularly true in mathematics and science education, where many new video-based and multimedia programs have recently been developed. In some cases, video is used to demonstrate new ways that teachers can explore specific content areas with students (e.g., Hatfield & Bitter, 1994)). In other cases, video is used to illustrate particular classroom processes such as discourse or problem-solving (e.g., Corwin, Price, & Storeygard, 1996). Common to both of these approaches is an emphasis on helping teachers learn what to *do* in the classroom.

In contrast, we are examining how video can help teachers learn to *notice*, that is, to develop new ways of "seeing" what is happening in their classrooms. We claim that this ability to notice is critical in the context of current reforms that require teachers to make pedagogical decisions in the midst of instruction. For example, teachers are supposed to pay close attention to the ideas that students raise and then use these ideas as the basis for the lesson-in-progress. This adaptive style of instruction calls for teachers to be skilled at noticing and interpreting classroom interactions. Even veteran teachers who may already be experienced at seeing what is happening in their classrooms need to find ways to focus their attention on new aspects of classroom interactions.

In this paper, we report on two related studies that used video to support teachers' ability to notice and interpret classroom interactions. In both cases, we found changes in *what* the teachers noticed and in *how* they interpreted these events. This research adds to our theoretical understanding of the role of video in teacher education and also provides direction for the development of new forms of video-based professional development activities.

Theoretical Perspectives

A great deal of research has explored experts' ability to recognize the complexities within the situations that they examine (e.g., Goodwin, 1994). In van Es and Sherin (2002) we synthesize such work and propose three key components of teachers' ability to notice. First, noticing involves identifying what is important in a teaching situation (Frederiksen, 1992; Leinhardt, Putnam, Stein, & Baxter, 1991). The classroom is a complex environment with multiple interactions occurring at the same time. A teacher cannot possibly pay attention to all that is happening. Instead, teachers must be selective in determining where to focus their attention.

Second, noticing involves making connections between specific classroom interactions and the broader concepts and principles of teaching and learning that they represent. Experts in many different fields, from chess to physics have been found to represent complex problems in terms of the larger principles that are at stake (e.g., Chi, Glaser,. & Farr, 1988). Similarly, we claim that teachers should not only recognize, as described above, that "This is important." In addition, noticing involves considering "What is this a case of?" (Shulman, 1996). Doing so can help teachers to recognize important relationships among events that occur.

Third, noticing involves teachers using what they know about the context to reason about a given situation. Prior research has found that as individuals gain expertise within a domain, they become more adept as making sense of situations that occur within that domain (Chi et al., 1988). For teachers, this means that noticing classroom interactions is tied to the specific context in which one teaches — the particular subject matter, school environment, grade level, and more.

In exploring how to support the development of teachers' ability to notice classroom interactions, prior research suggests that video can be an effective tool (Sherin, 2001). Video offers a permanent record of classroom interactions. Thus teachers do not have to rely only on their memory of what occurred. Instead they can view a video, multiple times if they wish, examining what took place from different perspectives. In addition, researchers have argued that teachers are often constrained by their familiar classroom routines (e.g., Putnam & Borko, 2000). Viewing video, however, provides teachers with a very different kind of experience, one in which the goal is reflection rather than action. By allowing teachers to remove themselves from the demands of the classroom, viewing video may prompt teachers to develop new ways to examine what happens in their classrooms.

Methods

Data for this paper come from two related studies. In the first study, four middle-school mathematics teachers participated in a year-long series of video club meetings. In these meetings, the teachers met monthly for one hour to watch and discuss excerpts of videos from each other's classrooms. A researcher facilitated the meetings using open-ended questions. For example, after the group watched a video excerpt, the facilitator would ask, "What did you notice?" A total of 10 meetings occurred across the year. Each meeting was videotaped.

In the second study, six pre-service teachers working towards certification in secondary mathematics or science participated in three hour-long sessions in which they used VAST (Sherin & van Es, 2001), a Video Analysis Support Tool, to examine video of their own and others' teaching. VAST allows teachers to import digitized video from their own classroom and provides a series of scaffolds to foster teachers' analysis of this video. Specifically, teachers are prompted to analyze three aspects of their videos: student thinking, the teacher's roles, and classroom discourse. Furthermore, within each of these areas, teachers are asked to respond to a series of questions, the first of which is "What do you notice?" Prior to and following participation in these sessions, the pre-service teachers wrote narrative essays in which they discussed videotaped lessons from their classrooms. (See van Es & Sherin, 2002, for a more detailed description of the VAST software.)

The data were analyzed using an iterative and grounded approach. Fine-grained analyses of videotapes (Schoenfeld, Smith, & Arcavi, 1993) formed the basis for much of the work. Furthermore, we used techniques designed by the Video Portfolio Project (Frederiksen, Sipusic, Sherin, & Wolfe, 1998) to analyze the ways that the teachers discussed and reviewed video excerpts in both the video club and VAST sessions. The narrative essays were analyzed for the extent to which the pre-service teachers (a) highlighted particular events that occurred, (b) paid attention to specific or general evidence from the video, and (c) took a descriptive, evaluative, or interpretive stance toward discussing what had occurred. In addition, changes in the essays were compared with changes in the essays of six other teachers in the same teacher education program but who did not participate in the VAST sessions. Together, these two contexts allowed us to examine different but related ways that video can support teachers' ability to notice and interpret classroom interactions. Furthermore, they compliment each other by differing in the grade level of the participating teachers as well as in their years of prior teaching experience.

Results and Conclusions

Teachers in both studies developed new ways of noticing and interpreting classroom interactions. In particular, two kinds of changes took place. There were changes in *what* the teachers noticed as they discussed the video excerpts, and there were changes in *how* the teachers discussed these events.

There was a shift in what the teachers noticed.

Changes occurred in what the teachers noticed as they examined videos from their classrooms over time. These changes, however, were somewhat different between the two groups. The teachers in the video club began the year by focusing on what the teacher in the video was doing. For example, in the first video club, the teachers initiated a discussion concerning the mathematical topic that the teacher in the video had decided to pursue. "You know, as teachers [we] make decisions right on the spot about explore it or don't explore it." Similarly, the group discussed the ways that the teacher had responded to a group of students that were working together. "I wanted them to discuss it…I wasn't going to answer him. I wanted his group to do it." With time, however, the focus of their attention shifted from the teacher to the student, and, more specifically, to the mathematical thinking of students. For example, in one of the later video club meetings, the teachers compared two different methods that students offered for estimating the number of people in an aerial photograph of a crowd. "[Julie's idea] was kind of the opposite of what [Robert] said, and that is that all dots are uniformly placed. So taking a small sample…wouldn't make you any less accurate than the larger [sample]." This approach to viewing video became quite common for the teachers and they regularly discussed in detail how students talked about and worked with mathematical ideas. In discussing her experiences in the video club, one teacher explicitly commented on this shift. She explained, " [At first I was thinking] 'Oh, I think I should have said that or done this.' As I was watching though, I thought a lot about… just following the ideas of different kids." This shift is particularly important in light of reform recommendations that encourage teachers to pay close attention to the ideas that students raise (NCTM, 2000). Moreover, researchers have shown that examining student thinking can lead to valuable changes in teachers' instruction and can help teachers to effectively implement the goals of refom (Franke, Fenemma, & Carpenter, 1997).

In the VAST study, a different kind of shift occurred in what the teachers noticed. Rather than a change in topic, there was a change in the range of events that were noticed and discussed by the teachers. Specifically, the pre-service teachers' initial analyses consisted largely of describing events as they unfolded in the video. For instance, one essay started as follows, "The morning began with a test and after a 10-minute break, we began to set up for the discussion of 'number families.'" Another essay chronicled a class discussion by listing the order in which members of the class participated and the comments that were made. "I called on a particular student, Ian, instead of waiting for someone to volunteer. I asked Ian what graph his group chose, and he answered that they had chosen Graph D. I asked him why they chose that graph. After a pause and some giggles from his other group members, they admitted that they had not formed their reasons. At that point, a student from another group, Kenny, raised his hand and said that he picked Graph C…" In contrast, later in the year, the teachers' analyses became more organized around particular events that they identified as noteworthy. No longer were their analyses simply chronological. Instead, the pre-service teachers were now able to identify significant features of instruction and focus their analyses in that area. This shift represents the development of a key component of noticing and has been identified by researchers an important aspect of teaching expertise (Berliner, 1994).

There was a shift in how the teachers discussed what they noticed.

Changes occurred not only in the topic of the teachers' comments but also in the ways in which they discussed these ideas. First, in both studies, the teachers began with an evaluative stance toward events that occurred during instruction. In the video clubs, for example, it was common for teachers to ask "What should I have done?" or to suggest an alternative pedagogical approach that the teacher on the video might have used. Similarly, in the VAST study, early in the year when the pre-service teachers discussed videos from their classes, they focused on what had and had not "worked" and on what they might want to do differently next time. In one essay a teacher wrote "I wish I had handled much of this discussion differently," and another noted, "I could have ... done a better job of enforcing rules about talking in turn and listening to others." Later in the year, both groups of teachers focused more on interpreting what occurred rather than simply evaluating the teaching and learning that was evident in the video. Thus, for example, instead of focusing immediately on the effectiveness of a particular pedagogical approach, the teachers tried to understand the influence of that approach on the learning that occurred. And when evaluation of a particular situation did take place, it was proceeded by careful interpretation of what had happened. We believe that this is a valuable shift and one that is closely tied to the goals of reform. As other researchers have stated as well, a focus on interpretation allows teachers to understand what has happened and to then use these understandings to inform their decisions of how to proceed (Hammer, 2000; Putnam & Borko, 2000; Sherin, 2001).

In addition to adopting an interpretive stance, the teachers also came to base their interpretations of what had occurred in evidence from the video. Teachers in both studies moved from talking generally about their practice to using specific events in the video as a resource for discussing particular ideas. For example, in the later video clubs, it was not uncommon for a teacher to ask to replay a segment of video so that he or she could more precisely discuss what a student had said. Similarly, the pre-service teachers initially talked broadly about what they saw happening in the classroom, stating, for example, "The students are really thinking in this lesson," without being explicit about what in the video indicated "thinking" on the part of the students. Over time, however, they began to refer to specific student actions and comments in the video as representing "student thinking" and as illustrations of their claims. This use of evidence is important for several reasons, two of which we mention here. First, as they use evidence, teachers make connections between the events that they see and key ideas of teaching and learning. For example, teachers in the video club found that watching video helped them to develop a concrete vision of what a "community of learners" can look like in practice. "I got to see this culture of kids knowing that you expect them to interact and bounce off each other's ideas and they aren't going to just look at you for the answer all the time. That's [a community of learners.]" Similarly, teachers in the VAST study developed more explicit definitions of discourse and inquiry. Second, basing one's comments in evidence from the video allows other teachers to offer different interpretations of the same events and can raise the level of discussion and debate among the group. This is particularly valuable as teachers work together to examine and reflect on their teaching practices.

Implications

The results of this paper illustrate different ways that video-based professional development can provide teachers with opportunities to learn. While video has played an important role in teacher education for over three decades, more research is needed to understand the affordances of video for teacher education and those aspects of teacher cognition that are influenced by the viewing of video. In our research, we take an important step in that direction by examining how video can help teachers learn to notice — learn to notice new aspects of classroom interactions and learn to develop new techniques for making sense of these interactions. We found that both the video clubs and the use of VAST helped teachers to develop ways of noticing and interpreting classroom events that are in line with goals of mathematics and science education reform efforts. Furthermore, we believe that the types of changes that were observed in these studies have the potential to influence teachers' classroom instruction. In ongoing work, we are currently examining the influence of teachers' ability to notice on their classroom instruction and subsequently on students' learning.

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Online Video Case Studies: What Have We Learned about their Value in Preservice Education?

David Georgi, California State University, Bakersfield
Pam Redmond, University of San Francisco
Sue Talley, Pepperdine University
Terence Cannings, Pepperdine University

Online video cases have the potential to provide real-world examples and dilemmas of classroom teaching to our teacher candidates in ways that text-based cases often cannot. In this presentation the panelists will demonstrate the video cases they have created and will share the results of the use of these cases in their respective teacher education programs. They will also discuss tips that they have learned about the production process. Finally, they will discuss the pros and cons of using text-based cases versus online video cases.

Shulman's (1992) research indicates that the use of text-based cases is very effective in teacher preparation, especially when discussion of the case is led by a skilled moderator who can help students develop the reflective skills necessary to improve their teaching practice. But text-based cases cannot address the need for preservice teachers to *observe* teachers handling daily problems in their classrooms. Learning to teach is difficult when students often have little time to observe effective teaching in a variety of situations, to practice their own teaching, and to reflect on this experience with others (Wasserman, 1994).

Online video case studies offer promise in addressing these challenges. Online video cases allow teacher candidates and instructors to view the cases many times, whether on campus or at home. These cases can be linked to a rich set of contextual resources to expand what can be understood directly from observation. These resources might include state frameworks or standards, the lesson plans underlying the video case, papers on relevant theoretical research, the rubrics or assessment tools used, and other web-based resources. The Internet also offers the opportunity for online discussion of the cases, creating the opportunity for students to reflect on these cases beyond just face to face class time, thus moving into a 24 / 7 environment. In addition, the Internet allows discussion to occur between geographically dispersed educators, creating the possibility for teachers to develop the habit of dialogue with others in their community of practice.

Low cost digital video cameras also enable preservice teachers to create their own video cases. They can videotape their own practice, for example, and then add reflective commentary. Easy to use video editors have made this a readily accessible option for teacher educators.

The presenters have all created online video cases as part of their Preparing Tomorrow's Teachers to Use Technology grants.

David Georgi has used Learning Circles consisting of professors, K-12 teachers, future teachers and others to produce streamed videos to illustrate instruction that can be accessed by anyone with an Internet connection. David will share two products, one in Special Education and the other in Physical Fitness.

Pam Redmond has worked with Apple Computer, Inc. to develop online video resources for educators. The project began as the California Learning Interchange and now is expanding into the Teacher's Learning Interchange (TLI). Pam will show some of these resources and discuss their evolution. In addition, she is the evaluator for the work being done at CSU, Bakersfield and will share some of those results.

Sue Talley and Terence Cannings have worked at Pepperdine University on a series of online video case studies. These cases use the tools created by LessonLab, a company founded by Dr. James Stigler. The tools have been developed based on lessons learned from the Third International Mathematics and Science Study. The series includes lessons showing the use of the Language Experience Approach in elementary classrooms, a Climatology lesson in upper elementary using Palm Pilots, and techniques for teaching English Language Learners. Sue and Terry will demonstrate how these videos are used in courses in the Pepperdine teacher credentialing course sequence and discuss the evaluation results to date.

After the demonstrations, the panel members will interact with the audience, answering questions about the value of online video cases and the advantages they have found in using this type of case. They will also discuss times when text-based cases may still be preferable. The panel will also answer questions about production of these online video cases. Finally, they will invite feedback about the elements included in their cases and will discuss the relative merits of these elements based on their use at their respective universities.

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Pepperdine Presents: An Online Video Case Studies Series to Use Throughout a Teacher Education Program

Sue Talley, Pepperdine University, PT3 Project Director

Pepperdine University has developed a series of online video case studies to use as part of its fifth year teacher education program. These online video cases use the software tools developed by LessonLab. Three cases from the series will be demonstrated. The first case, from a lower elementary classroom, includes four segments from a reading lesson that uses the Language Experience Approach. The follow-up to this case demonstrates how these same techniques can be adapted for use in a secondary level classroom The second case includes four segments from a unit on Climatology, covering both science and math concepts and highlighting the use of Palm Pilots as part of the unit. The third case demonstrates a variety of techniques used to teach English Language Learners.

The LessonLab tools are based on Dr. James Stigler's findings from the Third International Mathematics and Science Study. These findings were documented in his book The Teaching Gap. Stigler & Hiebert (1999) write there that they believe that the teaching profession does not have enough knowledge about what constitutes effective teaching and that there is a lack of a system for developing professional knowledge and for giving teachers the opportunity to learn about teaching.

The cases developed by Pepperdine University using the LessonLab tools include a variety of elements that research indicates are valuable when using cases to better understand teaching. By adding other elements to the video, a richer context for the video case is developed. These elements include commentaries designed to guide the preservice educators while viewing the video. These commentaries may be from the teacher or from other experts in the pedagogy being used or in the technology being infused into the lesson. There are also resources such as the lesson plan used, state frameworks or standards, samples of student work, and the rubrics or assessment tools used as part of the lesson. Because these resources are online, students may also be directed to web-based resources that will be important to them in their teaching practice. In addition to video of the lesson, there is video of the teacher indicating, prior to the lesson, what he or she believes is their intent in the lesson. There is also video of the teacher being interviewed after the lesson, indicating areas that he or she feels could be improved and why. In addition, there is usually commentary from the students about what they understood about the lesson.

While the original intent for these online video cases was to supplement materials used in methods courses, our experience at Pepperdine indicates that the cases have much wider applicability. For example, they can be used in an Instructional Strategies class where preservice educators may be discussing possible classroom management strategies. They might also be used in an Educational Psychology course where preservice teachers might develop their observation and reflection skills. As instructors in the Pepperdine teacher education program use the online video cases, they continue to find new and different ways to take advantage of the rich resources inherent in the video case.

Although the content of these online video cases is important, even more important perhaps are some of the ways that these cases are actually used in preservice instruction. Moving cases from text to online allows preservice educators to watch the video many more times than they might within the context of their face to face classroom time. Preservice educators may also participate in online discussions about the cases, not only with their peers but also with a larger community of educators. Perhaps most important, preservice educators, using the LessonLab tools, can interact with the video in a way that lets them identify key points where they observe certain activities occurring in the video and to reflect on why they believe this is happening.

Finally, these professionally developed online video cases have led faculty to use digital video in even more ways in their classrooms. The availability of low cost digital video cameras and easy to use video editors have led faculty to combine the use of the prepared cases with student-developed cases.

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Educational Applications of Video: Creating Educational Video with Pre-service Teachers to Demonstrate Classroom Management Strategies

Mary Thompson
Curriculum and Instruction
University of Houston
mthompson@pioneer.coe.uh.edu

This paper will describe a joint project between PT3 grant team members, an Instructional Technology graduate course, a pre-service teacher core course, and pre-service teachers which resulted in video clips that are currently being used to supplement the curriculum of a classroom management course at the College of Education, University of Houston.

The following paper discusses the design and development of a collaborative video project at the University of Houston through the roles of the multiple participants: Dr. Bernard Robin, the video course instructor; Dr. Philip Ruthstrom, PT3 grant coordinator; Dr. Will Weber, the classroom management course instructor; Mary Thompson, PT3 grant technology fellow and videographer, and students of classroom management who participated in the creation of the videos. The purpose of this paper is to describe the video project from the inception of the idea through its completion including the current status of the project.

Course Concept—Dr. Bernard Robin, course instructor

CUIN 7346, Educational Applications of Interactive Video, is a graduate-level course in the Instructional Technology program of the department of Curriculum and Instruction at the University of Houston. It is also the course for which the video project to be described in this paper was the final project. Beginning in the early 1990s, CUIN 7346 was a course in which educators learned how to take existing video and edit it for their own use in the classroom. The focus at that time was on taking educational materials such as laserdiscs and videotapes and using them to support the classroom goals of the enrolled students. As video technology both increased in sophistication and decreased in cost, the course objectives changed to the creation of video resources rather than the retooling of pre-existing resources. Graduate students enrolled in the course were taught the basics of videography so that they could create their own video resources for personal use. As the course evolved, however, the need for a focus, a central guiding project, whose goal was more permanent and far-reaching, became apparent. Students needed a goal, in the form of real projects for real clients who intended to put the completed video projects to use, to give them the impetus for greater creativity. The inauguration of a project-based focus for the digital video course led to greater room for creativity and better implementation of resources which were, by then, more accessible than ever. This new project-based goal required that groups of students work with a client to create video for actual distribution and use. The final step in the process which led to the creation of the classroom management video project was the collaboration between the students and instructor of CUIN 7346 and the PT3 grant awarded to the University of Houston in Fall 2000. As a result of the PT3 grant, instructors of pre-service teacher courses within the College of Education became clients for the spring semester of Educational Applications of Digital Video.

Collaboration—Dr. Phil Ruthstrom, PT3 grant coordinator

One of the stated goals, among many, of the PT3 grant team at the University of Houston, was to increase the infusion of technology into the education courses for pre-service, pre-certification teachers. The idea for collaboration between the students and instructor of the Education Applications of Interactive Video and the instructors of these courses grew from the stated goals of the PT3 grant. A stated goal of the PT3 grant at the University of Houston is to create opportunities for pre-service teachers to be exposed to authentic uses of technology in their education courses. The personalized video resources proposed for this project, it was hoped, would become integral components of the pre-service teacher courses for which they were created and thereby expose those students to a new and innovative use of technology. As a result, instructors of pre-service education courses, the main focal point of the PT3 grant, became clients for the students enrolled in CUIN 7346. The needs of the clients and the matching of video students to those needs were facilitated by the course instructor and the PT3 grant coordinator. Specifications for videos required that they be short, "mini-case" products, between thirty seconds to one and one-half minutes long, which could be incorporated into a class discussion, and would not require the entirety of a class to view. The goal of the finished videos was to be twofold; that these videos would act as curriculum enhancers for the pre-service teacher courses and that they would serve as a resource for many semesters beyond the time of their actual creation. The pre-service teacher instructors/clients for CUIN 7346 were informed of and in agreement with the stated goals for the video projects.

Client Experience—Dr. Will Weber, Classroom Management Course Instructor

Dr. Weber's classroom management course, CUIN 4375-6375, is a required component of the teacher certification program at the University of Houston. Students in the course are encouraged to look at a number of accepted approaches to classroom management and to choose those strategies which they feel will best suit their needs as teachers and their goals for their future classrooms. Dr. Weber often uses the analogy of a classroom management toolbox, enabling students to understand that the more strategies for classroom management that they have in their toolboxes, the better their chances for a successful managerial intervention to address inappropriate behavior, monitor possible problems, and maintain appropriate behaviors. Dr. Weber frequently employs case studies to help students to better grasp the nature of classroom management strategies. The idea of creating mini-video cases for use in his teaching, therefore, was a perfect fit. Dr. Weber offered his students the opportunity to participate in the video project as an alternative to the standard paper project. In return, students agreed to work closely with the video crew, students of the Educational Applications of Video course, to complete the steps necessary to the creation of good classroom management examples.

Coordination—Mary Thompson, PT3 Grant Technology Fellow and student enrolled in Educational Applications of Video

After Dr. Weber announced the project, interest in the classroom management video project was extremely high. The role of video project coordination fell to a PT3 Grant Technology Fellow who was also enrolled in the Educational Applications of Interactive Video course. Management of materials such as video equipment and permission slips, communication between video crew and the pre-service teachers, and an understanding of concepts being taught in the classroom management course were crucial elements to the development of usable video resources. Knowledge acquired as a student of Educational Applications of Interactive Video played a major role in the successful translation of raw footage filmed at the schools into usable mini-clips which accurately and succinctly demonstrated the classroom management objectives. The first semester of the video project encompassed 12 pre-service teacher volunteers and took place in six school districts in the Houston area. Completing such a large project in a single semester required the cooperation and hard work of all involved.

Creation—Preservice Teachers enrolled in Classroom Management (CUIN 4375-6375)

As participants in the classroom management video project, students were required to make arrangements to provide a real classroom setting for filming. They had to obtain permission to use a classroom from school administration and to film actual students from their parents. Once appropriate permissions had been received, the students created scripts which demonstrated the classroom management strategies recommended in Dr. Weber's course. Students then rehearsed those scenes with their students so that they would be ready for filming. While the amount of work involved in the video project certainly equaled and, in some cases, surpassed the amount of work required by the traditional paper assignment, student evaluation of the process was resoundingly positive. Feedback from two pre-service teacher video project participants follows:

> I used strategies and created scenarios that I felt would demonstrate a teacher-student encounter with management strategies in a classroom environment. My video took place at Stephens Elementary in the Gym; I had a total of ten participants from third and fourth grade…I tried to create realistic scenarios such as following directions, proximity control, and "I" messages. Best of all, I enjoyed the making of the video we created in collaboration to create memorable experiences that can be useful for pre-service teachers or any individual who is interested in classroom management. As an undergraduate student, I will always remember the classroom management video that I invested time in creating. I may not remember the titles of papers that I have written for other classes but my video participation is a valuable resource to retain.
> Evette Silva, 4th grade pre-service teacher, Video Project Participant, Spring 2001
>
> I believe it is simple to put in theory what one should think a classroom setting should be like. It is very easy to write down on paper what a smooth transition between one lesson and the next should be like but it is not always easy to do it in the real world. Theory and applied theory are two completely different ballgames but without a doubt the video project gave me great experience in applying what I had learned in theory. To be able to write adequate skits I not only had to do my research but, I had to go to observe a class to see what classroom management strategies stood out. Many of the things I observed impressed me so much I decided to incorporate them in my own toolbox of strategies. Once the skits were ready the actors had to be chosen and the skits needed to be rehearsed. The funny thing

> is that classroom management needed to be utilized to have successful practice sessions which further built on my experience with its implementation. What I had learned was needed every two seconds with at least one of the little bodies we were trying to control. After days of practice, the final day comes when it was time to film. The effort from the children and the smile on their faces was the greatest treat of all. No essay can give you that kind of satisfaction. I had a great experience with the video and if I could do it again, I would do it again without a doubt. It is not only great experience with the children, but a great chance to see experts doing everyday things that you read about. It is amazing how you understand some theory when you read it, but it is not until you experience it that you completely come to understand and internalize what is written in your textbook. This video project gave me the opportunity to assimilate and internalize my knowledge of classroom management into something a lot more whole and rewarding.
> Betty Garcia, 1st grade pre-service teacher, Video Project Participant, Fall 2001

Along with the educational benefit provided to pre-service teachers by the video project, a positive result has been the knowledge gained by participants in the creation process. Above all, the decision to use real teachers and real students has proven to be a valuable one. Using authentic classroom conditions, even in scripted situations, provides a naturalistic insight into teacher/student interactions within the classroom. In addition, it has become readily apparent from viewing the completed videos, that much more can be learned from these video segments than how to teach a single skill. In some cases, the strategy captured on film is not necessarily the exact one that the teacher had planned. In such cases, the natural interaction between teacher and students, again, plays a strong role in producing practical classroom materials. Another unforeseen benefit to filming in a real classroom setting with real students is the pleasure the majority take in participating. Not only do students like the moments when they are the center of attention, they also like the idea that they are helping their own teachers in a project for their coursework. Additionally, reflection on the video creation process led to the discovery that educational videos, while needing to be professional and cleanly edited, do not have to be filled with glamour; the purpose of these videos is to highlight the skills of the teacher not the videographer. Therefore, fireworks and special effects are not necessary and, indeed, would have distracted from the established goal.

Current Status—Continued Collaboration

The collaborative nature of this project, involving representatives from all levels of the College, enabled the success of the venture. The strength of this project lies in the concerted effort of so many participants throughout the College of Education. Each stakeholder in the video project brought the resources without which the videos could not have been made. Results are such that the project has been extended and is now in its third semester. The continuing goal is to create a library of classroom management examples that future students can draw on both in class and in a projected online component.

SECTION EDITORS:

Nicola Yelland, RMIT University
Glenn DeVoogd, California State University Fresno

The events of 2001 have left an indelible mark on us all and have placed our humanity at the forefront of our lives. This is interesting because for those of us work with information and communication technologies (ICT), it reinforces the need for humans to be in control of machines and to use them to complete our own needs and desires. This process begins in the early childhood years when young children appropriate technologies to make sense of the world in which they live and also to communicate with others. There are those who wish to isolate young children from ICT and they suggest that children need to play only with three dimensional materials in order to understand the environments that they inhabit. Such people ignore the fact that technologies are an integral part of young children's lives and to dismiss them is to become like the ostrich who submerges his head in the sand. I recently met a teacher who proudly told me that her preschool was a "technology free zone". She justified this in terms of developmental theory that required active engagement with materials and stated that young children "had too much technology in their lives". This assertion, based on no evidence at all, was, for me, patronizing, and naïve in the extreme. To ignore the role that technologies play in our lives is bizarre. We need to appropriate the power of information and communication technologies so that they can help children to learn in new and dynamic ways. To ignore them, and their potential for learning and expression, is to further isolate early childhood education. How can you ignore a resource that is such an essential part of our lives?

The papers in this section have, as their focus, the use of computers with young children. Buldu interrogates early childhood teachers and discusses the findings of interviews which have, as a focus, children's views of computers and the ways in which they can be used in educational contexts. Buldu suggests that we should pay attention to the results of the study since they impact on the lives of the children that we teach.

Hall considers using technology in the primary grades of schooling. He considers the digital divide in a collaborative project that observed student achievement through the primary grades. Yost looks beyond "drill and kill" software to examine ways in which technologies can be incorporated into early childhood curriculum. She suggests ways in which teachers can use generic software to create learning opportunities that are exciting and innovative. Hirschier describes ways in which technologies can support preschool teachers professional development. She worked with 42 Head Start teachers and discovered that they needed professional development in the area of literacy that incorporated the use of ICT. Hirschier worked with teachers, showing them ways of using ICT effectively and discusssd the findings of their work in the context of the provision of quality early childhood experiences. This work links closely with the paper by Crawford which focussed on children in preschool contexts and considered a particular cohort, that is those with a disability. The study is interesting as it highlighted the diverse ways in which computers can be used with this group in exciting and innovative ways.

The papers in this section are examples of the ways in which children and their teachers have appropriated ICT in varying contexts. It is evident that the use of ICT afford opportunities for young children to explore ideas in new and dynamic ways that were not possible without the technologies and additionally that new technologies engage children so that they are motivated to learn. Early childhood curricula have almost been stuck in a time warp that was the 19th century. Young children today are curious and excited and use ICT to explore concepts and communicate with others as a natural part of their everyday lives. Teachers and administrators should embrace new ways of thinking and learning. To dismiss ICT for young children is to ignore an essential element of their existence and further isolate education from the current and contemporary lives of children who inhabit our schools.

YOUNG CHILDREN'S COMPUTER USE: PERSPECTIVES OF EARLY CHILDHOOD TEACHER EDUCATORS

Mehmet Buldu
Early Childhood Education
Indiana University – Bloomington
United States
mbuldu@indiana.edu

Abstract:

What early childhood teacher educators know about and think about computers and computer use for young children will likely affect what future early childhood teachers implement in early childhood settings. In this study, the researcher wished to find out the possible perspectives of early childhood teacher educators on computer use of young children. Three early childhood teacher educators teaching at two Midwestern universities in the US were interviewed for the study. The findings categorized into four categories—knowledge, experience, beliefs about the value of computers, and beliefs about practice. When sorting out the data, the researcher first examined the similarities among the subjects' responses, and then analyzed the differences. The author concludes that it is critical we pay attention to the results of this study and others that examine the teacher educators. It is the first window through which we see what future teachers may implement in early childhood programs.

Introduction

Since computers have been introduced to early childhood education, there has been a wide debate among early childhood professionals about both the developmental appropriateness and the effectiveness of computer use for young children. Classroom and policy decisions made as a result of these debates will have significant impact on young children's development and learning. Therefore, it is important to examine the perspectives of early childhood education professionals, find out where they stand on the issue of computer use with young children. In particular, this researcher examined early childhood education teacher educators' opinions and values.

Conceptual Framework and Rationale

Computers are very important parts of our lives and will probably be more important in the future. Since the last two decades, they have been increasingly present in early childhood education settings. As Clements (1999) states, toward the end of the 1980s, only one-fourth of licensed preschools had computers, and he continues that today almost every preschool has a computer, with the ratio of computers to students changing from 1:25 in 1984 to 1:22 in 1990 to 1:10 in 1997 (Clements 1999). This last ratio shows us that computers became a part of early childhood education settings; therefore, teachers of early childhood education need to be familiar with the latest computer technology in order to make use of its advantages for young children.

In their position statement "Technology and Young children - Ages Three through Eight" (National Association for the Education of Young Children 1996), the National Association for the Education of Young Children (NAEYC) states that "As early childhood educators become active participants in a technological world, they need in-depth training and ongoing support to be adequately prepared to make decisions about technology and to support its effective use in learning environments for children." In this statement, NAEYC also mentions that institutions of higher education have a responsibility to provide training for future teachers of early childhood education on how to integrate computer technology into early childhood curriculum. Here the biggest responsibility belongs to early childhood teacher educators.

What early childhood teacher educators know about and think about computers and computer use for young children will likely affect what future early childhood teachers implement in early childhood settings. In this study, the researcher wished to find out the possible perspectives of early childhood education scholars on computer use of young children—their knowledge, their experiences, their opinions about value, and their opinions about practice.

Research Questions

Specifically, this researcher was guided in this study by the following questions: "What is the perceived knowledge, experience, opinion and values of early childhood education instructors?" and "What is the relationship between knowledge, experience, opinions and values of early childhood instructors and implementations for future early childhood teachers?"

Methodology

Convenience samples of three early childhood teacher educators were interviewed for the study. Interviews were audiotaped, and notes were taken during the sessions.

Participants were early childhood education instructors who have been teaching at two different Midwestern universities in the U.S. Early Childhood Teacher Educator A has 14 years teaching experience, and has worked in early childhood education programs at two different universities since 1986. Early Childhood Teacher Educator B has 10 years teaching experience and has been working in early childhood education programs for 6 years. Prior to this she taught two years in Psychology, and one year in Child Development and Family Studies. Finally, Early Childhood Teacher Educator C had 4 years of teaching experience in early childhood education programs at two different colleges as an instructor and associate instructor.[1]

Each subject was interviewed in an-hour-long, and semi-structured interview session. Although interviews were organized into predetermined questions, questions were used only as a flexible guide. Based upon the responses of the subjects, the researcher found he needed to adapt the order and phrasing of the questions from one interview to the next.

During the interviews, four types of questions were asked. These were as follows: (a) background questions, (b) knowledge questions, (c) experience questions, and (d) opinion and value questions. The purpose of these interview questions was to discover the relationship between instructors' knowledge, experience, beliefs about the value of computers, and beliefs about the practice and how future early childhood education teachers may implement what they learned from their instructors.

Are teacher educators, especially those who have been in the field many years, aware of the issues being debated about computer use and young children? Do they have well-informed opinions and beliefs about this issue? This information is important because what early childhood teacher educators know, believe, and are able to do in terms of computer-use and its value will impact what future teachers learn from their instructors at college level about young children and computers.

Analysis and Interpretation

Based on the framework provided by the questions and results of the interviews, the findings can be categorized into four categories—knowledge, experience, beliefs about the value of computers, and beliefs about practice. When sorting out the data, the researcher first examined the similarities among the subjects' responses, and then analyzed the differences.

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[1] All samples were informed about the purpose of the interviews.

Knowledge:

When subjects were asked about their computer literacy and the amount of knowledge they used in their teaching, Instructor A and B defined themselves as fairly computer literate. They stated that they could do word processing, accessed the web frequently, used e-mail daily, did statistical analyses on the computer, and in general, they felt that they were able to do anything they needed to do on the computer. Instructor C, however, told the researcher that she felt she was not as well prepared to use the available technology effectively. One thing that was common across the three participants was that they all searched the web for information that they can share with their classes. They also each indicated that they were using e-mail for discussion groups and to facilitate communication. In addition, Instructor A and B mentioned that they were using power point for lecturing purposes.

The subjects were also asked about heir familiarity with programs and software for young children. Interview results indicated they were all somewhat familiar with the programs and software for young children. In particular, they were familiar with problem solving kinds of software, drill or practice software, and reading, writing, and painting programs.

Experience:

When participants were asked about their teaching experience at the college level about computers and software for young children, results show that the instructors, to date, do not have much experience teaching about computers and software for young children. Instructor B, however, talked about a new early childhood teacher education program that is about to begin at her university.

> "... In the new program, technology is one of the three things we want to hit on from the beginning of the program to the end. In this program technology is defined broadly; we want students be prepared to teach in the real world, discussing its value, its dangers, who should have it, should it be in every class; we want students, 21-year-olds, going out at least ready to critically examine technology, and be critical consumers of it, be ready to know how to access the world wide web, and how to search it, how to use computers as information sources ..." (Interview with Instructor B)

Moreover, based on the results of interviews, the researcher found that they did not talk about computers and software for young children very much as something they used as in-class activities in their college learning environments. But, they do take their college students on field trips to early childhood education programs in which they talk to the teachers of these programs, and observe young children using computers. According to the instructors' reflections about these field trips, most of the programs they have visited have one or two computers, but children do not use them much. " ...There were some exceptions to that, where computers are used for painting, writing, sound and letter learning, etc., ..." said Instructor C.

Beliefs about the Value of Computers:

(a) Physical and Cognitive Readiness of Young Children to Use Computers

Findings from the interviews show that the instructors had different perspectives about the physical and cognitive readiness of young children to use computers. The participating instructors agreed that young children were very capable of using computers. According to instructors A and C, the question was not that, the question was when they should begin to use them, and whether it was good for them or not.

"I think some kids are able to use them, I think some of the software is ok. But, I do not think they are learning anything different. I am not sure what benefits they are getting from it, and what function it serves in the classroom. I do not think it is the primary means for them to get instruction or information; they can get this stuff later. They can learn what they need to do with computers when they are a little bit older, may be in 2nd grade or 3rd grade it would be helpful. ..." (Interview with Instructor A)

Unlike Instructor A and C, Instructor B had a different perspective. According to her, it depends on a couple things. First, it depends on what we define as young child who varies from birth through age 8, and it depends on what kind of program they, the teachers, are using.

"I feel very differently if we are talking about a primary age child then I do a three or four year old. I am always nervous about the word *readiness*. I think kids are ready for many different things, whether they are good for them or not. I think I prefer to think about whether it, a computer program, promotes their healthy social-emotional, intellectual, language, and overall cognitive growth and development rather than if they are ready or not. ..." (Interview with Instructor B)

Instructor C believes that kids need to be doing other things at ages 2 through 5, such as reading or being read to, writing or having them write their words written down, they need to play, need to be exploring, etc. But, when they get into 1st and 2nd grade she believes that computer access is critical. Her reason for this belief was that we use computers everywhere in our life, whatever level we achieve; we have to know how to use computer technology as a tool, for example communication and record keeping. Those who come from homes in which computer usage is not a part of daily life, for instance children in poverty, may be put at further disadvantage if this tool is not available to them in the classroom. So, Instructor C believes children in elementary school need to learn about computer technology.

(b) Possible Pros and Cons

When asked potential advantages and disadvantages of computers, participating instructors were in nearly total agreement, stating that they see computers as communication tools; a way for children to learn about the whole world through internet, and that computers can be engaging, and entertaining. They also agreed, on the other hand, that computers are addictive, isolating, they replace other activities, and may keep kids from doing *real* things if used too much. Moreover, Instructor B added:

"... maybe depends on the teacher, what he choose for children, how much he knows about computers, how much time he lets children work with computers, whether he supports group work or not"

Beliefs about Practice:

(a) What Would Instructors Like to See in Early Childhood Settings?

Examining the interview data about instructors' beliefs about the value of computers, it was found that they had different beliefs about computer in early childhood education settings. This is revealed in the following sample of quotes:

"... I would like to see that every 1st and 2nd grade classrooms have may be three or four computers that are also internet ready. ... I would like to see teachers have sufficient knowledge about computers and computer programs, and also teachers walking around the class interacting with different groups of children. ..." (Interview with Instructor B)

"... I would like to see teachers really take the ability of computers seriously to individualized different kinds of instructions, and have the ability to demonstrate to the children how they can use computers as a source of information. ..." (Interview with Instructor C)

"... Teachers who want to use them and know how to do it well can use them, but equally teachers who do not want to use them can do a good a job without them. You can be a good teacher with them or without them. It is just a tool like anything else. ..." (Interview with Instructor A)

The most interesting thing in these findings is that each of the instructors emphasizes the importance of the teacher's role facilitating of computer use in the classrooms. How they differ is in what they want or require of the teacher. Instructors B and C want the teachers to be knowledgeable and strong facilitators, individualizing instruction as needed, interacting with children who are using the computers as a tool in groups. Instructor A mirrors part of the sentiment expressed by Instructor B, stated earlier, that the computer is a tool. He differs from Instructor B, however, in that she feels that those teachers who do not use this tool can do their jobs as well as those who do; i.e., she does not feel computers are essential.

(b) What Would Instructors Like to See Taught in Early Childhood Teacher Education at the College Level?

Unlike their beliefs about practice in early childhood education settings all three of the instructors were very similar in their wishes about what they would like to see taught in early childhood education at the college level. They all wanted early childhood education college students have some experiences in using whatever the current programs are, in searching the world wide web for information, and they want students to know how to use certain kinds of software, and to be prepared to critically examine its usefulness. They want them prepared to be able to select appropriate technology tools for the children in their classrooms, and to understand the importance of staying current – knowing what is the newest and latest and what experts have said about its value. But, on the other hand, Instructor A mentioned that early childhood education college students should decide themselves how much they need to know and learn according to their own teaching style.

Conclusions

This researcher confirmed the findings of Haugland and Wright (1997), who examined the beliefs about the potential dangers and benefits of computers. Haugland and Wright found that some of the early childhood education professionals that they studied fear that computers will replace other activities and may lead to social isolation; while, on the other hand, computers may provide children a wide world to explore, experiment and discover. These findings echo those of the beliefs expressed by Instructors A, B, and C in this study.

It is widely accepted philosophy in the early childhood field, that through active participation, children acquire and construct knowledge. Therefore, before using computers with young children it is important to address the potential effects of computer use on children's development and learning. There have been many debates regarding the potential dangers and benefits of computers in early childhood classrooms, but too few scholars have actually examined prevailing attitudes and beliefs of teachers in the classroom and of those who prepare teachers.

We need to research what new early childhood teachers, recent graduates from college, implement in their early childhood classrooms. Ultimately, we then must examine how the perspectives affect development and learning outcomes with young children. As pointed out by Davis and Shade (1994), despite revolutionary advances in the field of educational computing, technology remains simply a tool, and potentially powerful and stimulating, the computer is only an inert object that can never be a substitute for the personal touch of the classroom teacher. The critical thing is how teachers implement computer use in their school.

It is critical that we pay attention to the results of this study and others that examine the teacher educators. It is the first window through which we see what future teachers may implement in early childhood programs.

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Using Technology in the Primary Grades: An Innovative Educational Pocket PC Project

Grey Hall, East Carolina University, US
Renee Gilpin, Newport Elementary School, US

The playing field in our nation's public schools is not level and East Carolina University (ECU) and Newport Elementary are collaborating to change that. All students need access, at home and at school, to the tools necessary to allow them the freedom to academically compete with their classmates, regardless of race or socioeconomic background. School leaders need new technological, pedagogical and financial models to make the field as level as possible. Parents and teachers must be part of a communications team to support student achievement. All children must be given an equal chance. The fact that some have more financial resources does not mean they should have a monopoly on essential learning tools.

Many students lacking financial resources do not have necessary technology in their homes. Small and rural schools do not have proper digital equipment in their classrooms. Students negatively affected by this lack of resources are part of America's rapidly developing digital divide. Their work is often inferior to those who have access to tools supporting content mastery. Without innovative, knowledgeable intervention by school leaders this situation will manifest itself as low scores on local and national standardized tests intended to measure student progress and academic accountability.

Methodology will be both quantitative and qualitative. Standard instruments will be used to quantitatively measure student progress in mastery of technology and curriculum content. Technological, pedagogical and financial models will be constructed before the study begins and modified as necessary. More subjective qualitative measurements will be use for parental assessment of the pilot.

A grant has been procured to purchase the necessary technology. The teacher, her assistant and selected school leaders have been given Jornadas and are being trained to use them. Kick-off meetings have been held with central office, school personnel, university officials, students and their parents/guardians.

In October, 2001 each student will be given a Jornada equipped with electronic reader, software for word processing, spreadsheet application, email, Internet access capability, a calculator and scheduling/tasking packages for homework and communication with parents. Students will be tested at that time for knowledge of the technology and content related to the North Carolina Standard Course of Study in the areas of reading and writing.

In November, or whenever the teacher believes a pre-determined level of mastery has been met, students will be retested on their knowledge of the technology, and on their mastery of reading and writing. This testing, intervention and retesting will repeat throughout the school year, moving to different content areas once a pre-selected level of mastery is achieved.

Parents will be expected to nightly review a folder on the Pocket PC reserved for them and to stay informed of students' progress. They will also be required to assess the project. The second graders in this study will be measured against norms established by all second graders in the school. Data will be gathered and analyzed in the late spring and early summer of 2002 and a final report will be produced.

Using Technology to Support Preschool Teachers' Professional Development

Julie Hirschler, Education Development Center, Inc, US
Carol Darcy, Education Development Center, Inc., US

Background and Educational Importance

The recent National Research Council's report, Preventing Reading Difficulties, highlights the urgent need for more effective literacy education for preschool programs that serve low-income children. Indeed, our own research has provided deeper insight into the source and extent of the problem. In our study of 42 Head Start classrooms, we found that teachers are minimally knowledgeable about using books correctly, in supporting early writing, and in engaging in intellectually stimulating conversations with children. When teachers are trained in these areas, they do show marked improvements in the quality of programs and in outcomes for children. However, typical professional development is characterized by episodic workshops or lectures that do not reflect research-based knowledge. In addition, early childhood educators have constraints on their time and resources that are not alleviated by traditional professional development opportunities.

Education Development Center, Inc, Newton, MA, a non-profit international research and development, has piloted and is implementing an technologically-enhanced in-service course for early childhood educators that is constituted of 1) two-way television, 2) web participation, and 3) face-to-face facilitated group discussions. In its first operational year, we are offering two sections of the course from the University of Massachusetts, Lowell to six sites in Massachusetts, Connecticut, North Carolina.

This presentation will explore the results of implementing this multi-technology inservice course for teachers. In doing so, it will attempt to answer the following questions:

1. Do participants stay focused and engaged throughout the interactive television sessions?
2. Do participants feel as comfortable contributing to the interactive television discussion as they would during a typical large class?
3. Do participants use the web to help them communicate with other class participants?
4. Do participants use the web to help them learn the class material?
5. Do participants use the web to get new resources or ideas to use their classroom?

Description of the Project

The project, the *Technologically-Enhanced Learning Environments Enrichment Program (T-LEEP)*, includes both course delivery and a research study that examines how preschool teachers and supervisors respond to the use of technology to support their professional growth. The project is being supported by a grant from an interagency consortium of the National Science Foundation, the United States Department of Education, and the National Institutes of Health. Their goal is to develop the knowledge and experimental methods that will allow for the implementation and evaluation of large-scale educational interventions, which will, in turn, inform education policy and practice.

We believe that the integration of technologies adds to the value of professional development for our early childhood teacher participants. Through our course design, we are able to:

- Reach practitioners in geographically diverse locations, minimizing transportation and tie costs.
- Offer opportunities to view model classroom via CD/web augmentation and analyze pedagogy with practitioners during ITV sessions.
- Provide online discussion of course content and online assistance

- Introduce practitioners to interactive instruction and web-based technologies that can strengthen and widen their communities of practice.

To most effectively support our participant teachers, we have created a new model: the *Instructional Videoconference*. This consists of 1) a one hour face-to-face professional conversation among participants at each local site. During this conversation, participants share information about classroom assignments and are introduced to the content of the ITV session to follow 2) the two-hour ITV session and 3) a shorter face-to-face session that follows ITV during which participants expand on questions from the ITV and discuss the classroom assignments for the following weeks. These three modes of instruction have been modeled into a whole whose pieces fit together in the interest of making positive changes in child learning outcomes and teacher practices in early childhood classrooms.

Instructors have developed new Power Point presentations with imbedded videos of model classrooms for analysis during the ITV classes. Several interactional techniques are employed by ITV instructors to increase the cross-site interactions during ITV sessions.

The T-LEEP website complements the ITV portion of instruction and interaction by allowing teachers to do more in-depth literacy work around case studies. Part of each participant's weekly assignment is to log in and post to the discussion board on our website. Because we want to have ITV instructors accessible to students, we have created an Instructor Office Hours section of the website in which students may pose questions directly to the teachers.

Data Collection

Participants complete a survey after each of the ten sessions of the course. After half of the sessions, this is limited to a six-question survey. An extended questionnaire is completed after other sessions in order to collect data on cumulative perceptions of the course and pedagogical practices it is supporting.
At the final session, participants complete a much more extensive standardized questionnaire that gauges their perception of the teaching environment. In including such an evaluation instrument, we hope to compare participants' perceptions of the classroom environment in a technologically-enhanced classroom setting to that in a more traditional classroom.

Web activity will be monitored throughout the course as well to allow us to analyze participants' use of the various layers of our website and to follow the discussion strands based on course content.

We will conduct telephone interviews with a subsample of participants and with the site facilitators to gain qualitative data. These individual interviews will be designed, conducted, and recorded in order to create a format in which stakeholders can be free to explore the meaning of events in this course. Questionnaire and interview analyses will then be conducted to allow for new and fuller understanding of the use of technology in inservice education.

Computer Use Within Learning Environments: Early Childhood Case Study

Sylvia S. Martin
Special Education
University of Houston-Clear Lake
United States of America
martinsy@cl.uh.edu

Randy L. Seevers
Special Education
University of Houston-Clear Lake
United States of America
seevers@cl.uh.edu

Caroline M. Crawford
Instructional Technology
University of Houston-Clear Lake
United States of America
crawford@cl.uh.edu

Abstract: This exploratory study investigated a seeming disparity between availability and types of computer use within childcare settings and preschool programs for children with disabilities as reported by families of young children with disabilities. Investigators surveyed a random sample of special education teachers and child care administrators. Results indicate: (a) child care setting environments may provide more and varied opportunity for computer use by preschool children, and (b) the availability and implementation of technology within the learning environments for young children warrants further investigation.

Introduction

The benefits of technology use in special education and young child education is well documented in reviews of the literature (Edyburn, 2001; Blackhurst & Edyburn, 2000; Woodward & Reith, 1997; Okolo, Bahr, & Reith, 1993). Although there is an assumption that early childhood special education teachers have computers in their classroom or access to computers, anecdotal reports from teachers indicated a lack of technologically enhanced learning environment opportunities for children with disabilities. The disparity between the education the teachers receive at the university level and the lack of technology available at the early childhood level leads towards a lack of educational tools at an important stage of development (Crawford & Martin, 2001). Anecdotal reports by families of young children with disabilities commented on the lack of technology in their child's classrooms and the availability of technology in after school childcare programs. This study investigated a seeming disparity between the availability and types of use of computers within the child care settings and preschool programs for children with disabilities.

Method

Data for this exploratory pilot study were collected by phone survey. Special education teachers were selected randomly from graduates of the university teacher preparation program and administrators of child care centers were selected randomly from the phone directory yellow pages. Interviewees were surveyed until a pool of ten special education teachers and ten child care administrators met the following qualifications: Children with and without disabilities aged 3-5 years were present in the setting and computers were available for child use. Interviewees were then asked six questions:

1. Do you have computers for the children to use?

2. Do the children use computers with adult assistance?
3. Do the children use computers with peers/a friend?
4. Do the children use computers independently?
5. Do you have software you consider to be for play?
6. Do you have software you consider to be for drill and practice of skills?

In total fourteen teachers of young children with disabilities were contacted. Four were excluded because of lack of computer access for the children. Two childcare settings were also excluded because computers were for the use of staff only. In total twelve childcare centers were contacted and two were eliminated for lack of computer access for the children.

Findings

Findings of this exploratory study to determine a possible disparity between preschool instructional environments for children with disabilities and child care center environments support anecdotal evidence that child care settings provide more and varied opportunity for computer use by young children. Results are presented in Table 1. Implications of this study are limited by sample size, convenience sample of teachers, and self report data. However, findings indicate a need for future studies on the availability of computers and actual computer use by young children in child care and in classroom settings.

Table 1
Frequency of Responses on Computer Use by Young Children

	Classroom Setting		Childcare Setting	
Question	yes	no	yes	no
1. for child use	7	3*	10	0
2. with adults	7	3	5	5
3. with a peer	1	9	8	2
4. independent	4	6	8	2
5. play software	3	7	8	2
6. skills software	4	6	4	6

* software available will not run on the outdated computers

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Using Technology to Support Student Learning

Staci Noecker
School of Education
Box 1249
St. Bonaventure Unversity
St. Bonaventure, NY 14778
noeckesl@sbu.edu

Abstract: This poster/demo session will present plans and outcomes from a variety of technology-enhanced learning experiences in elementary classrooms. I will provide examples of how technology can be used within all different subject areas and how technology can be used to meet the needs of diverse learners. My demonstrations would include lessons, student and teacher reflections, and student and teacher artifacts of some of the many ways to use technology in the classroom.

To demonstrate my application of technology in the classroom as a leaning tool for students during internships and student teaching, I plan to display a variety of examples of what my students and I have been working on. I will provide examples of how technology can be used within all different subject areas and how technology can be used to meet the needs of diverse learners. My demonstrations would include lessons, student and teacher reflections, and student and teacher artifacts of some of the many ways to use technology in the classroom.

I have many ideas in which I would demonstrate incorporating technology into all subject areas. I would show how the software programs *Inspiration*, *Kidspiration*, *Easy Book Deluxe*, and *Hyperstudio* could be incorporated into lessons for every subject area. I would also demonstrate how a digital microscope brings science alive for students. The program *Timeliner* would also be presented as a wonderful learning tool with many options for students and teachers. I would show the digital slide show that I created using *Timeliner* and the class yearbook that I created using *Kidspiration* and a digital camera. I would also present my electronic portfolio and a *HyperStudio* stack on ladybugs.

For each example that I present, I would show how the teacher and students are able to use this technology to support their work. I would also present ways in which every student could benefit from this form of technology. This poster/demonstration I would allow me to present my knowledge of how to incorporate technology into student learning and it would allow me to learn great ideas of how other educators inspire children through this new and exciting way of teaching.

BEYOND DRILL AND KILL: APPROPRIATE WAYS TO INCORPORATE TECHNOLOGIES WITH K-2

Nancy Yost
University School
Indiana University of Pennsylvania
United States
njyost@iup.edu

Abstract: This paper looks at additional ways to incorporate technology into an early childhood classroom beyond drill and practice software. Several peripherals are examined giving purchasing information, an overview of the basic mechanics of the item, plus examples of how the item can be incorporated into an early childhood classroom. The IntelPlay microscope and desktop cameras are discussed. The paper also looks at incorporating appropriately software like Kidspiration, websites, digital cameras, and PowerPoint.

The pros and cons of the appropriate use of technology with young children is still debated. In my mind the issues lie around how the technology is being utilized with the children. There are so many items available it is becoming easier and easier to look at appropriate, hands-on ways to utilize the technologies with children. This paper will look at several options utilizing peripherals, software, websites, and additional technologies.

Over the last three years, Intel and Mattel have partnered to create new technologies specifically for children. The new venture, IntelPlay (http://www.intelplay.com), currently has four products:

QX3 Microscope
Movie Creator
Sound Morpher
Me2Cam

I have had personal experience with three of the four products. I am sold on the use of two of them for classrooms. The microscope and movie camera are excellent tools for young children to explore and utilize. The microscope allows the children to examine specimens at three magnification levels. The children can take snapshots of the specimens or create movies of the specimen. The microscope comes with a camera that allows the children to further manipulate the specimen with a paint program. Any activity that involves a microscope can be carried out with this tool. One of the benefits I have found is that it allows multiple viewers of the image, since it displays on the computer monitor.

The second item, Movie Creator, allows the children to explore using a movie camera that is scaled to their size. The children look through an eyepiece to see the actual image being photographed. The use of an eyepiece, instead of an LTD, actually assists in the steadying of the camera for the young hands. Again, excellent software allows the child to manipulate the image further. This camera allows even kindergarten children to operate it successfully. Both are relatively inexpensive at around $100 each.

Another tool that I have found beneficial is the "Flip-Chart" from Mimio (http://www.mimio.com). This hardware plugs in to a USB port and attaches to the standard flip chart. This allows teachers to save the chart work to a graphic that can be altered or shared with parents in a newsletter. This can be a great timesaver for an early childhood teacher. You can save all the chart work to a smaller, readable size without taking up the wall space that a chart paper will. This allowed me to keep work and revisit it when desired, or to print the work to send home to parents. Mimio has text conversion software that I have not invested in at this time, but intend to soon. I believe that this will further increase the desirability of this peripheral.

I have used an inexpensive desktop videoconference camera that can be incorporated in to centers for the children to interact with and explore. The children have used the camera in a dramatic play center as they explored being meteorologists in a television studio. The software with my Kodak camera is easy for the children to manipulate. They have been successful at creating both still and video pictures. The still images can be inserted into printed documents to share with family and friends. Both file formats can be emailed to others. The videos from this camera have been used in several PowerPoint books created with the children. The camera has held up well to classroom use, the current camera has been used for three school years. A little word of advice is to attach the camera to a tripod for better stability, fewer falls seem to occur this way.

I have used digital cameras for several years for a variety of activities. I have had reservations over allowing the children to operate the $800 Sony with out close supervision. However, a low-end Polaroid digital camera, less than $50, has been effective. Yes, I did sacrifice the quality of the pictures some, but the ease of mind is better. The pictures are a little more cumbersome for the children to retrieve also. But the children can be more autonomous in the use of the camera. They take pictures of their finished block structures and manipulative projects to print and take home.

Software like Kidspiration has gone a long way to encourage children to interact with computers as a tool. This program assist teachers in creating activities for the children to interact with that relate to the current topics of discussion in the classroom. Kidspiration will read the directions to the children, assisting them in recalling what they are to do. Story maps can be created, or whole stories can be written and read back to the children.

An old stand by, but little used in the United States, is the Roamer. This round dish like robot allows children to begin exploring programming. The children use the touch pad on the top and tell the Roamer what direction to go, for how long, and even play music as it goes. The children can create roads for the Roamer, or insert a pen to have the Roamer write their names. While the Roamer is an excellent tool, it is rather expensive at $300 for a basic start up.

Websites need to be explored in advance of using them with children but can be a great addition to the early childhood programs. When discussing dinosaurs and how scientists dig for the fossils, a documentary website on a dinosaur dig was very helpful. The children were able to see photographs of an actual dig, increasing their understanding of what is involved and what a site looks like (http://tccsa.freeservers.com/adventure/dig.html). During this same unit, children researched individual dinosaurs using information from ZoomDinosaurs.com. Weather cam websites provide the children with a look at what the world outside our small community. During a unit on castles, websites were located that allowed the children to see castles in different locations. Frequently children think of castles as being only the British versions found in fairytales. Because of a high level of diversity in the classroom, we located sites to look at castles in the countries that the children had come from. It was interesting for everyone to learn about castles in Thailand, Korea, China, India, and Egypt. This certainly added a new level to our study.

Monarch Watch (http://www.monarchwatch.org/) was beneficial during our fall monarch study. The information on the site helped the children understand about the migration of the butterflies and the importance of the milkweed to the caterpillar development.

Using image search engines at AltaVista and Google provide the children with the visual images that are frequently missing. It is potential to answer questions immediately thanks to these engines. When reading dinosaur stories and a new dinosaur is named, we search for a picture to learn what it looked like. A child wanted to study mailboxes was able to see a large variety of them through these searches.

Authors' websites allow the children to get to know more about authors and their work. Some authors have activities for the children to explore or printables for them to work with. Jan Brett, (http://www.janbrett.com), probably has one of the richest websites to support her work. Most of the sites have email contact for the author also.

I have used PowerPoint with kindergarten children for 5 years. We have made many multimedia books and projects. These are done as extensions of projects currently going on in the classroom. The books frequently include drawings done by the children, video clips or audio clips. In addition to supporting emergent readers and writers, I have used it as a tool to evaluate students' knowledge at the end of a study.

These are just a sampling of the many items available to support appropriate, hands-on ways to utilize the technologies with children. The quality of items and types of activities have improved every year and will continue to increase young children's ability to use technology in appropriate ways.

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SOCIETY FOR INFORMATION TECHNOLOGY & TEACHER EDUCATION

MEMBERSHIP INFORMATION

Advancing Instructional Technology in Teacher Education

www.aace.org/site

SOCIETY FOR INFORMATION TECHNOLOGY AND TEACHER EDUCATION (SITE)

Mission

The Society for Information Technology and Teacher Education is an international association of individual teacher educators, and affiliated organizations of teacher educators in all disciplines, who are interested in the creation and dissemination of knowledge about the use of information technology in teacher education and faculty/staff development.

The Society seeks to promote research, scholarship, collaboration, exchange, and support among its membership, and to actively foster the development of new national organizations where a need emerges. SITE is the only organization that has as its sole focus the integration of instructional technologies into teacher education programs.

SITE promotes the development and dissemination of theoretical knowledge, conceptual research, and professional practice knowledge through the SITE conference, books, collaborative projects with other organizations, and the *Journal of Technology and Teacher Education.*

SITE (founded in 1990) is a society of the Association for the Advancement of Computing in Education (AACE). AACE (founded in 1981) is an international, educational, and professional organization dedicated to the advancement of the knowledge, theory, and quality of learning and teaching at all levels with information technology.

Executive Committee
President: Niki Davis
Past President: Ann Thompson
Founders: Jerry Willis & Dee Anna Willis
Journal Editor: Debra Sprague
Executive Director: Gary Marks
Global Liaison: Michelle Selinger

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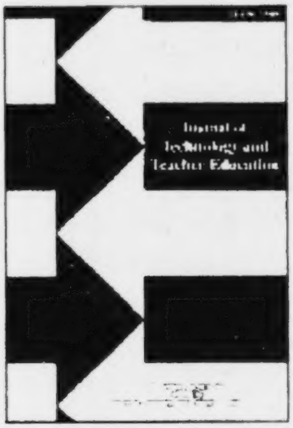
JOURNAL OF TECHNOLOGY AND TEACHER EDUCATION

www.aace.org/pubs/jtate



This official journal of SITE serves as a forum for the exchange of knowledge about the use of information technology in teacher education. Journal content covers:

- preservice and inservice teacher education,
- graduate programs in areas such as curriculum and instruction,
- educational administration,
- instructional technology, and
- educational computing.

Content categories include:

- Research Papers,
- Evaluations,
- Experimental Studies,
- Tutorials,
- Case Studies,
- Courseware Experiences,
- Opinions, and
- Qualitative Studies.

A quarterly subscription to *JTATE* is included with SITE membership.

SITE ELECTRONIC JOURNAL

www.citejournal.org

CITE
CONTEMPORARY ISSUES IN TECHNOLOGY & TEACHER EDUCATION

Contemporary Issues in Technology and Teacher Education (CITE) is an electronic publication of the Society for Information Technology and Teacher Education (SITE), established as a multimedia, interactive electronic counterpart of the *Journal of Technology and Teacher Education.* Funded by a U.S. Department of Education Preparing Tomorrow's Teachers to Use Technology (PT3) catalyst grant, *CITE* makes possible the inclusion of sound, animated images, and simulation, as well as allowing for ongoing, immediate dialog about theoretical issues.

Subscriptions are at no cost due to a PT3 grant from the U.S.A. Department of Education

CITE includes three major categories of articles

- **Current Issues** include more theoretical discussions of technology and teacher preparation.
- **Current Practices** provide shorter, up-to-the-minute snapshots of technology in practice.
- **Seminal Articles** include previously published "classic" articles that have advanced the discussion of technology and teacher education.

Articles address technology and teacher education, assessment, attitudes, beliefs, curriculum, equity, research, translating research into practice, learning theory, alternative conceptions, sociocultural issues, special populations, and integration of subjects.

Current Issues Articles

The respective professional societies for each of the following disciplines have sole responsibility for editorial review of Current Issues articles in their discipline:

- **Science Education** - Association for the Education of Teachers in Science (AETS)
- **Mathematics Education** - Association of Mathematics Teacher Educators (AMTE)
- **English Education** - Conference on English Education (CEE)
- **Social Studies Education** - National Council of Social Studies College and University Faculty Assembly (CUFA)
- **General** – Society for Information Technology and Teacher Education (SITE)

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SOCIETY FOR INFORMATION TECHNOLOGY & TEACHER EDUCATION 2003

14TH INTERNATIONAL CONFERENCE

www.aace.org/conf/site

You are invited to attend and participate in this annual international forum to share your ideas, explore the research, development, and applications, and to network with the leaders in this important field of teacher education and technology. There are over 1000 presentations in 31 major topic areas!

Scope

The SITE Conference includes Keynote & Invited Speakers, Paper and Panel presentations, Tutorials/Workshops, Posters/Demonstrations, Institutional and Interactive Sessions, Mentor Meetings, a Video Festival, Corporate Demos, and Roundtables from the introductory through advanced levels on all topics related to:

(1) the use of information technology in teacher education, and

(2) instruction about information technology in
- Preservice
- Inservice
- Graduate Teacher Education
- Faculty & Staff Development

The SITE International Conference is designed for:
- Teacher educators in ALL disciplines
- Computer technology coordinators
- K-12 Administrators
- Teachers
- Curriculum developers
- Higher education leaders
- IT service providers to teacher education
- All interested in improving education through technology

Join Us at Next Year's SITE Conference

March 24-30, 2003 • Albuquerque, New Mexico USA

www.aace.org/conf

JOIN SITE TODAY!

You are invited to join SITE and receive the following benefits of professional membership. And, as a member of SITE, you automatically become of member of the Association for the Advancement of Computing in Education (AACE).

Benefits of SITE/AACE membership:
- Subscription to the *Journal of Technology and Teacher Education*
- Subscription to the member periodical, *Educational Technology Review*
- SITE Conference registration discounts
- Early announcements on Calls for Papers and CITE electronic journal issues
- Discounts on all other AACE journals and conference proceedings
- Opportunities to work and collaborate with members on activities in areas of common interest and concern

Professional Membership: $85 (US); $100 (non-US)

Student Membership: $45 (US); $60 (non-US)

To join SITE/AACE, see
www.aace.org/membership/join.htm

International Headquarters:
SITE/AACE
PO Box 3728
Norfolk, VA 23514-3728 USA
Tel: 757-623-7588
Fax: 703-997-8760
E-mail: info@aace.org

AACE *Estab. 1981*

Association for the Advancement of Computing in Education

Advancing Knowledge & Learning
with Information Technology Worldwide

PO Box 5728 ■ Norfolk, VA 23514-5728 USA

Non-Profit Organization
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SITE Conference Proceedings

The SITE conference proceedings are published annually and each contains over 800 papers presented at the SITE conference. These volumes serve as major source documents for research work and indicate the current state of teacher education and information technology.

Proceedings for several years are available on CD as well as online at:

www.aace.org/conf/site

SITE Position Paper: Statement of Basic Principles & Suggested Actions ('Ames White Paper')

The SITE Position Paper known as the "Ames White Paper" was developed at Iowa State Univ. in response to a request from Linda Roberts, and presented at the "White House Conference on Technology Training for Teachers" in Washington, D.C. on April 24, 1998. The recommendations flowing from this conference provided the impetus for the subsequent "Preparing Tomorrow's Teachers to Use Technology" initiative.

www.aace.org/site/SITEstatement.htm

AACE *Estab. 1981*

Association for the Advancement of Computing in Education

Advancing Knowledge & Learning
with Information Technology Worldwide

Publications

- Journal of Technology and Teacher Education
- International Journal on E-Learning
- Journal of Computers in Mathematics and Science Teaching
- Journal of Interactive Learning Research
- Journal of Educational Multimedia and Hypermedia
- Information Technology in Childhood Education Annual
- Educational Technology Review (electronic)
- Contemporary Issues in Technology and Teacher Education (electronic)

Conferences

SITE – Society for Information Technology & Teacher Education International Conference
March 24-30, 2003; Albuquerque, NM USA

ED-MEDIA – World Conference on Educational Multimedia and Hypermedia & Telecommunications
June 24-29, 2002; Denver, Colorado USA
June 23-28, 2003; Honolulu, Hawaii USA

E-Learn – World Conference on E-Learning in Corporate, Healthcare, Government, and Higher Education
October 15-19, 2002; Montréal, Canada

ICCE – International Conference on Computers in Education (Asia-Pacific Chapter)
December. 3-6, 2002; Auckland, New Zealand

www.aace.org

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Association for the Advancement of Computing in Education

Membership Information • Conferences • Publications

Invitation to Join

The Association for the Advancement of Computing in Education (AACE) is an international, non-profit educational organization. The Association's purpose is to advance the knowledge, theory, and quality of teaching and learning at all levels with information technology. This purpose is accomplished through the encouragement of scholarly inquiry related to technology in education and the dissemination of research results and their applications through AACE sponsored publications, conferences, and other opportunities for professional growth.

AACE members have the opportunity to participate in topical and regional divisions/societies/chapters, high quality peer-reviewed publications, and conferences.

Join with fellow professionals from around the world to share knowledge and ideas on research, development, and applications in information technology and education. AACE's membership includes researchers, developers, and practitioners in schools, colleges, and universities; administrators, policy decision-makers, professional trainers, adult educators, and other specialists in education, industry, and government with an interest in advancing knowledge and learning with information technology in education.

Membership Benefit Highlights

- *Gain professional recognition by participating in AACE sponsored international conferences*
- *Enhance your knowledge and professional skills through interaction with colleagues from around the world*
- *Learn from colleagues' research and studies by receiving AACE's well-respected journals and books*
- *Receive a subscription to the Professional Member periodical* Educational Technology Review [electronic]
- *Receive discounts on multiple journal subscriptions, conference registration fees, proceedings books & CD-ROMs*

AACE

Association for the Advancement of Computing in Education

www.aace.org

Advancing Knowledge and Learning with Information Technology

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AACE Journals

Abstracts for all journal issues are available at www.aace.org/pubs

Educational Technology Review – Electronic Journal

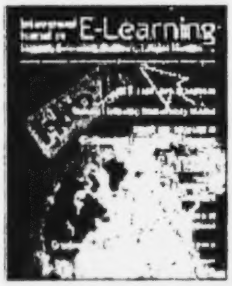
Educational Technology Review
International Forum on Educational Technology Issues & Applications

AACE's member journal is the focal point to exchange information between disciplines, educational levels, and information technologies. Its purpose is to stimulate the growth of ideas and practical solutions which can contribute toward the improvement of education through information technology.

International Journal on E-Learning

(formerly WebNet Journal & International Journal of Educational Telecommunications)

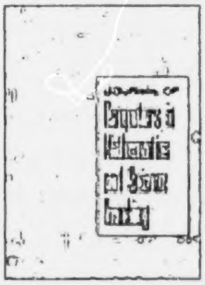
(IJEL) ISSN# 1537-2456 Quarterly



IJEL serves as a forum to facilitate the international exchange of information on the current theory, research, development, and practice of E-Learning in education and training. This journal is designed for researchers, developers and practitioners in schools, colleges, and universities, administrators, policy decision-makers, professional trainers, adult educators, and other specialists in education, industry, and government.

Journal of Computers in Mathematics & Science Teaching

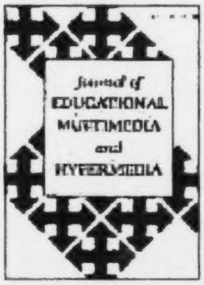
(JCMST) ISSN# 0731-9258 Quarterly



JCMST is the only periodical devoted specifically to using information technology in the teaching of mathematics and science. The *Journal* offers an in-depth forum for the exchange of information in the fields of science, mathematics, and computer science.

Journal of Educational Multimedia & Hypermedia

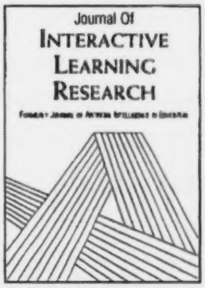
(JEMH) ISSN# 1055-8896 Quarterly



Designed to provide a multidisciplinary forum to present and discuss research, development and applications of multimedia and hypermedia in education. The main goal of the *Journal* is to contribute to the advancement of the theory and practice of learning and teaching using these powerful and promising technological tools that allow the integration of images, sound, text, and data.

Journal of Interactive Learning Research

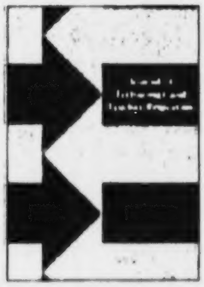
(JILR) ISSN# 1093-023X Quarterly



The *Journal's* published papers relate to the underlying theory, design, implementation, effectiveness, and impact on education and training of the following interactive learning environments: authoring systems, CALL, assessment systems, CBT, computer-mediated communications, collaborative learning, distributed learning environments, performance support systems, multimedia systems, simulations and games, intelligent agents on the Internet, intelligent tutoring systems, micro-worlds, and virtual reality based learning systems.

Journal of Technology and Teacher Education

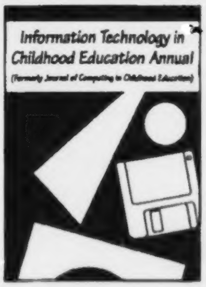
(JTATE) ISSN# 1059-7069 Quarterly



A forum for the exchange of knowledge about the use of information technology in teacher education. *Journal* content covers preservice and inservice teacher education, graduate programs in areas such as curriculum and instruction, educational administration, staff development, instructional technology, and educational computing.

Information Technology in Childhood Education Annual

(ITCE) ISSN# 1522-8185



A primary information source and forum to report the research and applications for using information technology in the education of children – early childhood, preschool, and elementary. The annual is a valuable resource for all educators who use computers with children.

AACE Conferences

Details for conferences are available at **www.aace.org/conf**

The exchange of ideas and experiences is essential to the advancement of the field and the professional growth of AACE members. AACE sponsors conferences each year where members learn about research, developments, and applications in their fields, have an opportunity to participate in papers, panels, poster/demonstrations and workshops, and meet invited speakers.

ED-MEDIA 2002

World Conference on
Educational Multimedia,
Hypermedia & Telecommunications

JUNE 24-29, 2002
DENVER, CO USA

JUNE 23-28, 2003
HONOLULU, HI USA

ED-MEDIA - World Conference on Educational Multimedia, Hypermedia & Telecommunications

This annual conference serves as a multidisciplinary forum for the discussion of the latest research, developments, and applications of multimedia, hypermedia, and telecommunications for all levels of education.

E-Learn 2002

World Conference on E-Learning in Corporate,
Government, Healthcare, & Higher Education

OCTOBER 14-19, 2002
MONTREAL, CANADA

E-Learn 2002 - World Conference on E-Learning in Corporate, Government, Healthcare, & Higher Education

E-Learn is a respected, international conference enabling E-Learning researchers and practitioners in corporate, government, healthcare, and higher education to exchange information on research, development, and applications. This interdisciplinary dialogue is further supported by satellite events such as by the WebNet Symposium on the WWW and Internet.

SOCIETY FOR INFORMATION TECHNOLOGY & TEACHER EDUCATION 2003

14TH INTERNATIONAL CONFERENCE

MARCH 24-30, 2003
ALBUQUERQUE, NM USA

SITE - Society for Information Technology and Teacher Education International Conference

This conference, held annually, offers opportunities to share ideas and expertise on all topics related to the use of information technology in teacher education and instruction about information technology for all disciplines in preservice, inservice, and graduate teacher education.

Co-Sponsored Conferences

ICCE—International Conference on Computers in Education

ICCE is an annual event focusing on a broad spectrum of interdisciplinary research topics concerned with theories, technologies and practices of applying computers in education. It provides a forum for interchange among educators, cognitive and computer scientists, and practitioners throughout the world, especially from the Asia-Pacific region.

DECEMBER 3-6, 2002
AUCKLAND, NEW ZEALAND

Membership Application

Join today and keep up-to-date on the latest research and applications!

Name: ____________________

Address: ____________________

City: __________ State: ____ Code: __________ Country: __________

E-mail: __________ ☐ New Member ☐ Renewal Membership ID # __________

AACE Journals

Please check below the journal(s) you wish to receive:

- ☐ ***International Journal on E-Learning (IJEL)***
  (formerly WebNet Journal & International Journal of Educational Telecommunications (IJET)
- ☐ ***Jrl. of Educational Multimedia and Hypermedia (JEMH)***
- ☐ ***Jrl. of Computers in Math and Science Teaching (JCMST)***
- ☐ ***Jrl. of Interactive Learning Research (JILR)***
- ☐ ***Jrl. of Technology and Teacher Education (JTATE)***
  Includes membership in Society for Information Technology and Teacher Education (SITE)
- ☐ ***Information Technology in Childhood Education Annual (ITCE)***

Professional & Student Memberships

Annual membership includes a choice of AACE-sponsored journals, a subscription to *Educational Technology Review* (member electronic journal), discounts for conferences, proceedings books & CD-Roms and more.

Please check below the Journal(s)/membership(s) you wish to receive:

	Professional Membership	Student Membership*	
1 Journal	$ 85	$ 45	$ _____
2 journals	$140	$ 80	$ _____
3 journals	$195	$ 115	$ _____
4 journals	$250	$150	$ _____
5 journals	$305	$185	$ _____
All 6 journals	$360	$220	$ _____

*If you selected a Student Membership rate above, you must be registered full-time in an accredited educational institution and you must provide the following information:

Expected graduation date: __________

Educational Institution: __________

Non-U.S. postage: add $15 for shipping EACH Journal outside the U.S. $ _____

TOTAL $ _____

Library/Institutional Subscriptions

☐ *Int'l Jrl. on e-Learning (IJEL)*	$120
☐ *Jrl. of Educational Multimedia and Hypermedia (JEMH)*	$120
☐ *Jrl. of Computers in Math and Science Teaching (JCMST)*	$120
☐ *Jrl. of Interactive Learning Research (JILR)*	$120
☐ *Jrl. of Technology and Teacher Education (JTATE)*	$120
☐ *Information Technology in Childhood Education Annual (ITCE)*	$85
Non-U.S. postage: add $15 for shipping EACH Journal outside the U.S.	$ _____
TOTAL$	_____

Method of Payment (US Dollars)

Membership extends for 1 year from the approximate date of application. Please allow 6-8 weeks for delivery.

Enclosed: ☐ **Check** (U.S. funds & bank, payable to AACE)
☐ **Purchase Order** (PO must be included)

Credit Card: ☐ MasterCard ☐ VISA ☐ AMEX ☐ Discover

Card # |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|

Card Exp. Date |_|_| / |_|_|

Signature: __________

Total: $ __________

Return to: AACE, PO Box 3728, Norfolk, VA 23514-3728 USA
757-623-7588 Fax: 703-997-8760
E-mail: info@aace.org www.aace.org

AACE
Association for the Advancement of Computing in Education
PO Box 3728, Norfolk, VA 23514-3728 USA

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Permit #564

Current members:
Please give to a colleague

CALL FOR PARTICIPATION www.aace.org/conf/site

SOCIETY FOR INFORMATION TECHNOLOGY & TEACHER EDUCATION 2003

14TH INTERNATIONAL CONFERENCE

March 24-30, 2003
Albuquerque, New Mexico USA

Proposal deadline:
October 25, 2002

Authors notified:
November 19, 2002

Proceedings file due:
December 19, 2002

Early registration deadline:
February 13, 2003

PHOTO BY: GARY MARKS

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BOTTOM: LARRY MESS

- **Keynote & Invited Speakers**
- **Papers** • **Panels**
- **Tutorials & Workshops**
- **Institutional Sessions** • **Interactive Sessions**
- **Video Festival** • **Roundtables**
- **Posters/Demonstrations**
- **Corporate Showcases & Demonstrations**
- **PT3 Special Strand**

AACE Estab. 1981
Association for the Advancement of Computing in Education
Advancing Knowledge & Learning with Information Technology Worldwide

A CONFERENCE OF
AACE & SITE

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SITE 2003 INVITATION

14TH INTERNATIONAL CONFERENCE

SITE 2003 is the 14th annual conference of the Society for Information Technology and Teacher Education. This society represents individual teacher educators and affiliated organizations of teacher educators in all disciplines, who are interested in the creation and dissemination of knowledge about the use of information technology in teacher education and faculty/staff development. SITE is a society of the Association for the Advancement of Computing in Education (AACE).

SITE is unique as the only organization which has as its sole focus the integration of instructional technologies into teacher education programs. SITE promotes the development and dissemination of theoretical knowledge, conceptual research, and professional practice knowledge through conferences, books, projects, and the *Journal of Technology and Teacher Education*.

You are invited to attend and participate in this annual international forum to share your ideas, explore the research, development, applications, and to network with the leaders in this important field of teacher education and technology. There are over 1,000 presentations in 31 major topic areas!

The SITE 2003 Conference is designed for:

- **Teacher educators in ALL disciplines**
- **Computer technology coordinators**
- **K-12 administrators**
- **Teachers**
- **Curriculum developers**
- **Principals**
- **All interested in improving education through technology**

Scope

SITE 2003 includes the following:

- **Keynote & Invited Speakers**
- **Pre-Conference Tutorials/Workshops**
- **Papers & Panels**
- **Posters/Demonstrations**
- **Roundtable Discussions**
- **Institutional Sessions**
- **Video Festivals**
- **Interactive Sessions**
- **Corporate Demos**
- **SIG Discussions**

From introductory through advanced level on all topics related to:

(1) the use of information technology in teacher education, and
(2) instruction about information technology in

- **Preservice**
- **Inservice**
- **Graduate Teacher Education**
- **Faculty & Staff Development**

Information for Presenters

- All communication will be with the principal presenter who is responsible for communicating with co-presenters of that session.
- The conference will attempt to secure basic equipment needs for presenters, with the exception of poster/demonstration presenters. However, when equipment cannot be obtained, presenters will need to bring or rent equipment. The name of a rental firm can be provided.
- Presenters must pay the registration fee. Early registration fee will be approximately $295 (AACE members); $305 (non-members).

Proceedings

The Proceedings will be published by AACE in the *Technology and Teacher Education Annual* series. Proceedings in this series serve as major source documents indicating the current state of teacher education and information technology. The Annual will be available as a searchable electronic CD-ROM (Macintosh, IBM, and ISO 9660 formats) included in each conference registrant's packet. Proceedings papers also will be stored and available in the Technology and Teacher Education Digital Scholarship Portal. The Annual also may be purchased in hard copy book form.

Paper & Presentation Awards

All presented papers will be considered for Best Paper Awards within several categories. Award-winning papers will be invited to submit for publication in the *Journal of Technology and Teacher Education* and will be highlighted in the AACE online periodical *Educational Technology Review*. Outstanding presentations will be selected for awards in a variety of categories.

Hotel & Travel Arrangements

Conference special hotel room rates will be available to attendees. Special discount airfares will be available from a designated airline carrier.

Topics

- **Concepts & Procedures**
- **Corporate**
- **Distance Education**
- **Diversity**
- **The Educational Computing Course**
- **Educational Leadership**
- **Electronic Portfolios**
- **Faculty Development**
- **Fine Arts**
- **Graduate & Inservice Education**
- **Instructional Design**
- **International**
- **Mathematics**
- **New Media**
- **Partnerships across Organizations**
- **Preservice Teacher Education**
- **Preparing Tomorrow's Teachers to Use Technology**
- **Research**
- **Reading, Language Arts & Literacy**
- **Science**
- **Simulations**
- **Simultaneous Renewal of Organizations**
- **Social Studies**
- **Special Needs**
- **Technology Diffusion**
- **Theory**
- **Telecommunications: Graduate, Inservice & Faculty Use**
- **Telecommunications: Preservice Applications**
- **Telecommunications: Systems & Services**
- **Video Cases**
- **Young Child**

Highlighted:

PT3 (Preparing Tomorrow's Teachers to Use Technology) Strand

PT3 will showcase invited presentations and sessions of all types describing PT3 activities demonstrating and discussing research, development and applications in progress, to gain feedback and to establish connections with those engaged in similar activities.

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Submission Information

FULL PAPERS (25 min.)

Papers on all aspects of information technology and teacher education are invited. Accepted paper presentations will be published in the *SITE Conference Proceedings*.

BRIEF PAPERS (15 min.)

Brief Papers are more condensed presentations or work-in-progress projects and will be published as 2 pages in the *Proceedings* volume. There will be an award for Best Brief Paper.

TUTORIALS & WORKSHOPS (half-day)

Tutorials and Workshops are intended to enhance the skills and broaden the perspective of their attendees. They should be designed for learning a new area or to provide advanced training in an area.

Note that few workshops are selected because a lab of equipment is required for each. If you submit a workshop proposal, please indicate if your proposal is also appropriate for presentation as a non-hands on tutorial.

PANELS (1 hr.)

Panels will consist of at least four members presenting different aspects of a relevant issue and interacting with the audience to broaden the discussion.

INSTITUTIONAL SESSIONS (90 min.)

We invite teacher education programs and institutions to submit proposals for "Institutional Sessions." These 90-minute sessions will give you an opportunity to present innovative teacher education programs. Institutional sessions are informal presentations held in a poster/demo format with other institutional sessions.They should be more in the "show and tell" tradition with active participation by faculty and students. You may, however, submit a formal paper for institutional sessions that will be published in the Proceedings. **Presenters will be required to provide their own software and hardware.** Table, poster board, and electricity will be supplied.

INTERACTIVE SESSIONS (1 hr.)

This 1 hour will be shared time with 3 other interactive sessions in the same room. If you have mastered a new piece of software (or a new version) that others would be interested in learning about, submit a proposal for an interactive session. In that informal session you would demonstrate the software, illustrate the process of using it, show participants some of the complexities and tricks about it, and give them an opportunity to play with it themselves. These sessions are also appropriate for instructional strategies, procedures, and evaluation procedures such as portfolios. The idea is not to give a definitive workshop on the topic but to provide participants with enough information to help them decide whether their needs can be met with the program or procedure. Interactive Sessions can be supported by a paper published in the *Proceedings*.

Submission Requirements

Submit all proposals by following the submission guidelines and completing the form at:
www.aace.org/conf/site

Questions? Contact AACE at:
E-mail: conf@aace.org
Phone: 757-623-7588 • Fax:703-997-8760

VIDEO FESTIVAL (1 hr.)

The field has matured to the point that we have a growing number of video resources – cases, classroom video clips, and many other forms. Proposals for video festival entrants will be given 1 hour in the conference program. Presenters should have a short handout on the video and take most of the time showing the video. A prize for "Best Teacher Education Video" will be awarded at the end of the conference.

ROUNDTABLES (30 min.)

These sessions allow maximum interaction in informal, small-group discussions on a single topic. The format is appropriate for papers, projects, or work-in-progress that encourage discussion.

POSTERS/DEMONSTRATIONS (2 hrs.)

These sessions enable presenters to demonstrate and discuss research, development and applications in progress to gain feedback and to establish contacts. Presenters will be required to provide their own software and hardware. Table, poster board, and electricity will be supplied.

CORPORATE SHOWCASES 30 min.) & DEMONSTRATIONS (2 hrs.)

Demonstrate and discuss your company's products, services, developments, applications and research, inform the audience of your future directions, gain feedback, and establish contacts. Not included in the Proceedings.

Showcase Format: 30-minute presentation scheduled during concurrent sessions; Presentation rooms generally accommodate 50-150 people, theatre-style. This is more of a formal presentation than the Corporate Demonstration.

Demonstration Format: 2 hours; scheduled with Posters/Demonstrations grouped together in open exhibition-style, usually all in one hall. This is an informal event with a circulating audience. Sales are permitted: You may stock and sell your product at your table.

Corporate proposals must include a brief description (1 paragraph) of what you intend to present.

Preparing Tomorrow's Teachers to Use Technology (PT3)

The major USA initiative in our field is one of the conference's highlighted strands.

Preparing future teachers to use technology effectively to improve learning is a major challenge facing our nation's schools of education. Over the next decade about 2.2 million teachers must be recruited to replace retiring teachers and to accommodate student population increases. If our information technology investments are to pay off in improved education, these future teachers must be technology-proficient educators who know how to use these modern learning tools to help students meet high standards.

To meet this urgent need for technology-proficient teachers, the Preparing Tomorrow's Teachers to Use Technology (PT3) initiative is providing $75 million in grant support to 225 teacher education programs and consortia. Consult the PT3 web site at www.ed.gov/ teachtech for more information about this grant program.

The Society for Information Technology and Teacher Education (SITE) is working closely with the U.S. Department of Education and with the teacher education professional associations in core subject areas such as Mathematics Education, Science Education, English Education, and Social Studies Education.

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Albuquerque, New Mexico

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Albuquerque is a place where the views go on forever. From the Sandia Mountains you can look out over 15,000 square miles of magical landscape. And to the west, the Rio Grande snakes its way through the cottonwood-lined valley, silhouetting dormant volcanoes against fiery red sunsets.

Albuquerque's beguiling balance of big city convenience and rural charm has something of lasting value for everyone. Here the Old West meets the new frontier. Sip a malt on Route 66, try on some cowboy boots, watch an unforgettable sunset, take a tram ride, hike the Sandias, revisit the great atomic past or tour the silicon future. Delight in the dizzying blend of shops, industry, culture, arts and entertainment.

From the Sandias in the east to the dormant volcanoes out west, up and down the river, you'll be seduced by Albuquerque's rich character, mild weather, and unique place in history. In a city that's unpretentious and accessible, friendly and easy to negotiate, you'll enjoy our beautiful mountains, spiritual history, cultural diversity, urban funkiness, dynamic commerce and great blue skies.

Dining and Entertainment: A visit to Albuquerque is not complete without sampling authentic New Mexican cuisine. Looking for variety? You'll find international fare from every corner of the globe. You can have breakfast in an abuela's kitchen, lunch in a New York-style deli and dinner in "Thailand."

In Albuquerque's newly revitalized downtown, you can learn how to two-step or just listen to live music in one of the city's many nightspots. Other entertainment options include theater, dance, classical and rock concerts, and films.

Arts and Culture: You'll be amazed at the diversity of our performing arts. See a show at the historic Kimo Theatre, American Indian dances at the Indian Pueblo Cultural Center, Hispanic arts at the National Hispanic Cultural Center, or popular music at the outdoor Journal Pavilion. Popejoy Hall hosts world-class concerts and performances year-round.

For visual arts, browse the galleries of Old Town or the permanent and changing exhibits at the Albuquerque Museum. Try hands-on exhibits at !Explora! Science Center and Children's Museum of New Mexico, and see the stars at LodeStar Astronomy Center, part of the New Mexico Museum of Natural History and Science.

Shopping: Shop around in Albuquerque and you'll find a little bit of everything: from bargains, one-of-a-kinds, and secondhand to art, antiques, and even tepees. Albuquerque's three malls feature national chain stores, but it's the unique neighborhood specialty shops where you'll find treasures like American Indian and traditional Hispanic jewelry, pottery, weavings, paintings, carvings, clothes and furniture.

Recreation: With mild year-round weather, an average altitude of more than a mile, and mountains, rivers and lakes nearby, it's hard not to be active in Albuquerque. Try hang-gliding off the Sandias, snowboarding at Sandia Peak, rollerblading along the Rio Grande, or mountain biking through the West Mesa. Professional sports fans can enjoy Scorpions Hockey or horse racing at the Downs.

We invite you to join us in this dynamic modern city that embodies the Spirit of the West. Albuquerque – it's the place to be for SITE 2003!

Attractions:

Albuquerque is a city full of exciting attractions and events, from Historic Old Town, where the Villa of Albuquerque was founded in 1706, to the Kodak Albuquerque International Balloon Fiesta, the most popular ballooning event in the world. Be sure to check out these and other local attractions during your visit:

- **Historic Old Town** Discover the location of the original Spanish villa, famous for its restaurants, shops and galleries.
- **Petroglyph National Monument** Find over 17,000 lava-rock etchings carved by hunting parties over thousands of years.
- **Sandia Peak Tramway** Ride the world's longest continuous single-span tramway to Sandia's 10,378-foot peak.
- **Albuquerque Biological Park** Tour the Albuquerque Aquarium/Rio Grande Botanic Garden and Rio Grande Zoo in search of flora, fauna and fun!
- **Indian Pueblo Cultural Center** Discover the art, history and culture of the region's 19 American Indian Pueblos.
- **Kodak Albuquerque International Balloon Fiesta** Marvel as nearly 1,000 balloons take part in Mass Ascensions, Balloon Glows and Special Shapes Rodeos.
- **National Hispanic Cultural Center** Celebrate Hispanic arts and culture through compelling exhibits and performances.

Countless treasures await you beyond the city limits. Explore these attractions on your day off:

Turquoise Trail Travel this beautiful, scenic route from Albuquerque to Santa Fe.

Santa Fe Wander through the charming and sophisticated City Different, renowned for its first-class galleries and restaurants.

Acoma Sky City Visit the oldest continuously inhabited community in the United States, situated on a 356-foot sandstone mesa.

Bandelier National Monument Explore part of a 50-square-mile wilderness area, including miles of trails that lead to spectacular Ancestral Pueblo cliff dwellings.

For more information on Albuquerque, see: http://www.abqcvb.org

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